

# BLUE - Worksheet 1

Simplify these expressions:

1.  $x \times x = x^2$
2.  $3 \times 2x = 6x$
3.  $3x \times 4x = 12x^2$
4.  $3x \times 4y = 12xy$
5.  $3x \times 4y \times 2t = 24xyt$
6.  $x \times y = xy$
7.  $y \times x = xy$  or  $yx$
8.  $x \times y \times r = xyr$
9.  $3x \times 5y = 15xy$
10.  $3x \times 4y \times 10z = 120xyz$

**LOOK!**



Three boys ran in a race.  
Their total time was 24 minutes.  
Bill ran 3 minutes quicker than Peter.  
Michael ran 3 times quicker than Bill.  
Find the race times of each boy.

*Bill 9 minutes*

*Peter 12 minutes*

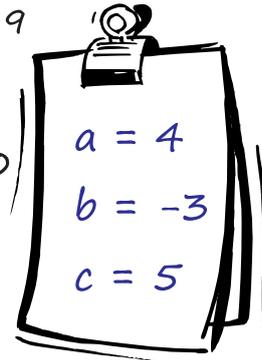
*Michael 3 minutes*

Simplify these expressions:

1.  $a + a$   
 $= 2a$
2.  $a + a + a$   
 $= 3a$
3.  $2a + 3a$   
 $= 5a$
4.  $3a - 2a$   
 $= a$
5.  $4a + 3a$   
 $= 7a$
6.  $3a + 2b + 2a$   
 $= 5a + 2b$
7.  $3a + 2b + a + 4b$   
 $= 4a + 6b$
8.  $5a - 3b - a + 2b$   
 $= 4a - b$
9.  $4a - 3b + 2a - 4b$   
 $= 6a - 7b$
10.  $6a - 3b - 3a - 5b$   
 $= 3a - 8b$

Substitute the values into the expressions.

1.  $c + b$        $5 + -3 = 2$
2.  $a + b - 2c$      $4 + -3 - 10 = -9$
3.  $4b$              $4 \times -3 = -12$
4.  $abc$              $4 \times -3 \times 5 = -60$
5.  $b - c$             $-3 - 5 = -8$
6.  $2a + 3b$         $8 + -9 = -1$
7.  $a - b$             $4 - -3 = 7$
8.  $5a - 2b$         $20 - -6 = 26$
9.  $ab - bc$          $-12 - -15 = 3$
10.  $ac - b$          $20 - -3 = 23$



### TEN QUICK QUESTIONS

Write the next 3 numbers in the sequences.

1. 2, 4, 6, 8, 10, 12, 14
2. 7, 10, 13, 16, 19, 22, 25
3. 21, 27, 33, 39, 45, 51, 57
4. 2, 4, 8, 16, 32, 64, 128
5. Simplify  $a + 2a + 3a$     6a
6. Simplify  $5a - 2a$         3a
7. Simplify  $2a \times a$          $2a^2$
8. Substitute  $a = 2$  into  $3a$  and evaluate.  
 $3 \times 2 = 6$
9. Simplify  $2a + 3b + 2a$     $4a + 3b$
10. Work out  $2(a + 3b)$  given that  $a = 4$ ,  $b = 2$ .  
 $2(4 + 6) = 20$

# BLUE - Worksheet 2

0 Substitute  $x = 6$  and  $y = 3$  then evaluate each expression. 0

1.  $3x$        $\underline{6 \times 3 = 18}$

6.  $3x - 2y$        $\underline{18 - 6 = 12}$

2.  $x + y$        $\underline{6 + 3 = 9}$

7.  $\frac{x-y}{2}$        $\underline{(6-3) \div 2 = 1.5}$

3.  $2x + 3y$        $\underline{12 + 9 = 21}$

8.  $\frac{18}{x-y}$        $\underline{18 \div (6-3) = 6}$

4.  $\frac{x}{2} + y$        $\underline{3 + 3 = 6}$

9.  $\frac{x}{y}$        $\underline{6 \div 3 = 2}$

5.  $2(x + y)$        $\underline{2(6 + 3) = 18}$

10.  $\frac{3x}{2y}$        $\underline{18 \div 6 = 3}$

9 For the following sequences, give the next three numbers.

1. 2, 4, 6, 8, 10, 12, 14

2. 18, 16, 14, 12, 10, 8, 6

3. 1, 4, 7, 10, 13, 16, 19

4. 7, 13, 19, 25, 31, 37, 43

5. 1, 3, 5, 7, 9, 11, 13, 15

Powers of 2

$2^0 = 1$

$2^1 = 2$

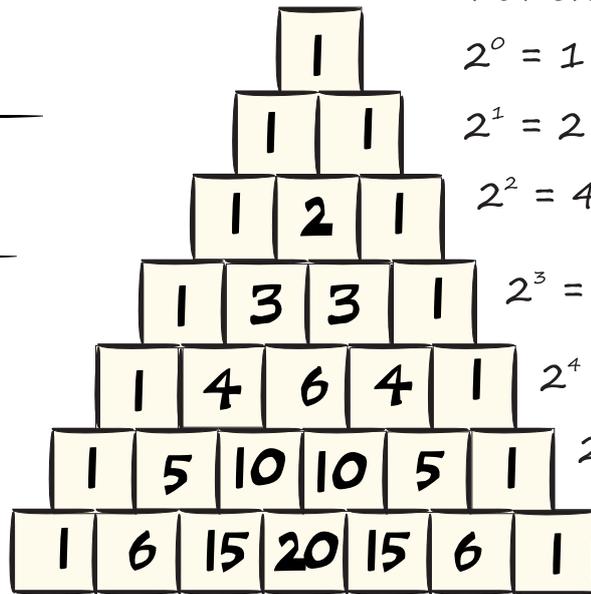
$2^2 = 4$

$2^3 = 8$

$2^4 = 16$

$2^5 = 32$

$2^6 = 64$



How many different number sequences can you identify in the pyramid figure above?

1, 2, 3, 4, 5, 6 counting numbers

1, 3, 6, 10, 15 triangular numbers

1, 4, 10, 15 tetrahedral numbers

## SUDOKU

<b>7</b>	<b>6</b>	2	4	<b>3</b>	8	5	<b>9</b>	<b>1</b>
<b>5</b>	<b>9</b>	3	<b>1</b>	2	<b>7</b>	6	8	<b>4</b>
4	<b>1</b>	<b>8</b>	5	<b>9</b>	6	<b>3</b>	7	2
<b>9</b>	<b>7</b>	4	<b>3</b>	<b>5</b>	1	2	<b>6</b>	8
<b>3</b>	8	1	<b>6</b>	<b>4</b>	<b>2</b>	<b>9</b>	5	<b>7</b>
6	<b>2</b>	5	<b>7</b>	<b>8</b>		4	<b>1</b>	3
<b>2</b>	3	<b>9</b>	8	7	5	<b>1</b>	4	6
<b>8</b>	5	6	<b>2</b>	<b>1</b>	<b>4</b>	7	3	<b>9</b>
<b>1</b>	<b>4</b>	7	<b>9</b>	<b>6</b>	3	8	<b>2</b>	<b>5</b>

## PUZZLE

How many years old is a person if her age now is equal to her age in 3 years  $\times$  3, less 3 times her age 3 years ago?

$$x = (x + 3) \times 3 - 3 \times (x - 3)$$

$$x = 3x + 9 - 3x + 9$$

$$x = 18$$

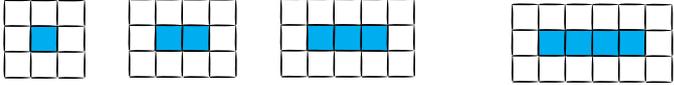
## MORE SEQUENCES

Draw the next pattern to each of the sequences.

- 

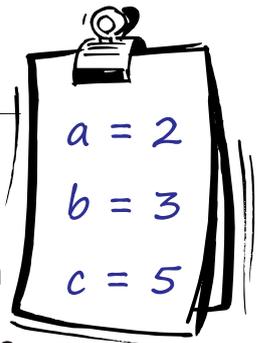
1                      2                      3                      4                      5
- 

3                      5                      7                      9                      11
- 

4                      7                      10                      13                      16
- 

8                      10                      12                      14
- 

1                      4                      9                      16



## CROSS NUMBER

1. 1	2		2. 1	5	
5		3. 1	1		4. 1
	5. 1	4		6. 3	2
7. 3	5		8. 1	2	
1		9. 2	2		10. 2
	11. 1	0		12. 1	8

### Across

- 6a
- 5b
- 3b + a
- 4b + a
- 6c + a
- 11b + a
- 3c - b
- 8b - a
- 2c
- 4c - a

### Down

- 3c
- 9 + a
- 7a
- 3c - b
- 3c
- 12b - 2a
- 9b + 2a
- 4b
- 5c - (b + a)
- 6c - a

## TEN QUICK QUESTIONS

Write the next 3 numbers in the sequences.

1. 1, 3, 5, 7, 9, 11, 13

2. 20, 17, 14, 11, 8, 5, 2

3. 3, 6, 12, 24, 48, 96, 192

4. Simplify  $4b + 3b = 7b$

5. Simplify  $3a \times 4a = 12a^2$

6. Simplify  $\frac{a^6}{a^2} = a^4$

7. If  $a = 3$ , calculate  $2a - 6 = 0$

8. Simplify  $7a + 2b - 3a - b = 4a + b$

9. If  $a = 4$  and  $b = 2$  calculate  $3(3b - a)$ .

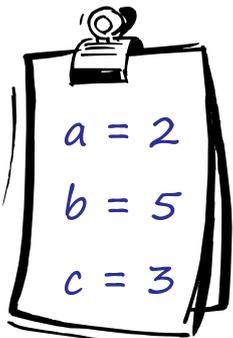
$$3(6 - 4) = 6$$

10. Work out  $\frac{(a + b)}{2}$  given that  $a = 4$ ,  $b = 2$ .

$$6 \div 2 = 3$$

## ESSENTIAL SKILLS

Substitute the values into each expression.



1.  $10a - c$   $20 - 3 = 17$

2.  $5ab - 3c$   ~~$50 - 9 = 41$~~

3.  $3(a + b)$   $3 \times 7 = 21$

4.  $\frac{3a - b}{2c}$   $(6 - 5) \div 6 = \frac{1}{6}$

5.  $(b - 2)^2$   $(5 - 2)^2 = 9$

6.  $(2a + b)^2$   $(4 + 5)^2 = 81$

7.  $2a^2$   ~~$2 \times 2^2 = 8$~~

8.  $5b - c$   $25 - 3 = 22$

9.  $8a^2 - 3c^2$   ~~$8 \times 4 - 3 \times 9 = 5$~~

10.  $4(6c - 3b)^2$   $4(18 - 15)^2 = 36$

# WHAT IS THE UNIVERSE MADE OF?

Simplify the following expressions. Use your answers to complete the question.

1.  $5x^3 \times 2x^2 \times 2$  E  $20x^5$

2.  $(2x^2)^3$  G  $8x^6$

3.  $\sqrt{9x^{12}}$  C  $3x^6$

4.  $3x^2 \times 8x^5$  A  $24x^7$

5.  $(3x)^2$  R  $9x^2$

6.  $x^6 \div x^3$  Y  $x^3$

7.  $\sqrt{64x^2}$  I  $8x$

8.  $2x^2 \times 2x^4 \times x$  T  $4x^7$

9.  $(2x + 2x)^2$  N  $16x^2$

10.  $\frac{20x^5}{4x^3}$  P  $5x^2$

11.  $\frac{5x^7}{x^3}$  S  $5x^4$

12.  $\sqrt{16x^{16}}$  M  $4x^8$

M	A	T	T	E	R
$4x^8$	$24x^7$	$4x^7$	$4x^7$	$20x^5$	$9x^2$

E	N	E	R	G	Y
$20x^5$	$16x^2$	$20x^5$	$9x^2$	$8x^6$	$x^3$

S	P	A	C	E
$5x^4$	$5x^2$	$24x^7$	$3x^6$	$20x^5$

T	I	M	E
$4x^7$	$8x$	$4x^8$	$20x^5$



# BLUE - Worksheet 3

## ESSENTIAL SKILLS

Simplify the following:

- $2 \times 3x$        $6x$
- $3x \times 4y$        $12xy$
- $2x + 5x$        $7x$
- $3x + 4y + 2x$        $5x + 4y$
- $5x + 4y - 2x - 3y$        $3x + y$
- $x^2 + x^5$        $x^2 + y^5$
- $x^3 \times x^2 \times x^4$        $x^9$
- $3x \times 5x^2$        $15x^3$
- $\frac{x^7}{x^3}$        $x^4$
- $\frac{8x^5}{12x^3}$        $\frac{2x^2}{3}$

## TEN QUICK QUESTIONS

Write the next 3 numbers in the sequences.

- 1, 4, 7, 10, 13, 16, 19
- 90, 85, 80, 75, 70, 65, 60
- 1, 4, 9, 16, 25, 36, 49
- 0, 3, 8, 15, 24, 35, 48
- Simplify  $2a \times 5a$        $10a^2$
- Simplify  $x^3 \times x^4$        $x^7$
- Simplify  $3b + 2c + b + c$        $4b + 3c$
- If  $a = 3$ , calculate  $2a^2$       18
- If  $a = 4$  and  $b = 1$ , calculate  $\frac{a-b}{2}$   
1.5
- Find two equal numbers that sum to 28.  
14

## PUZZLE

A farmer has 3 bales of hay: alfalfa, barley and wheat.

Together, the alfalfa and barley weigh 30kg.

Together, the barley and wheat weigh 50kg.

Together, the wheat and alfalfa weigh 40kg.

How much does each weigh?

$$\underline{A+B=30, A=30-B}$$

$$\underline{B+W=50, W=50-B}$$

$$\underline{W+A=40}$$

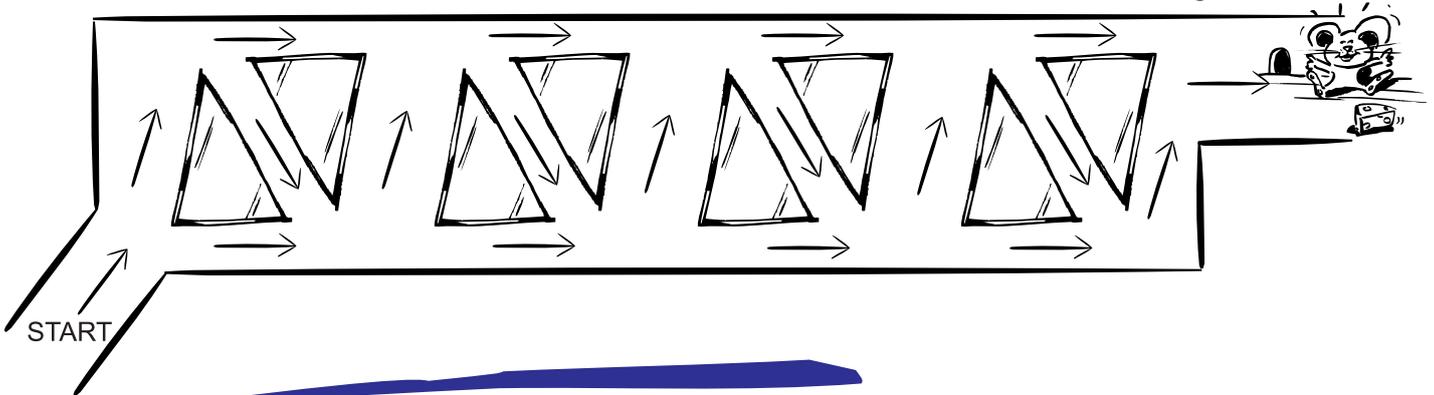
$$\underline{(50-B)+(30-B)=40}$$

$$\underline{A=10, B=20, C=30}$$

## INVESTIGATION

A mouse can walk through the maze a number of ways. How many ways are there from start to finish?

44 different ways



Simplify these expressions:

1.  $x \times x = \frac{x^2}{1}$

2.  $x^2 \times x^3 = \frac{x^5}{1}$

3.  $3x^3 \times 4x^3 = \frac{12x^6}{1}$

4.  $x^5 \times x^2 \times x^7 = \frac{x^{14}}{1}$

5.  $3(x^2 + 2x^2) = \frac{9x^2}{1}$

6.  $\frac{x^5}{x^3} = \frac{x^2}{1}$

7.  $\frac{6x^5}{3x^3} = \frac{2x^2}{1}$

8.  $\frac{10x^5}{8x^3} = \frac{5x^2}{4}$

9.  $\frac{x^3 \times x^5}{x^3} = \frac{x^5}{1}$

10.  $\frac{x^3 + x^3}{x} = \frac{2x^2}{1}$

## EQUATION SOLVING

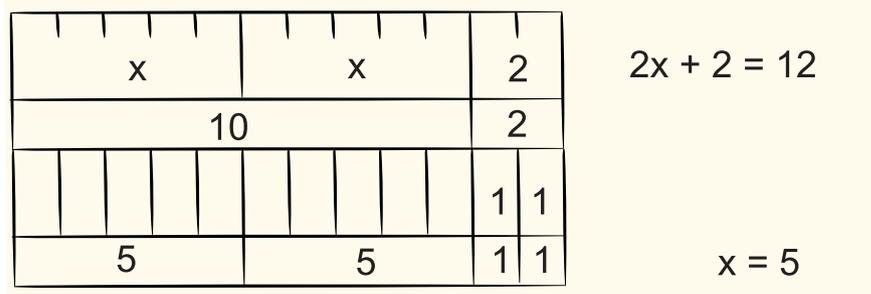
Solve the following equations.

- |    |               |                             |     |                  |                            |
|----|---------------|-----------------------------|-----|------------------|----------------------------|
| 1. | $x + 5 = 7$   | <u><math>x = 2</math></u>   | 6.  | $2x - 3 = 5$     | <u><math>x = 4</math></u>  |
| 2. | $x - 3 = 8$   | <u><math>x = 11</math></u>  | 7.  | $x - 11 = 0$     | <u><math>x = 11</math></u> |
| 3. | $3 + x = 4$   | <u><math>x = 1</math></u>   | 8.  | $2x + x - 3 = 6$ | <u><math>x = 3</math></u>  |
| 4. | $7 + x = 11$  | <u><math>x = 4</math></u>   | 9.  | $x + 11 = 11$    | <u><math>x = 0</math></u>  |
| 5. | $2x + 1 = 12$ | <u><math>x = 5.5</math></u> | 10. | $11 - x = 5$     | <u><math>x = 6</math></u>  |

## MORE EQUATION SOLVING

You can solve equations many different ways.

For example,  $2x + 2 = 12$  can be represented with equal sized boxes.



Solve the following equations:

- |     |                  |                           |
|-----|------------------|---------------------------|
| 1.  | $2x + 3 = 15$    | <u><math>x = 6</math></u> |
| 2.  | $3x + 1 = 16$    | <u><math>x = 5</math></u> |
| 3.  | $2x + 7 = 9$     | <u><math>x = 1</math></u> |
| 4.  | $2x - 1 = 11$    | <u><math>x = 6</math></u> |
| 5.  | $2x + 7 = x + 8$ | <u><math>x = 1</math></u> |
| 6.  | $3x + 3 = x + 7$ | <u><math>x = 2</math></u> |
| 7.  | $2(x + 1) = 12$  | <u><math>x = 5</math></u> |
| 8.  | $2(x + 3) = 16$  | <u><math>x = 5</math></u> |
| 9.  | $2 + 3x = 17$    | <u><math>x = 5</math></u> |
| 10. | $5 + 2x = 7$     | <u><math>x = 1</math></u> |

## THE NUMBER SYSTEM

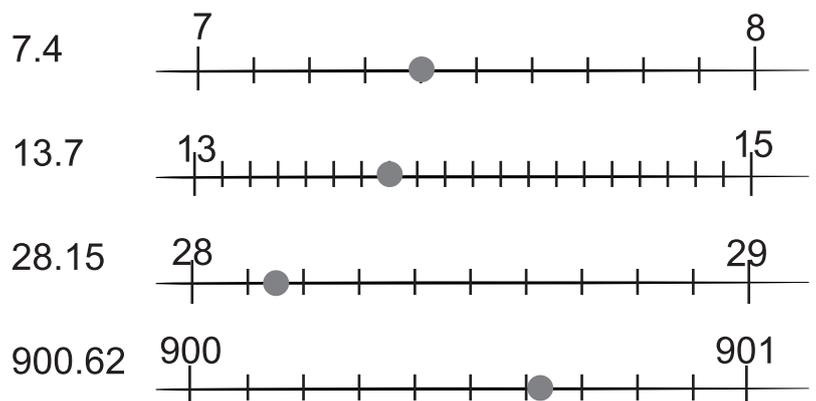
Complete the table below:

	<i>Number</i>	<i>Number written in words</i>
1.	3 906	three thousand nine hundred and six
2.	190	<i>one hundred and ninety</i>
3.	6 423	<i>six thousand four hundred and twenty three</i>
4.	67 599	<i>sixty seven thousand five hundred and ninety nine</i>
5.	<i>159</i>	one hundred and fifty nine
6.	8 350	eight thousand three hundred and fifty
7.	44 221	forty four thousand two hundred and twenty one
8.	764 000	seven hundred and sixty four thousand
9.	80.5	<i>eighty and five tenths</i>
10.	5010.3	<i>five thousand and ten and three tenths</i>
11.	12.15	twelve and fifteen hundredths
12.	0.006	six thousandths

## SUDOKU

1	4	9	6	3	8	7	5	2
3	5	7	4	2	9	8	6	1
2	8	6	7	1	5	4	9	3
9	1	5	3	8	4	6	2	7
8	6	2	5	7	1	3	4	9
7	3	4	2	9	6	5	1	8
6	2	8	1	5	7	9	3	4
5	9	3	8	4	2	1	7	6
4	7	1	9	6	3	2	8	5

Indicate these numbers on the number lines.



# BLUE - Worksheet 4



## PUZZLES

I am thinking of a number. If I treble it and subtract 3, the answer is 48. What is the number?

$$3x - 3 = 48, x = 17$$

You have a 10 cm × 10 cm cube that is made from 1 cm × 1 cm cubes. If you painted the outside of the big cube blue, how many of the small 1 cm cubes would get painted?

$$100 + 100 + 80 + 80 + 64 + 64 = 488$$

## EQUATION SOLVING

Solve the following equations:

- |    |           |          |     |            |          |
|----|-----------|----------|-----|------------|----------|
| 1. | $3x = 6$  | $x = 2$  | 6.  | $5x = 95$  | $x = 19$ |
| 2. | $5x = 15$ | $x = 3$  | 7.  | $6x = 126$ | $x = 21$ |
| 3. | $4x = 8$  | $x = 2$  | 8.  | $11x = 11$ | $x = 1$  |
| 4. | $2x = 22$ | $x = 11$ | 9.  | $5x = 0$   | $x = 0$  |
| 5. | $3x = 30$ | $x = 10$ | 10. | $2x = 132$ | $x = 66$ |

1.	2.		3.	4.	
1	2		1	1	
	5.	6.		7.	0
	4	1		4	
8.		9.	10.		
1		4	1		
11.	12.			13.	
1	5		0		1
	14.		15.		
	1	3	4		0
16.		17.			
2	4	2	1		

## CROSS NUMBER

### Across

- $2x = 24$
- $2(x - 3) = 16$
- $2x - 1 = 81$
- $x \div 10 = 4$
- $(x - 1) \div 5 = 8$
- $x \div 5 = 3$
- $2x + 1 = 27$
- $x \div 2 = 20$
- $x \div 3 = 8$
- $5x - 3 = 2x + 60$

### Down

- $x \div 3 = 8$
- $2x - 3 = 25$
- $2(x + 6) = 40$
- $2x + 3 = x + 14$
- $x - 3 = 7$
- $(3x + 4) \div 2 = 773$
- $2x + 3 = 23$
- $(x - 1) \div 5 = 8$

Solve the following equations:

1.  $\frac{x}{3} = 2$        $x = 6$

2.  $\frac{x}{5} = 4$        $x = 20$

3.  $\frac{x}{6} = 6$        $x = 36$

4.  $\frac{x}{5} = 11$        $x = 55$

5.  $\frac{x}{2} = 1$        $x = 2$

6.  $\frac{x}{11} = 3$        $x = 33$

7.  $\frac{x}{5} = 0$        $x = 0$

8.  $\frac{x}{x} = 1$       any number  
except 0

9.  $\frac{x}{0} = 0$       no solution

10.  $\frac{x}{8} = \frac{1}{2}$        $x = 4$

### QUICK QUESTIONS

1.  $235 + 193 =$  428

2.  $121 - 96 =$  25

3.  $6 \times 5 - 11 \times 2 =$  8

4.  $4 + 4 \times 4 \times 0 =$  4

5. Find the missing numbers:  
17, 21, 25, 29, 33, 37

6. What is 10% of 450?  
45

7. Convert 0.07 to a percentage.  
7%

8. What are the factors of 24.  
1, 2, 3, 4, 6, 12

9. List the prime numbers  
between 5 and 15.  
7, 11, 13

10.  $\frac{3}{7} - \frac{1}{6} =$   $\frac{11}{42}$

### PUZZLE

The stairway shown is made of cubes. How many cubes would be needed to make the stairway if the steps at the end were 9 cubes high?

*45 cubes in stairwell*



## EQUATION SOLVING

Solve the following equations

$$\begin{array}{l} 1. \quad x + 3 = 11 \\ \quad \quad x = 8 \end{array}$$

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$$\begin{array}{l} 2. \quad x - 3 = 7 \\ \quad \quad x = 10 \end{array}$$

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$$\begin{array}{l} 3. \quad x \div 3 = 5 \\ \quad \quad x = 15 \end{array}$$

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$$\begin{array}{l} 4. \quad 7x = 2x - 15 \\ \quad \quad x = -3 \end{array}$$

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$$\begin{array}{l} 5. \quad 27x = 15x + 72 \\ \quad \quad x = 6 \end{array}$$

---

$$\begin{array}{l} 6. \quad 2x - 1 = 7 \\ \quad \quad x = 4 \end{array}$$

---

$$\begin{array}{l} 7. \quad 3x - 5 = 19 \\ \quad \quad x = 8 \end{array}$$

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$$\begin{array}{l} 8. \quad 6x - 18 = 2x + 10 \\ \quad \quad x = 7 \end{array}$$

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$$\begin{array}{l} 9. \quad 5x - 7 = -22 \\ \quad \quad x = -3 \end{array}$$

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$$\begin{array}{l} 10. \quad 7x + 3 = 3x - 13 \\ \quad \quad x = -4 \end{array}$$

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## QUICK CALCULATIONS

Calculate these without a calculator.

$$\begin{array}{l} 1. \quad 5 \times 27 \times 2 \\ \quad \quad = 270 \end{array}$$

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$$\begin{array}{l} 2. \quad 20 \times 42 \times 5 \\ \quad \quad = 4200 \end{array}$$

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$$\begin{array}{l} 3. \quad 25 \times 9 \times 4 \\ \quad \quad = 900 \end{array}$$

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$$\begin{array}{l} 4. \quad 50 \times 17 \times 20 \\ \quad \quad = 17000 \end{array}$$

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$$\begin{array}{l} 5. \quad 10 \times 33 \times 10 \\ \quad \quad = 3300 \end{array}$$

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Remember:  $99 = 100 - 1$

$$9 = 10 - 1$$

$$\begin{array}{l} 6. \quad 25 \times 99 \\ \quad \quad = 2475 \end{array}$$

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$$\begin{array}{l} 7. \quad 19 \times 9 \\ \quad \quad = 171 \end{array}$$

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$$\begin{array}{l} 8. \quad 0.5 \times 5 \times 20 \\ \quad \quad = 50 \end{array}$$

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$$\begin{array}{l} 9. \quad 210 \times 201 \\ \quad \quad = 42210 \end{array}$$

---

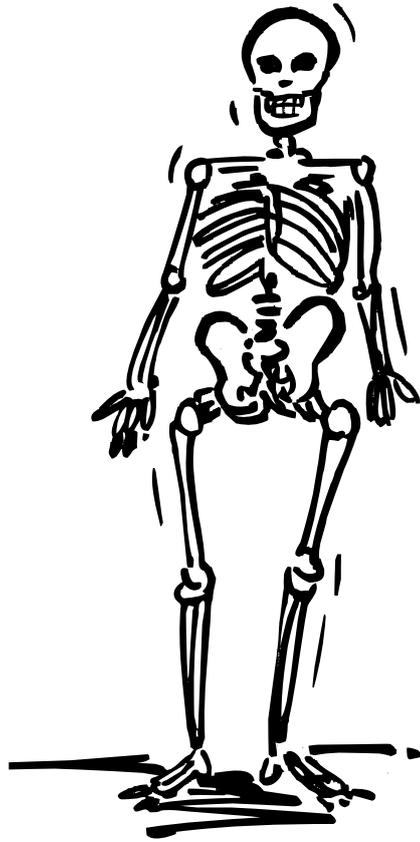
$$\begin{array}{l} 10. \quad 80 \times 101 \\ \quad \quad = 8080 \end{array}$$

---

# HOW OLD ARE THE CELLS OF A BODY?

Solve the following equations. Find the answer in the column opposite and place the letter in the table below.

T	1. $2x = 16$ $x = 8$
H	2. $x - 2 = 4$ $x = 6$
E	3. $\frac{x}{5} = 3$ $x = 15$
O	4. $9x + 2 = 7x - 12$ $x = -7$
L	5. $7x - 1 = 6$ $x = 1$
D	6. $\frac{x}{5} = -2$ $x = -10$
S	7. $5x - 2 = 14 - 3x$ $x = 2$
I	8. $2(x - 1) = 8$ $x = 5$
V	9. $5x - 2 = 2x + 7$ $x = 3$
N	10. $3x + 1 = -11$ $x = -4$
Y	11. $3x - 1 = 11$ $x = 4$
A	12. $4x + 3 = -7 - x$ $x = -2$
R	13. $4x - 2 = x + 19$ $x = 7$



T	H	E		O	L	D	E	S	T		I	S
8	6	15		-7	1	-10	15	2	8		5	2

S	E	V	E	N		Y	E	A	R	S		O	L	D
2	15	3	15	-4		4	15	-2	7	2		-7	1	-10

# BLUE - Worksheet 5

## EQUATION SOLVING

Solve the following equations:

1.  $2x + x = 9$

---

$$x = 3$$

---

2.  $2x + 3x + 2 = 12$

---

$$x =$$

---

3.  $3x - 6 = x$

---

$$x = 3$$

---

4.  $2x - 1 = x + 3$

---

$$x = 4$$

---

5.  $5x - 2 = 3x + 8$

---

$$x = 5$$

---

6.  $12x = x + 11$

---

$$x = 1$$

---

7.  $7x = 3x + 12$

---

$$x = 3$$

---

8.  $3x = 2x - 8$

---

$$x = -8$$

---

9.  $x + 5 = 2x - 3$

---

$$x = 8$$

---

10.  $2x + 7 = 5x - 2$

---

$$x = 3$$

---

## EXPANDING BRACKETS

Expand the following:

1.  $5(x + y)$   $5x + 5y$

2.  $2(x - y)$   $2x - 2y$

3.  $3(x + 2)$   $3x + 6$

4.  $4(x - 3)$   $4x - 12$

5.  $-2(x + 4)$   $-2x - 8$

6.  $-5(x - 6)$   $-5x + 30$

7.  $x(x + 5)$   $x^2 + 5x$

8.  $x(2x - 3)$   $2x^2 - 3x$

9.  $3x(2x - 4)$   $6x^2 - 12x$

10.  $-5x(3x + 6)$   $-15x^2 - 30x$

## PUZZLE

There are 4 red and 4 green counters. The object is to interchange the counters so that the green are on the left and red on the right.

Counters can only move in one direction, so red can only move right and green can only move left.

You can only move one space or jump one disc of the other colour.

What is the minimum number of moves needed to make the complete interchange?



24 moves

### TEN QUICK QUESTIONS

Write the next 3 numbers in the sequences:

- 5, 10, 15, 20, 25, 30, 35
- 21, 17, 13, 9, 5, 1, -3
- 1.3, 1.6, 1.9, 2.2, 2.5, 2.8, 3.1
- 2, 6, 18, 54, 162, 486, 1458
- Simplify  $3a \times 2a \times 2a =$   $12a^3$
- Simplify  $x^3 \times x^5 =$   $x^8$
- Simplify  $4a - 2b + 3a - b =$   $7a - 3b$
- If  $a = 2$ ,  $b = 3$ , calculate  $(2a + b) \times 2$   
14
- If  $a = 2$ ,  $b = 3$ , calculate  $\frac{2a - b}{2}$   $\frac{1}{2}$
- Find 3 consecutive numbers that sum to 33.  
 $10 + 11 + 12$

## SKILLS

Expand the following (simplify if needed).

1.  $2(a + b)$

$$2a + 2b$$

2.  $3(a + b - c)$

$$3a + 3b - 3c$$

3.  $-3(a - 2)$

$$-3a + 6$$

4.  $-2(4a - 3)$

$$-8a + 6$$

5.  $x(3x + 4)$

$$3x^2 + 4x$$

6.  $-3x(4x + 2)$

$$-12x^2 - 6x$$

7.  $-2x(5x - 2)$

$$-10x^2 + 4x$$

8.  $3(x + y) + 2(x + y)$

$$5x + 5y$$

9.  $4(x + y) + 3(x - y)$

$$7x + y$$

10.  $2(2x + 4) - 2(x - 3)$

$$2x + 14$$

## MORE QUICK QUESTIONS

1. Simplify  $x^3 \times x^4$

$$x^7$$

2. Simplify  $2x^3 \times 4x^4$

$$8x^7$$

3. Simplify  $\frac{x^6}{x^4}$

$$x^2$$

4. Simplify  $\frac{8x^6}{4x^4}$

$$2x^2$$

5. Solve  $3x = 15$

$$x = 5$$

6. Solve  $x + 3 = -4$

$$x = -7$$

7. Solve  $\frac{x}{5} = 6$

$$x = 30$$

8. Solve  $x - 4 = 20$

$$x = 24$$

9. Solve  $2x - 1 = 5$

$$x = 3$$

10. Solve  $3x + 7 = 2x + 9$

$$x = 2$$

## TEN QUICK QUESTIONS

Use any strategy but not a calculator.

1.  $235 + 141 = \underline{376}$

2.  $76 - 68 = \underline{8}$

3.  $54 \times 6 = \underline{324}$

4.  $43 \times 100 = \underline{4300}$

5.  $160 \div 5 = \underline{32}$

6.  $\$12.08 \div 4 = \underline{\$3.02}$

7.  $\$2.22 \div 3 = \underline{\$0.74}$

8.  $\$1.20 + \$2.30 = \underline{\$3.50}$

9.  $\frac{3}{11} + \frac{4}{11} = \underline{\frac{7}{11}}$

10.  $\frac{8}{9} - \frac{2}{9} = \underline{\frac{6}{9} \text{ or } \frac{2}{3}}$

## ALGEBRA

Complete the chart given the different values of x and y.

x	y	x + y	xy	2x + y	3x - 2y
4	3	7	12	11	6
8	5	13	40	21	14
4	-2	2	-8	6	16
-5	-4	-9	20	-14	-7

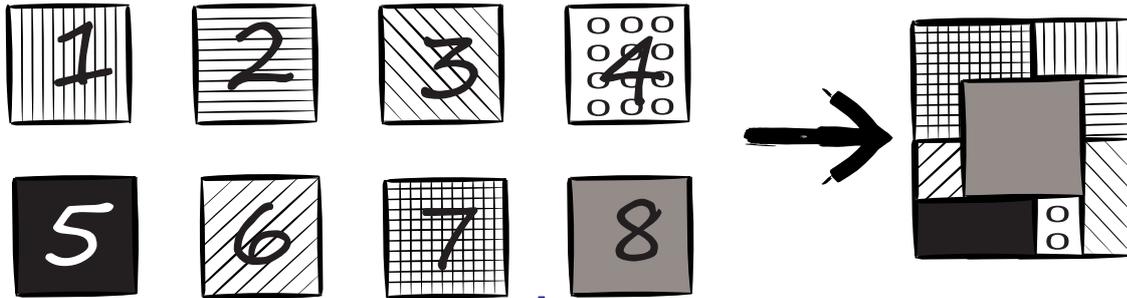
## SUDOKU

<b>4</b>	1	<b>5</b>	<b>7</b>	<b>9</b>	6	3	<b>2</b>	6
6	3	2	1	<b>5</b>	8	7	<b>9</b>	<b>4</b>
8	9	7	2	3	4	<b>5</b>	1	<b>6</b>
<b>2</b>	<b>6</b>	1	8	7	<b>5</b>	4	3	9
9	<b>7</b>	8	<b>3</b>	4	<b>2</b>	1	<b>6</b>	5
5	4	3	<b>6</b>	1	9	<b>8</b>	<b>7</b>	<b>2</b>
<b>3</b>	<b>5</b>	<b>6</b>	<b>9</b>	8	1	2	4	7
<b>7</b>	<b>8</b>	9	4	<b>2</b>	3	6	5	1
1	<b>2</b>	4	5	<b>6</b>	<b>7</b>	<b>9</b>	8	<b>3</b>

# BLUE - Worksheet 6

## PUZZLE

Eight same sized squares (pictured below) are layered on top of each other. Determine the order which they are placed with the square 8 placed last.



## EQUATION SOLVING

Solve the following equations:

$$\begin{array}{l} 1. \quad 2(x + 1) = 14 \\ \quad \quad 2x + 2 = 14 \\ \hline \quad \quad x = 6 \end{array}$$

$$\begin{array}{l} 2. \quad 2(x - 1) = 16 \\ \quad \quad 2x - 2 = 16 \\ \hline \quad \quad x = 9 \end{array}$$

$$\begin{array}{l} 3. \quad 3(x - 3) = 15 \\ \quad \quad 3x - 9 = 15 \\ \hline \quad \quad x = 8 \end{array}$$

$$\begin{array}{l} 4. \quad 4(x - 2) = -8 \\ \quad \quad 4x - 8 = -8 \\ \hline \quad \quad x = 0 \end{array}$$

$$\begin{array}{l} 5. \quad 2x + 1 = 4x + 3 \\ \quad \quad -2x = 2 \\ \hline \quad \quad x = -1 \end{array}$$

$$\begin{array}{l} 6. \quad 5(x + 2) = 2x + 1 \\ \quad \quad 5x + 10 = 2x + 1 \\ \hline \quad \quad 3x = -9, x = -3 \end{array}$$

$$\begin{array}{l} 7. \quad 2(x - 3) = 3(x - 1) \\ \quad \quad 2x - 6 = 3x - 3 \\ \hline \quad \quad -x = 3, x = -3 \end{array}$$

$$\begin{array}{l} 8. \quad 2(x - 3) = 2(x - 3) \\ \quad \quad \text{Both sides are equal} \\ \hline \quad \quad \text{All solutions} \end{array}$$

$$\begin{array}{l} 9. \quad 2(x - 3) = 2(x + 3) \\ \hline \quad \quad \text{No solution} \end{array}$$

$$\begin{array}{l} 10. \quad 3(x + 2) + 1 = 7 \\ \quad \quad 3x + 6 + 1 = 7 \\ \hline \quad \quad x = 0 \end{array}$$

## FACTORISING

Factorise the following expressions.

- $2x + 2y$        $2(x + y)$
- $ax + ay$        $a(x + y)$
- $4x - 4y$        $4(x - y)$
- $5x + 5y + 5t$        $5(x+y+t)$
- $3x + 3y$        $3(x + y)$
- $2x + 4y$        $2(x + 2y)$
- $8x + 10y$        $2(4x + 5y)$
- $6x + 15y$        $3(2x + 5y)$
- $11x - 22y$        $11(x - 2y)$
- $15x - 40y$        $5(3x - 8y)$

## MORE FACTORISING

Factorise the following expressions.

- $5a + 5b$        $5(a + b)$
- $5a + 5b + 5c$        $5(a+b+c)$
- $3x + 18$        $3(x + 6)$
- $8x - 32$        $8(x - 4)$
- $10x - 25$        $5(2x - 5)$
- $39x + 26$        $13(3x + 2)$
- $xy + yr$        $y(x + r)$
- $7x - 7y$        $7(x - y)$
- $ax + ay + a^2$        $a(x + y + a)$
- $8x - x^2$        $x(8 - x)$

## QUICK QUESTIONS

- Simplify  $x^2 \times x^4 \times x^3$        $x^9$
- Simplify  $5x^2 \times 3x^7$        $15x^9$
- Simplify  $\frac{10x^7}{4x^3}$        $\frac{5x^4}{2}$
- Solve  $4x = 24$        $x = 6$
- Solve  $x + 3 = 11$        $x = 8$
- Solve  $\frac{x}{3} = 8$        $x = 24$
- $x - 11 = 2$        $x = 13$
- Solve  $3x + 4 = 6$   
 $3x = 2$   
 $x = \frac{2}{3}$
- Solve  $5x - 2 = 3x + 4$   
 $2x = 6$   
 $x = 3$
- Solve  $5x + 1 = -3$   
 $5x = -4$   
 $x = \frac{-4}{5}$

## SUDOKU

<b>7</b>	8	4	9	5	<b>2</b>	1	6	<b>3</b>
<b>2</b>	1	9	3	8	6	5	<b>4</b>	<b>7</b>
6	<b>5</b>	3	7	1	<b>4</b>	<b>8</b>	9	2
5	3	7	1	<b>4</b>	<b>9</b>	<b>2</b>	8	6
<b>8</b>	4	<b>6</b>	5	2	7	<b>3</b>	1	<b>9</b>
9	2	1	<b>6</b>	<b>3</b>	8	4	7	5
1	<b>9</b>	<b>2</b>	<b>8</b>	<b>6</b>	3	7	<b>5</b>	4
<b>3</b>	<b>7</b>	8	4	9	5	6	2	1
<b>4</b>	6	<b>5</b>	<b>2</b>	7	1	9	3	<b>8</b>

## TEN QUICK QUESTIONS

1. Simplify  $4a \times 2a \times 3a$   $24a^3$

2. Simplify  $4x^2 \times 3x^4$   $12x^6$

3. Simplify  $3a - 2b + a + 3b$   $4a + b$

4. Solve  $2x + 1 = 7$   
 $x = 3$

5. Solve  $\frac{x}{3} - 1 = 2$   
 $x = 9$

6. Solve  $3x + 2 = -10$   
 $x = -4$

7. Solve  $3x - 1 = x + 9$   
 $x = 5$

8. Solve  $-2x + 3 = 11$   
 $x = -4$

9. Expand  $3(x + 2)$   
 $3x + 6$

10. Expand and simplify  $4(2x + 3) + 2(x - 1)$   
 $10x + 10$

## SKILLS

Solve these equations:

1.  $2(x + 3) = 8$

---

$$x = 1$$

---

6.  $2(x - 2) = 5$

---

$$x = 4\frac{1}{2}$$

---

2.  $5(x - 2) = 2(x + 1)$

---

$$x = 4$$

---

7.  $3(x + 1) = 1$

$$x = -\frac{2}{3}$$

---

3.  $2(x - 1) = -12$

---

$$x = -5$$

---

8.  $3x + (x + 1) = 5$

---

$$x = 1$$

---

4.  $3(x - 1) = x$

---

$$x = 1\frac{1}{2}$$

---

9.  $2x - (x - 2) = 3$

---

$$x = 1$$

---

5.  $5x - 1 = 2(x + 4)$

---

$$x = 3$$

---

10.  $x + 2(x - 5) = 6$

$$x = 5\frac{1}{3}$$

---

## ALGEBRA

Complete the chart given the different values of x and y.

x	y	$x^2 + y$	$x^2y$	$2x^2 + y$	$3x - y^2$
3	2	11	18	20	5
4	5	21	80	37	-13
-3	1	10	9	19	-10
8	3	67	192	131	15

# BLUE - Worksheet 7

## NUMBER APPLICATIONS

1. A team in the English soccer league has 17 points. They have played 15 games. For a win there is 3 points, for a draw there is 1 point.

What are the various combinations (of Win, Draw or Lose) that would have summed to 17?

---

*5 wins + 2 draws + 8 losses*

---

*4 wins + 5 draws + 6 losses*

---

*3 wins + 8 draws + 4 losses*

---

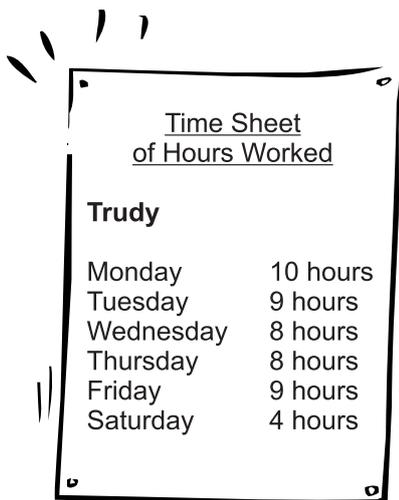
*2 wins + 11 draws + 2 losses*

---

*1 win + 14 draws*

---

2. The weekly time sheet of hours spent at work for Trudy is below.



Time Sheet  
of Hours Worked

Trudy

Monday	10 hours
Tuesday	9 hours
Wednesday	8 hours
Thursday	8 hours
Friday	9 hours
Saturday	4 hours

For days during the week, 8 hours is ordinary time and any hours worked after are considered overtime.

Work on Saturday is all counted as overtime.

The ordinary hourly rate is \$22.50 per hour and overtime is 1.5 times the ordinary rate.

How much would Trudy receive for the week?

---

*\$1170*

---

Find the lowest common multiple of the following pairs of numbers:

1. 3 and 4      12
2. 5 and 6      30
3. 7 and 4      28
4. 2 and 5      10
5. 3 and 12     12
6. 7 and 9      63
7. 14 and 4     28
8. 15 and 25   75
9. 8 and 9      72
10. 16 and 5    80

Find the highest common factor of the following pairs of numbers:

1. 10 and 12     2
2. 14 and 8      2
3. 4 and 16      4
4. 15 and 45     15
5. 20 and 28     4
6. 40 and 64     8
7. 54 and 80     2
8. 110 and 140   10
9. 60 and 80     20
10. 20, 15 and 40 5

### INVESTIGATION

Multiplication can be down by powers.

For example:  $8 \times 4 = 2^3 \times 2^2$   
 $= 2^{3+2}$   
 $= 2^5$   
 $= 32$

$128 \div 16 = 2^7 \div 2^4$   
 $= 2^{7-4}$   
 $= 2^3$   
 $= 8$

1	2	4	8	16	32	64	128	256	512	1024	2048	4096
$2^0$	$2^1$	$2^2$	$2^3$	$2^4$	$2^5$	$2^6$	$2^7$	$2^8$	$2^9$	$2^{10}$	$2^{11}$	$2^{12}$

Use the following table to do the calculations below. Only use a calculator to check your results!

1.  $16 \times 4$        $2^4 \times 2^2 = 2^6$   
 $= 64$
2.  $32 \times 64$       $2^5 \times 2^6 = 2^{11}$   
 $= 2048$
3.  $8 \times 128$       $2^3 \times 2^7 = 2^{10}$   
 $= 1024$
4.  $4 \times 128$       $2^2 \times 2^7 = 2^9$   
 $= 512$
5.  $8 \times 8 \times 64$     $2^3 \times 2^3 \times 2^6 = 2^{12}$   
 $= 4096$
6.  $16 \div 4$        $2^4 \div 2^2 = 2^2$   
 $= 4$
7.  $256 \div 8$       $2^8 \div 2^3 = 2^5$   
 $= 32$
8.  $128 \div 16$      $2^7 \div 2^4 = 2^3$   
 $= 8$
9.  $2048 \div 32$     $2^{11} \div 2^5 = 2^6$   
 $= 64$
10.  $4096 \div 256$   $2^{12} \div 2^8 = 2^4$   
 $= 16$

## PUZZLE

Using the numbers from 4 to 12 complete the square so that the totals of each row, column and diagonal are the same.

9	4	11
10	8	6
5	12	7

## INVESTIGATION

Multiplying numbers that differ by 2.

e.g.  $29 \times 31 = 899$

You could use a calculator!

or square the middle number  $30 \times 30 = 900$   
then subtract 1  $900 - 1 = 899$

Try this method with the following:

- $19 \times 21$  i.e.  $20 \times 20 = \boxed{400} - 1 = \boxed{399}$
- $24 \times 26 =$   $25 \times 25 = 625, 625 - 1 = 624$
- $41 \times 39 =$   $40 \times 40 = 1600, 1600 - 1 = 1599$
- $49 \times 51 =$   $50 \times 50 = 2500, 2500 - 1 = 2499$
- $99 \times 101 =$   $100 \times 100 = 10000, 10000 - 1 = 9999$

## NUMERACY STRATEGIES

Multiplication by compensation: e.g.  $4 \times 9$  try  $4 \times 10 = 40$   
 $40 - 4 = 36$

e.g.  $9 \times 22$  try  $9 \times 20 = 180$   
 $180 + 18 = 198$

Use the multiplication by compensation method for each of the following

- $7 \times 22 =$  154
- $3 \times 31 =$  93
- $8 \times 19 =$  152
- $6 \times 42 =$  252
- $8 \times 399 =$  3192
- $5 \times 51 =$  255
- $6 \times 58 =$  348
- $8 \times 81 =$  648
- $9 \times 119 =$  1071
- $7 \times 88 =$  616

## NUMERACY STRATEGIES

Numbers can be added quickly by regrouping:

e.g.  $17 + 8 + 3 + 2 + 9$

$$17 + 3 + 8 + 2 + 9 = 20 + 10 + 9 = 39$$

Regroup the following numbers then find the sum.

1.  $5 + 9 + 3 + 11 + 7 =$   $11 + 9 + 7 + 3 + 5 = 35$

2.  $8 + 3 + 2 + 5 + 7 =$   $8 + 2 + 7 + 3 + 5 = 25$

3.  $6 + 11 + 4 + 3 + 9 =$   $6 + 4 + 11 + 9 + 3 = 33$

4.  $21 + 13 + 9 + 17 =$   $21 + 9 + 13 + 17 = 60$

5.  $121 + 17 + 19 + 23 =$   $121 + 19 + 17 + 23 = 180$

6.  $14 + 23 + 6 + 7 + 3 =$   $14 + 6 + 23 + 7 + 3 = 53$

7.  $25 + 49 + 5 + 11 + 6 =$   $25 + 5 + 49 + 11 + 6 = 96$

8.  $123 + 18 + 7 + 12 =$   $123 + 7 + 18 + 12 = 160$

9.  $83 + 74 + 7 + 6 + 3 =$   $83 + 7 + 74 + 6 + 3 = 173$

10.  $127 + 83 + 13 + 17 + 4 =$   $127 + 13 + 83 + 17 + 4 = 244$

### QUICK QUESTIONS

Use any strategy except for a calculator

1.  $37 + 142 =$   $179$

2.  $58 - 47 =$   $11$

3.  $31 \times 3 =$   $93$

4.  $8 \times 7 =$   $56$

5.  $\$1.20 \times 4 =$   $\$4.80$

6.  $84c \div 4 =$   $21c$

7.  $50c + 125c =$   $175c$

8.  $\frac{1}{2}$  cake +  $\frac{1}{4}$  cake =  $\frac{3}{4}$  cake

9.  $54 \div 6 =$   $9$

10.  $\frac{1}{2}$  of  $\frac{1}{2} =$   $\frac{1}{4}$

# BLUE - Worksheet 8

## ARE GENIUSES ECCENTRIC?

Find the value of the following expressions after substituting  $x = 2$ .

For each answer, go to the table to work out the letter to go in the table below.

1.	$x^2 - 1$	3	Y
2.	$2x^2 + 1$	9	S
3.	$5x - x^2$	6	H
4.	$3x^2 + 1$	13	I
5.	$5x^2 - 4x$	12	U
6.	$3x^2 \div 6x$	1	D
7.	$(5x + 3x) \div 4x$	2	B
8.	$\frac{5x - 6}{4} \times 5$	5	X
9.	$2x + 3$	7	E
10.	$2(x^2 - 2)$	4	T
11.	$\frac{6x^2}{x + 1}$	8	N
12.	$3x^2 - 1$	11	K
13.	$(x + 1)^2 + 5$	14	O

Y	E	S		T	H	E	Y		T	H	I	N	K
3	7	9		4	6	7	3		4	6	13	8	11

O	U	T	S	I	D	E		T	H	E		B	O	X
14	12	4	9	13	1	7		4	6	7		2	14	5

## ORDER OF OPERATIONS

The following sums have either operations (+, -, × or ÷) or brackets missing. Rewrite each sum to make the given answer.

1.  $2 + 2 \underline{\quad} \underline{\quad} 2 \times 2 = 0$
2.  $(3 \times 3 + 3) \div 2 = 6$
3.  $4 + (4 \times 4) \underline{\quad} \underline{\quad} 0 = 4$
4.  $3 \underline{\quad} \underline{\quad} 3 \underline{\quad} \underline{\quad} 3 \underline{\quad} \underline{\quad} 3 = 7$
5.  $4 \underline{\quad} \underline{\quad} 2 \underline{\quad} \underline{\quad} 2 \underline{\quad} \underline{\quad} 1 = 4$
6.  $(3 \underline{\quad} \underline{\quad} 3) \div (3 \underline{\quad} \underline{\quad} 1) = 3$
7.  $(2 \underline{\quad} \underline{\quad} 2) \div (2 \underline{\quad} \underline{\quad} 2) = 1$
8.  $(4 \underline{\quad} \underline{\quad} 4) \times 4 \underline{\quad} \underline{\quad} 2 = 16$
9.  $4 \underline{\quad} \underline{\quad} 4 \underline{\quad} \underline{\quad} 4 \underline{\quad} \underline{\quad} 4 = 0$
10.  $8 \underline{\quad} \underline{\quad} 8 \underline{\quad} \underline{\quad} (8 \underline{\quad} \underline{\quad} 8) = 4$

## ANOTHER APPLICATION

John needs to purchase 8 kg of fertiliser. The bags come in 3 sizes:

2 kg - \$1.30

3 kg - \$1.75

5 kg - \$3.00

1. What different combinations would sum to 8 kg?

$2+2+2+2$        $3+3+2$        $5+3$

---

2. What is the cheapest cost per kilogram?

$\$0.58$  per kg for 3 kg

---

3. What combinations would give the cheapest cost for 8 kg?

$5\text{kg} + 3\text{kg} = \$4.75$

---

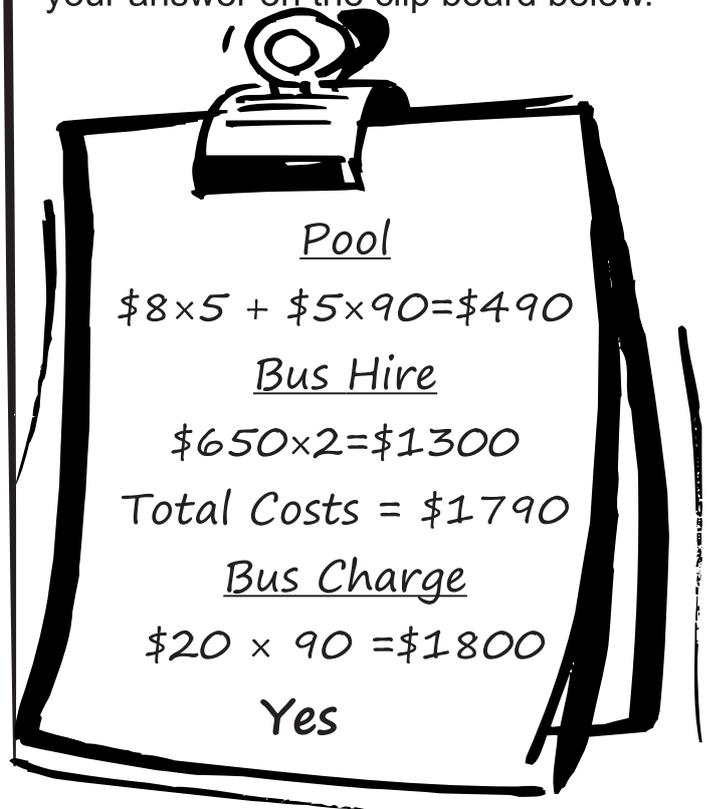
## APPLICATION

At the end of each year students are taken to the hot pools. Costs are:

Adults:      \$8  
Students:    \$5  
Bus hire:    \$650

There are 5 adults, 90 students and it takes 2 buses to transport them.

Students are charged \$20 each, but will it cover the total cost? Work out your answer on the clip board below.



Subtract the following. Do you really need a calculator?

- $8 - 2.5 = \underline{5.5}$
- $6 - 1.28 = \underline{4.72}$
- $7 - 2.03 = \underline{4.97}$
- $8 - 0.03 = \underline{7.97}$
- $14 - 1.13 = \underline{12.87}$
- $15.45 - 15.13 = \underline{0.32}$
- $15.45 - 0.33 = \underline{15.12}$
- $15.45 - 6.67 = \underline{8.78}$
- $21.03 - 11.02 = \underline{10.01}$
- $21.03 - 12.44 = \underline{8.59}$

Multiply the following. Do you really need a calculator?

- $3 \times 1.2 = \underline{3.6}$
- $4 \times 0.05 = \underline{0.2}$
- $12 \times 1.2 = \underline{14.4}$
- $0.5 \times 1.4 = \underline{0.7}$
- $2.6 \times 0.3 = \underline{0.78}$
- $0.6 \times 0.3 = \underline{0.18}$
- $0.006 \times 0.03 = \underline{0.00018}$
- $1.6 \times 0.3 = \underline{0.48}$
- $0.006 \times 3.0 = \underline{0.018}$
- $5.3 \times 0.005 = \underline{0.0265}$

### MULTIPLYING AND DIVIDING

Answer the following. NO calculators!

- $3.15 \times 10 = \underline{31.5}$
- $0.015 \times 100 = \underline{1.5}$
- $31.002 \times 100 = \underline{3100.2}$
- $0.14 \times 10 = \underline{1.4}$
- $0.00035 \times 100 = \underline{0.035}$
- $3.15 \div 10 = \underline{0.315}$
- $0.015 \div 100 = \underline{0.00015}$
- $31.002 \div 100 = \underline{0.31002}$
- $0.14 \div 10 = \underline{0.014}$
- $0.00035 \div 100 = \underline{0.0000035}$

### NUMERACY STRATEGIES

Write these as multiplications.

- $32 \div 4 = \underline{4 \times 8 = 32}$
- $56 \div 7 = \underline{7 \times 8 = 56}$
- $120 \div 5 = \underline{5 \times 24 = 120}$
- $84 \div 4 = \underline{4 \times 21 = 84}$
- $63 \div 9 = \underline{9 \times 7 = 63}$
- $84 \div 3 = \underline{3 \times 28 = 84}$
- $112 \div 4 = \underline{4 \times 28 = 112}$
- $92 \div 4 = \underline{4 \times 23 = 92}$
- $225 \div 5 = \underline{5 \times 45 = 225}$
- $171 \div 3 = \underline{3 \times 57 = 171}$

## INVESTIGATION

1. An original price of \$100 is increased by 50%. This new price is then reduced by one third. Is the final price bigger, smaller or the same as the original?

$$\underline{\$100 + 50\% = \$150 \times \frac{2}{3} = 100 \text{ (the same)}}$$

You can quickly square a number less than 100 which ends in 5 by the following method:

e.g.  $65^2$

$6 \times (6 + 1) = 42$  multiply the 10s digit by 1 plus the digit value.

$65^2 = 4225$  place the digits 2 and 5 at the end.

Use this method for the following squares:

2.  $25^2$   $2 \times 3 = 6, 625$

3.  $35^2$   $3 \times 4 = 12, 1225$

4.  $75^2$   $7 \times 8 = 56, 5625$

5.  $55^2$   $5 \times 6 = 30, 3025$

## QUICK QUESTIONS

Use any strategy but no calculators!

1.  $47 + 94 = 141$

6.  $\$3.65 \times 2 = \$7.30$

2.  $33 - 17 = 16$

7.  $\$1.20 \div 4 = \$0.30$

3.  $27 \times 5 = 135$

8.  $73c + 17c = 90c$

4.  $91 \times 10 = 910$

9.  $\frac{1}{4} + \frac{5}{4} = \frac{6}{4} \text{ or } \frac{3}{2}$

5.  $63 \div 9 = 7$

10.  $\frac{1}{2} \text{ of } \frac{1}{4} = \frac{1}{8}$

# BLUE - Worksheet 9

## NUMBER APPLICATIONS

1. Jill brought gifts for a party. She went to 5 shops and spent the following.

\$ 18.50 in Smiggles  
\$ 7.35 in Countdown  
\$ 11.93 in Whitcoulls  
\$ 33.85 in Just Jeans  
\$ 41.07 in You Beauty

If she started off with \$150, how much would she have left?

---

*\$37.30 change*

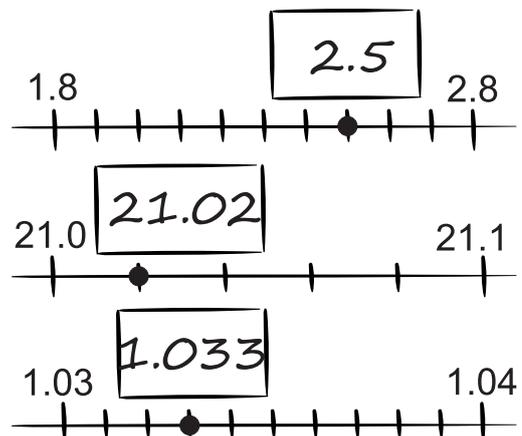
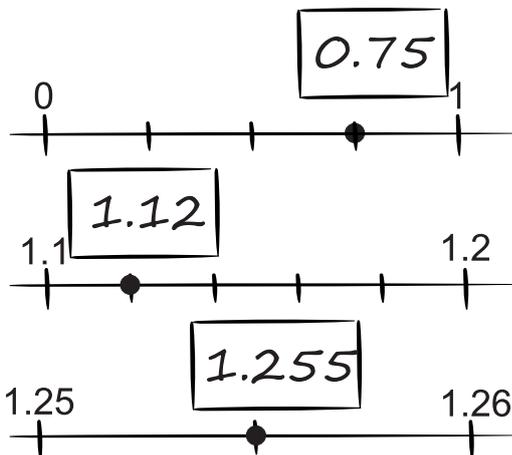
---

2. A father tells his daughter that she can either have her inheritance of \$100,000 or she can have 1c and then each day he will give her double the previous days money all through February for a total of 28 days. Which should she choose and why?

*Doubling each day will give her \$1,342,177.28*

---

3. Look at each number line and write down the value that each point represents.



## ESTIMATION

Some calculators do not have a square root key however you can still calculate the square root of a number by using the multiplication key and estimation.

e.g.  $\sqrt{17}$  this is very close to  $\sqrt{16}$

$$4.1^2 = 16.81$$

$$4.11^2 = 16.89$$

$$4.12^2 = 16.97$$

$$4.121^2 = 16.9882$$

$$4.122^2 = 16.991$$

$$4.123^2 = 16.9991 \text{ this is a good approximation of } \sqrt{17} \text{ to 3 DP}$$

Without using the square root key on a calculator try and find the following square roots to 3 decimal places.

1. 11

2. 37

3. 6

4. 37

---

3.317

6.082

2.449

6.083

---



---



---



---

## PUZZLE

Place the digits 1, 2, 3, 4, 6 and 9 into the squares so that the multiplication problem is correct.

$$\begin{array}{r}
 \boxed{6} \boxed{4} \\
 \times \quad \boxed{3} \\
 \hline
 \boxed{1} \boxed{9} \boxed{2}
 \end{array}$$

## SUDOKU

1	8	<b>7</b>	6	4	2	5	9	<b>3</b>
9	<b>6</b>	<b>2</b>	5	1	3	7	4	<b>8</b>
<b>4</b>	3	<b>5</b>	9	8	<b>7</b>	6	1	2
3	<b>2</b>	4	<b>9</b>	<b>7</b>	5	8	6	1
6	<b>5</b>	<b>9</b>	1	3	8	<b>2</b>	<b>7</b>	4
7	1	8	2	<b>6</b>	<b>4</b>	9	<b>3</b>	5
5	4	6	<b>3</b>	8	9	1	2	<b>7</b>
<b>8</b>	7	1	4	<b>2</b>	6	<b>3</b>	<b>5</b>	9
<b>2</b>	9	3	7	5	1	<b>4</b>	8	6

## NUMERACY STRATEGIES - ADDITION

Addition can be easier if you break down the numbers into powers of 10.

e.g.  $27 + 42$        $20 + 7 + 40 + 2 = 60 + 9$       Sum = 69

1.  $43 + 56$        $40+50 + 3+6 = 99$

---

2.  $17 + 82$        $10+80 + 7+2 = 99$

---

3.  $34 + 55$        $30+50 + 4+5 = 89$

---

4.  $132 + 65$        $100 + 30+60 + 2+7 = 197$

---

5.  $153 + 35$        $100 + 50+30 + 3+5 = 188$

---

6.  $112 + 42$        $100 + 10+40 + 2+2 = 154$

---

7.  $215 + 23$        $200 + 10+20 + 5+3 = 138$

---

8.  $1410 + 305$        $1000 + 400+300 + 10 + 5 = 1715$

---

9.  $2715 + 1272 = 3987$

---

10.  $1731 + 2256 = 3987$

---

### DECIMAL SUMS

Calculate the decimal sums.

1.  $3.7 + 2.2 = 5.9$

2.  $4.5 + 6.3 = 10.8$

3.  $5.5 + 6.3 = 11.8$

4.  $15.7 + 13.2 = 28.9$

5.  $12.03 + 0.66 = 12.69$

6.  $3.7 + 4.5 = 8.2$

7.  $4.7 + 8.6 = 13.3$

8.  $7.7 + 8.8 = 16.5$

9.  $12.45 + 1.66 = 14.11$

10.  $14.06 + 1.97 = 16.03$

### INVESTIGATION

Complete these calculations.

1.  $35 \boxed{+} 64 = 99$

2.  $60 \boxed{\div} 15 = 4$

3.  $75 \boxed{-} 60 = 15$

4.  $999 \boxed{-} 337 = 666$

5.  $22 \boxed{+} 41 = 63$

6.  $19 \boxed{\times} 3 = 57$

7.  $121 \boxed{\div} 11 = 11$

8.  $7 \boxed{\times} 63 = 441$

9.  $225 \boxed{\div} 25 = 9$

10.  $141 \boxed{-} 3 = 138$

## NUMERACY STRATEGIES - DIVISION

Division can be easier if you find the same fractions of the original numbers.

$$\begin{aligned} \text{e.g. } 64 \div 16 &= 32 \div 8 \\ &= 16 \div 4 \\ &= 8 \div 2 \\ &= 4 \end{aligned}$$

Try these divisions by using the above method.

$$1. \quad 92 \div 4 = 23$$

$$6. \quad 384 \div 16 = 24$$

$$2. \quad 112 \div 8 = 14$$

$$7. \quad 192 \div 8 = 24$$

$$3. \quad 128 \div 4 = 32$$

$$8. \quad 84 \div 6 = 14$$

$$4. \quad 180 \div 4 = 45$$

$$9. \quad 288 \div 8 = 36$$

$$5. \quad 336 \div 8 = 42$$

$$10. \quad 150 \div 6 = 25$$

### QUICK QUESTIONS

Use any strategy except for a calculator.

$$1. \quad 153 + 47 = 200$$

$$6. \quad \$13.15 \times 3 = \$39.45$$

$$2. \quad 111 - 97 = 14$$

$$7. \quad \$1.52 \div 4 = \$0.38$$

$$3. \quad 43 \times 7 = 301$$

$$8. \quad \frac{1}{7} + \frac{2}{7} = \frac{3}{7}$$

$$4. \quad 125 \times 10 = 1250$$

$$9. \quad 83c + 17c = \$1$$

$$5. \quad 141 \div 3 = 47$$

$$10. \quad \frac{1}{2} \text{ of } \frac{1}{8} = \frac{1}{16}$$

# BLUE - Worksheet 10

## NUMERACY STRATEGIES - SUBTRACTION

Subtraction can be easier if you break down the numbers into powers of 10.

e.g.  $57 - 35 = (50 + 7) - (30 + 5) = (50 - 30) + (7 - 5) = 22$

1.  $67 - 42 = (60 - 40) + (7 - 2) = 25$

---

2.  $95 - 71 = (90 - 70) + (5 - 1) = 24$

---

3.  $48 - 17 = (40 - 10) + (8 - 7) = 31$

---

4.  $97 - 65 = (90 - 60) + (7 - 5) = 32$

---

5.  $345 - 123 = (300 - 100) + (40 - 20) + (5 - 3) = 222$

---

6.  $83 - 41 = (80 - 40) + (3 - 1) = 42$

---

7.  $129 - 17 = (120 - 10) + (9 - 7) = 112$

---

8.  $348 - 236 = (300 - 200) + (40 - 30) + (8 - 6) = 112$

---

9.  $415 - 205 = (400 - 200) + (10 - 0) + (5 - 5) = 210$

---

10.  $1381 - 130 = (1300 - 100) + (80 - 30) + (1 - 0) = 1251$

---

## NUMBER APPLICATIONS

1. Three men sprinted 100 metres, each with the following times:

Peter 9.91 seconds 2

Michael 9.97 seconds 3

Philip 9.899 seconds 1

the  
**Winner!**

Philip

Who was first, second and third?

Add and subtract the following fractions

$$1. \quad \frac{2}{7} + \frac{2}{7} = \frac{4}{7}$$

$$2. \quad \frac{3}{9} + \frac{2}{9} = \frac{5}{9}$$

$$3. \quad \frac{25}{63} + \frac{14}{63} = \frac{39}{63} = \frac{13}{21}$$

$$4. \quad \frac{11}{20} + \frac{3}{20} + \frac{4}{20} = \frac{18}{20} = \frac{9}{10}$$

$$5. \quad \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3} = 1$$

$$6. \quad \frac{4}{9} - \frac{2}{9} = \frac{2}{9}$$

$$7. \quad \frac{11}{12} - \frac{3}{12} = \frac{8}{12} = \frac{2}{3}$$

$$8. \quad \frac{21}{30} - \frac{11}{30} = \frac{10}{30} = \frac{1}{3}$$

$$9. \quad \frac{5}{50} - \frac{4}{50} = \frac{1}{50}$$

$$10. \quad \frac{21}{67} - \frac{17}{67} = \frac{4}{67}$$

$$1. \quad \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$$

$$2. \quad \frac{1}{4} + \frac{1}{7} = \frac{11}{28}$$

$$3. \quad \frac{3}{4} + \frac{2}{7} = \frac{29}{28}$$

$$4. \quad \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$$

$$5. \quad \frac{3}{11} + \frac{2}{5} = \frac{37}{55}$$

$$6. \quad \frac{1}{8} - \frac{1}{7} = \frac{-1}{56}$$

$$7. \quad \frac{2}{5} + \frac{1}{4} = \frac{13}{20}$$

$$8. \quad \frac{2}{5} - \frac{1}{4} = \frac{3}{20}$$

$$9. \quad \frac{3}{4} - \frac{2}{7} = \frac{13}{28}$$

$$10. \quad \frac{1}{2} + \frac{1}{4} - \frac{1}{3} = \frac{5}{12}$$

Simplify the following fractions.

$$1. \quad \frac{6}{10} \quad \frac{3}{5}$$

$$2. \quad \frac{3}{15} \quad \frac{1}{5}$$

$$3. \quad \frac{9}{15} \quad \frac{3}{5}$$

$$4. \quad \frac{20}{50} \quad \frac{2}{5}$$

$$5. \quad \frac{21}{28} \quad \frac{3}{4}$$

$$6. \quad \frac{14}{10} \quad \frac{7}{5}$$

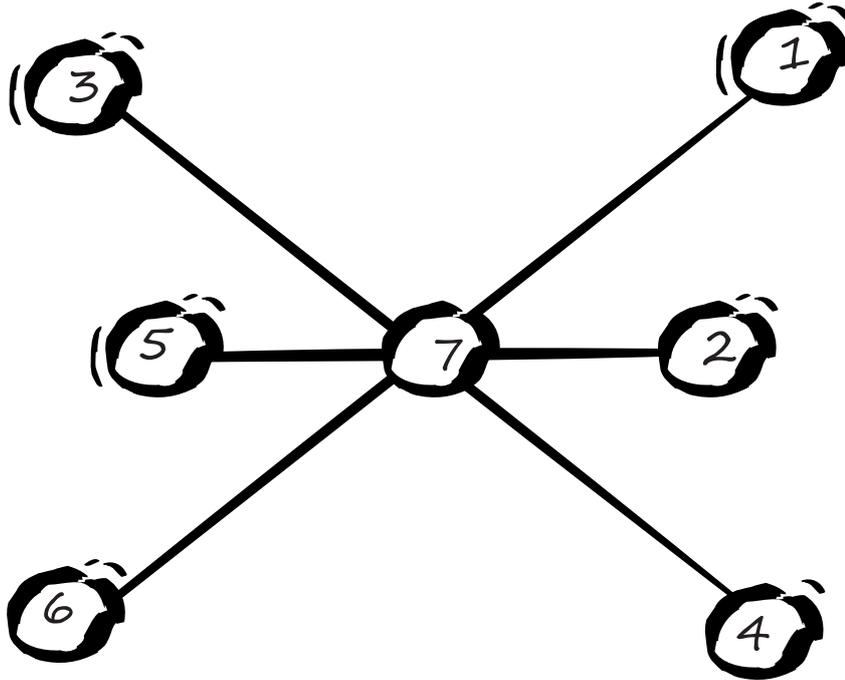
$$7. \quad \frac{32}{20} \quad \frac{8}{5}$$

$$8. \quad \frac{28}{42} \quad \frac{2}{3}$$

$$9. \quad \frac{18}{64} \quad \frac{9}{32}$$

## PUZZLE

Place the numbers 1, 2, 3, 4, 5, 6 and 7 in the circles so that the sum along each line is 14.



## APPLICATIONS

- Jane intends travelling to Britain. A bank is selling British currency at 0.4413 pounds (£) for each dollar.  
Convert NZ\$ 3 500 to British pounds.

$$3500 \times 0.4413 = \pounds 1544.55$$

- Jane decides the next day she is not going overseas and wants to convert the pounds back to New Zealand dollars. The buy rate of the bank is 0.4453 pounds (£) per NZ dollar (\$).  
How much in New Zealand dollars would this be?

$$1544.55 \div 0.4453 = \$3468.56$$

- Why is there a difference between what she initially spent and what she received a day later?

*the bank's transaction profit*

## INVESTIGATION

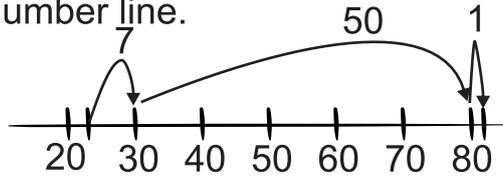
Find the odd one out in each of these sets of sums.

1.	$93 + 145 + 12$ 250	$175 - 8 + 83$ 250	$153 + 124 - 2$ 254
2.	$215 \times 12$ 2580	$50 \times 53$ 2650	$43 \times 60$ 2580
3.	$4032 \div 63$ 64	$320 \div 5$ 64	$804 \div 12$ 67

## NUMERACY STRATEGIES - ADDITION

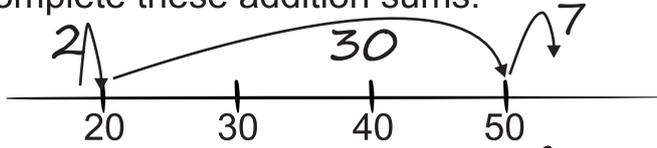
Addition can be easier if you use a number line.

e.g.  $23 + \boxed{58} = 81$

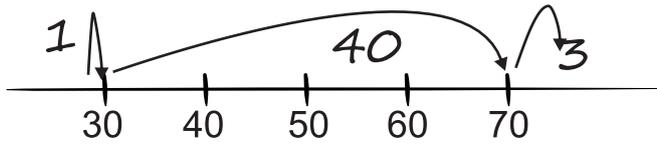


Use the number lines to complete these addition sums.

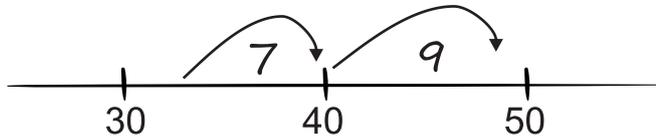
1.  $18 + \boxed{39} = 57$



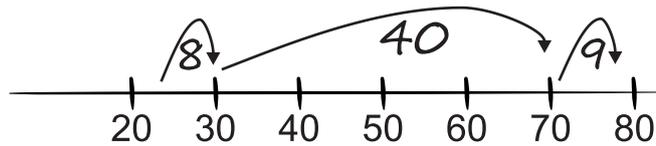
2.  $29 + \boxed{44} = 73$



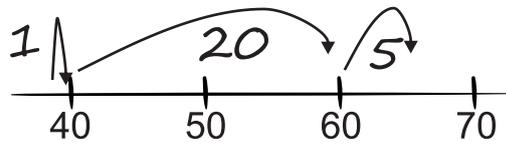
3.  $33 + \boxed{16} = 49$



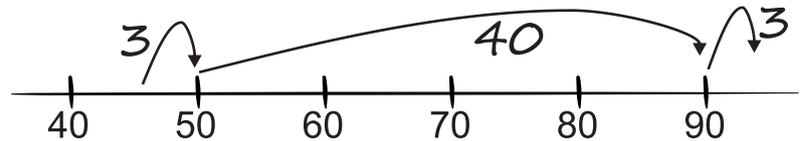
4.  $22 + \boxed{57} = 79$



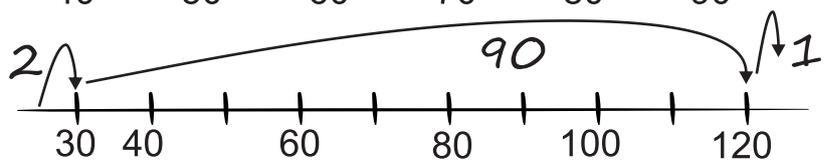
5.  $39 + \boxed{26} = 65$



6.  $47 + \boxed{46} = 93$



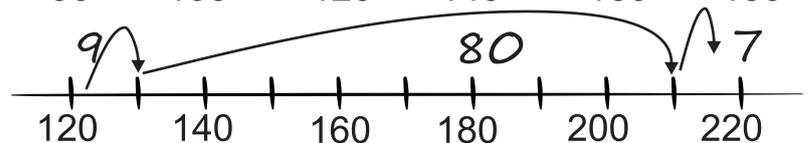
7.  $28 + \boxed{93} = 121$



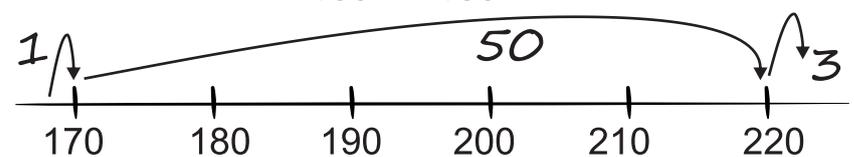
8.  $93 + \boxed{80} = 173$



9.  $121 + \boxed{96} = 217$



10.  $169 + \boxed{54} = 223$



# BLUE - Worksheet 11

## APPLICATIONS

1. Two different shops advertise oranges for sale.



Which shop is giving the best buy for 7kg of oranges?

---

$$\text{Shop A} = \$1.60 \text{ per kg}$$

---

$$\text{Shop B} = \$1.50 \text{ per kg}$$

---

Shop B is giving the best price

---

2. Two building suppliers advertise topsoil for sale.

Building Supplier A offers topsoil at \$130 per 2 cubic metres.

Building Supplier B offers topsoil at \$25 per  $\frac{1}{2}$  cubic metre.

Which supplier offers the best buy for 3 cubic metres of topsoil?

---

$$\text{Supplier A: } \frac{\$130}{2 \text{ kg}} = \$65 \text{ per kg}$$

---

$$\text{Supplier B: } \frac{\$25}{\frac{1}{2} \text{ kg}} = \$40 \text{ per kg}$$

---

Supplier B giving the best buy

---

## INVESTIGATION

Use any of the the symbols ( , ), +, -, ×, or ÷ to make the expression below into the largest possible number. Each symbol can only be used once.

$$(9 + 7) \times 16 \div 0.5 = 512$$

## SOLVE THE CODE

Solve the following equations. Place the letter in the table below to solve the code.

1. 

A
---

 $\frac{3}{5} + \frac{1}{6} = \frac{23}{30}$
2. 

N
---

 $\frac{3}{5} - \frac{2}{6} = \frac{4}{15}$
3. 

P
---

 $\frac{3}{5} - \frac{1}{4} = \frac{7}{20}$
4. 

I
---

 $\frac{4}{5} - \frac{1}{6} = \frac{19}{30}$
5. 

O
---

 $\frac{4}{6} + \frac{1}{6} = \frac{5}{6}$
6. 

H
---

 $\frac{1}{5} + \frac{1}{3} = \frac{8}{15}$
7. 

C
---

 $\frac{1}{5} + \frac{1}{4} = \frac{9}{20}$
8. 

M
---

 $\frac{5}{8} + \frac{2}{3} = \frac{31}{24}$
9. 

W
---

 $\frac{1}{6} + \frac{1}{3} = \frac{1}{2}$
10. 

U
---

 $\frac{1}{6} + \frac{1}{5} = \frac{11}{30}$
11. 

T
---

 $\frac{5}{6} - \frac{2}{3} = \frac{1}{6}$
12. 

S
---

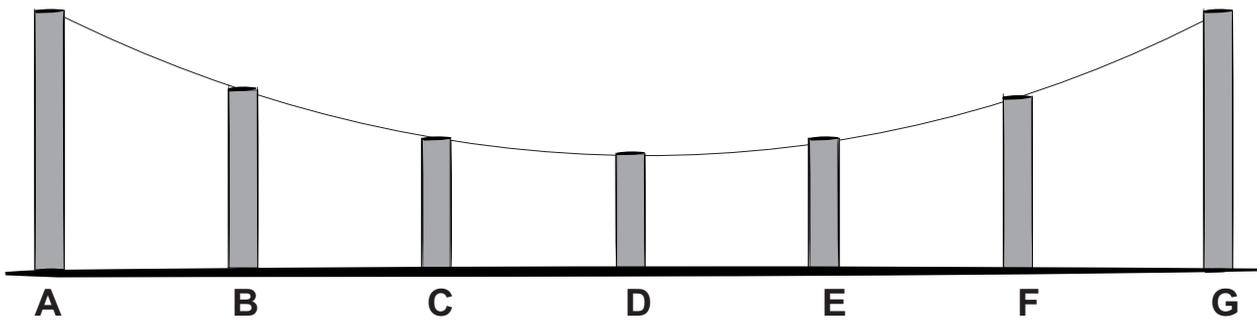
 $\frac{5}{6} - \frac{1}{4} = \frac{14}{24} = \frac{7}{12}$

WHAT IS A VOLCANO?

A	M	O	U	N	T	A	I	N
$\frac{23}{30}$	$\frac{31}{24}$	$\frac{5}{6}$	$\frac{11}{30}$	$\frac{4}{15}$	$\frac{1}{6}$	$\frac{23}{30}$	$\frac{19}{30}$	$\frac{4}{15}$

W	I	T	H	H	I	C	C	U	P	S
$\frac{1}{2}$	$\frac{19}{30}$	$\frac{1}{6}$	$\frac{8}{15}$	$\frac{8}{15}$	$\frac{19}{30}$	$\frac{9}{20}$	$\frac{9}{20}$	$\frac{11}{30}$	$\frac{7}{20}$	$\frac{7}{12}$

## APPLICATION



The above diagram is of a section of a bridge.  
A, B, C, D, E, F, G are vertical supports.

The vertical support A = 10 metres long.  
ALSO: length A = G, length B = F and length C = E

The length of B is  $\frac{3}{5}$  of A.

The length of C is  $\frac{4}{5}$  of B

The length of D is  $\frac{9}{10}$  of C

Calculate the total length of the supports.

$$B = \frac{3}{5} \text{ of } 10\text{m} = 6\text{m}$$

$$B + F = 12 \text{ m}$$

$$C = \frac{4}{5} \text{ of } 6\text{m} = 4.8\text{m}$$

$$C + E = 9.6 \text{ m}$$

$$D = \frac{9}{10} \text{ of } 4.8\text{m} = 4.32\text{m}$$

$$D = 4.32 \text{ m}$$

$$A + G = 20 \text{ m}$$

$$\text{total} = 45.92 \text{ m}$$

## FRACTIONS TO DECIMALS

Change these fractions to decimals.

1.  $\frac{1}{10}$  0.1

6.  $\frac{3}{8}$  0.375

2.  $\frac{3}{10}$  0.3

7.  $\frac{3}{1000}$  0.003

3.  $\frac{2}{5}$  0.4

8.  $\frac{21}{50}$  0.42

4.  $\frac{17}{100}$  0.17

9.  $\frac{8}{20}$  0.4

5.  $\frac{1}{8}$  0.125

10.  $1\frac{3}{4}$  1.75

## DECIMALS TO FRACTIONS

Change these decimals to fractions.

1.  $0.4 = \frac{4}{10} = \frac{2}{5}$

2.  $0.5 = \frac{5}{10} = \frac{1}{2}$

3.  $0.2 = \frac{2}{10} = \frac{1}{5}$

4.  $0.13 = \frac{13}{100}$

5.  $0.27 = \frac{27}{100}$

6.  $0.314 = \frac{314}{1000} = \frac{157}{500}$

7.  $0.175 = \frac{175}{1000} = \frac{7}{40}$

8.  $0.002 = \frac{2}{1000} = \frac{1}{500}$

9.  $0.006 = \frac{6}{1000} = \frac{3}{500}$

10.  $0.01 = \frac{1}{100}$

## QUICK QUESTIONS

Use any strategy. Don't use a calculator.

1.  $1.41 + 2.53 = \underline{3.94}$

2.  $25.4 - 24.1 = \underline{1.3}$

3.  $25 \times 7 = \underline{175}$

4.  $2.5 \times 7 = \underline{17.5}$

5.  $24 \div 3 = \underline{8}$

6.  $2.4 \div 3 = \underline{0.8}$

7. Round 3.156 to 1 DP.  
 $\underline{3.2}$

8.  $-2 + 4 = \underline{2}$

9.  $-2 - -3 = \underline{1}$

10.  $3 - -4 + -5 = \underline{2}$

11.  $2.15 + 4.62 = \underline{6.77}$

12.  $7.53 - 7.39 = \underline{0.14}$

13.  $24 \times 6 = \underline{144}$

14.  $2.4 \times 6 = \underline{14.4}$

15.  $141 \div 3 = \underline{47}$

16.  $14.1 \div 3 = \underline{4.7}$

17. Round 5.394 to 1 DP.  
 $\underline{5.4}$

18.  $-12 + 3 = \underline{-9}$

19.  $-4 - -6 = \underline{2}$

20.  $-8 + -2 - -6 = \underline{-4}$

# BLUE - Worksheet 12

## APPLICATIONS

1. Noel and Margaret each had a salary of \$60 000 in 2008. Noel's salary increased by 11% in 2009 and then increased 6% in 2010. Margaret's salary was increased by 6% in 2009 and then increased by 11% in 2010. Who had the greater salary in 2010? Make a guess then check your guess with a calculation.

*Both had the same salary in 2010*

---

*This is because in both cases you are multiplying \$60 000 by 1.11 and 1.06 = \$70, 596*

---

2. A person decides to go on a diet. To get to a healthy weight they must reduce their food intake by 15%.

An average intake is 9200 kJ a day.

How much of a reduction in average food intake would they need, to get to a healthy weight?

$$9200 \times 0.15 = 1380 \text{ kJ reduction.}$$

---

3. A real estate agent is paid a commission for selling a house. The commission is based on:

Sales for:           the first \$300 000, commission is 3.95%  
                          amounts above \$300 000, commission is 2%

How much would be paid to an agent who sells a house for \$757 000?

$$\text{First } \$300,000 \times 0.0395 = \$11\ 850$$

---

$$\text{Next } \$457,000 \times 0.02 = \$9\ 140$$

---

$$= \$20,990$$

---

## PERCENTAGES TO FRACTIONS AND FRACTIONS TO PERCENTAGES

Change to percentages:

1.  $\frac{1}{2}$  50%

2.  $\frac{3}{5}$  60%

3.  $\frac{17}{20}$  85%

4.  $\frac{41}{50}$  82%

5.  $\frac{7}{10}$  70%

6.  $\frac{1}{3}$  33.3%

7.  $\frac{5}{6}$  83.3%

8.  $\frac{2}{7}$  28.6%

9.  $\frac{14}{35}$  40%

10.  $\frac{26}{71}$  36.6%

Change to fractions:

1. 21%  $\frac{21}{100}$

2. 19%  $\frac{19}{100}$

3. 35%  $\frac{7}{20}$

4. 63%  $\frac{63}{100}$

5. 40%  $\frac{2}{5}$

6. 15%  $\frac{3}{20}$

7. 75%  $\frac{3}{4}$

8. 83%  $\frac{83}{100}$

9. 7%  $\frac{7}{100}$

10. 1%  $\frac{1}{100}$

### INVESTIGATION

How many times would you need to wind a string around your head before it was the same measurement as your height?

*3 times*

# WHAT IS THE BASIC PRINCIPLE BEHIND ASSETS?

Do the calculations and place the correct letter above the answers below.

- |   |  |
|---|--|
| 1. <b>T</b> $173 - 93 = 80$                   | 9. <b>I</b> $11.5 \div 1000 = 0.0115$      |
| 2. <b>U</b> $56 + 17 = 73$                    | 10. <b>D</b> $-17 + 25 = 8$                |
| 3. <b>E</b> $3 \times 31 + 7 \times 31 = 310$ | 11. <b>A</b> $-3 - -6 = 3$                 |
| 4. <b>M</b> $0.27 - 0.15 = 0.12$              | 12. <b>N</b> $2 \times -4 \times -3 = 24$  |
| 5. <b>O</b> $125 \times 3 = 375$              | 13. <b>G</b> $14 + (10 - 3 \times 2) = 18$ |
| 6. <b>R</b> $1.25 \times 3 = 3.75$            | 14. <b>W</b> $30\% \text{ of } 40 = 12$    |
| 7. <b>S</b> $0.351 \times 10 = 3.51$          | 15. <b>N</b> $2^5 = 32$                    |
| 8. <b>L</b> $0.0816 \times 100 = 8.16$        | 16. <b>H</b> $\sqrt{81} = 9$               |

<u>T</u>	<u>H</u>	<u>E</u>	<u>M</u>	<u>O</u>	<u>R</u>	<u>E</u>	<u>S</u>	<u>O</u>	<u>L</u>	<u>I</u>	<u>D</u>
80	9	310	0.12	375	3.75	310	3.51	375	8.16	0.0115	8

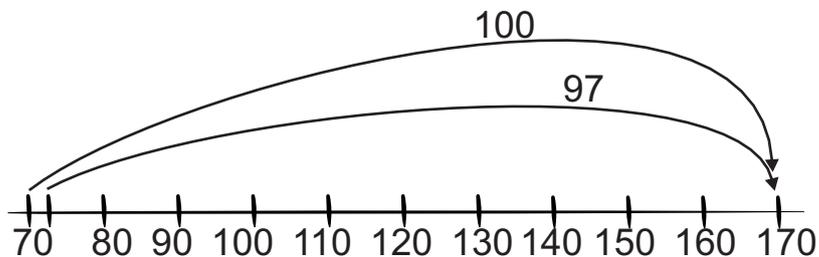
<u>T</u>	<u>H</u>	<u>E</u>	<u>A</u>	<u>S</u>	<u>S</u>	<u>E</u>	<u>T</u>	<u>T</u>	<u>H</u>	<u>E</u>
80	9	310	3	3.51	3.51	310	80	80	9	310

<u>L</u>	<u>O</u>	<u>N</u>	<u>G</u>	<u>E</u>	<u>R</u>	<u>I</u>	<u>T</u>
8.16	375	24	18	310	3.75	0.0115	80

<u>W</u>	<u>I</u>	<u>L</u>	<u>L</u>	<u>E</u>	<u>N</u>	<u>D</u>	<u>U</u>	<u>R</u>	<u>E</u>
12	0.0115	8.16	8.16	310	32	8	73	3.75	310

## ARITHMETIC STRATEGIES

$$\begin{array}{r} 73 + 97 \\ -3 \quad +3 \\ \hline 70 + 100 = 170 \end{array}$$



1.  $35 + 89$   
 $\pm 11 \gg 24 + 100 = 124$
2.  $47 + 96$   
 $\pm 4 \gg 43 + 100 = 143$
3.  $37 + 197$   
 $\pm 3 \gg 34 + 200 = 234$
4.  $93 + 289$   
 $\pm 11 \gg 82 + 300 = 382$   
 $\pm 7 \gg 100 + 282 = 382$
5.  $163 + 84$   
 $\pm 16 \gg 147 + 100 = 247$



6.  $47 + 87$   
 $\pm 13 \gg 34 + 100 = 134$
7.  $73 + 49$   
 $\pm 51 \gg 22 + 100 = 122$
8.  $114 + 97$   
 $\pm 3 \gg 111 + 100 = 211$
9.  $128 + 87$   
 $\pm 13 \gg 115 + 100 = 215$
10.  $311 + 93$   
 $\pm 7 \gg 304 + 100 = 404$

## QUICK QUESTIONS

Do these without a calculator.

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. <math>35 + 97 = 132</math></li> <li>2. <math>3.25 - 1.17 = 2.08</math></li> <li>3. <math>-7 - -12 = 5</math></li> <li>4. <math>2 \times -8 = -16</math></li> <li>5. <math>-4 \times -2 = 8</math></li> </ol> | <ol style="list-style-type: none"> <li>6. <math>8 \div -2 = -4</math></li> <li>7. <math>5 \times (2 + 4 \times 3) = 70</math></li> <li>8. <math>\frac{2}{3} + \frac{1}{5} = \frac{13}{15}</math></li> <li>9. <math>\frac{1}{3} \div \frac{3}{10} = 1\frac{1}{19}</math></li> <li>10. <math>\frac{4}{5} \times \frac{1}{6} = \frac{2}{15}</math></li> </ol> |
|--|--|

# BLUE - Worksheet 13

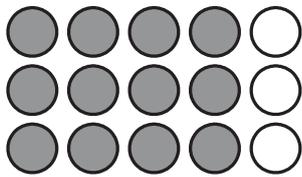
## RATIOS

Colour the following circles to show the ratios given.

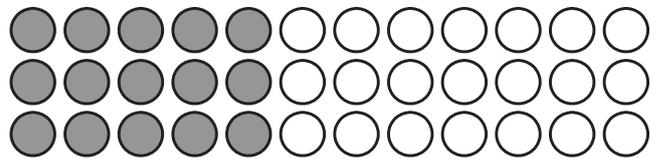
1.  $2 : 1$



2.  $4 : 1$

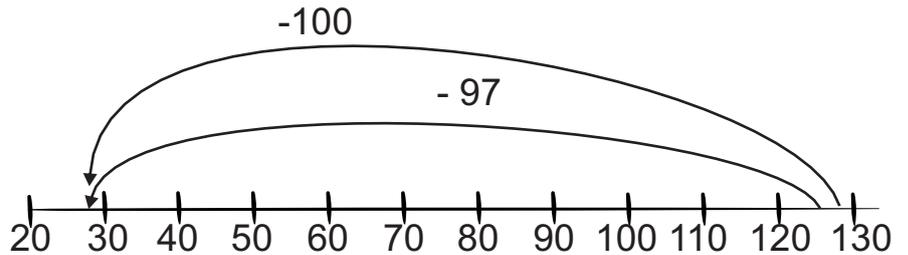


3.  $5 : 7$



## ARITHMETIC STRATEGIES

$$\begin{array}{r} 125 - 97 \\ + 3 \quad + 3 \\ \hline 128 - 100 = 28 \end{array}$$



1.  $834 - 99 = 735$

2.  $456 - 98 = 358$

3.  $183 - 89 = 94$

4.  $247 - 194 = 53$

5.  $314 - 184 = 130$



6.  $111 - 97 = 14$

7.  $176 - 94 = 82$

8.  $183 - 87 = 96$

9.  $218 - 92 = 126$

10.  $345 - 89 = 256$

## FIND THE HIDDEN MESSAGE

Do the calculations. Write the corresponding letter above the answers at the bottom of the page to solve the code.

1. **D** = 12% of 78  
= 9.36

10. **A** = 32% of 150  
= 48

2. **B** = 6% of 312  
= 18.72

11. **O** = 18% of 140  
= 25.2

3. **N** = 25% of 78  
= 19.5

12. **S** = 23% of 96  
= 22.08

4. **I** = 82% of 95  
= 77.9

13. **R** = 8% of 220  
= 17.6

5. **Y** = 14% of 60  
= 8.4

14. **K** = 19% of 72  
= 13.68

6. **T** = 20% of 150  
= 30

15. **L** = 25% of 120  
= 30

7. **H** = 17% of 130  
= 22.1

16. **U** = 18% of 160  
= 28.8

8. **C** = 11% of 44  
= 4.84

17. **W** = 50% of 162  
= 81

9. **E** = 7% of 215  
= 15.05

	C	O	W	B	O	Y	S	
	4.84	25.2	81	18.72	25.2	8.4	22.08	

	L	I	K	E		T	O	
	30	77.9	13.68	15.05		30	25.2	

	H	O	R	S	E	
	22.1	25.2	17.6	22.08	15.05	

	A	R	O	U	N	D
	48	17.6	25.2	28.8	19.5	9.36

## ARITHMETIC STRATEGIES

Multiplying using the distributive property.

$$\begin{aligned}5 \times 37 &= 5 \times (30 + 7) \\ &= 150 + 35 \\ &= 185\end{aligned}$$

1.  $6 \times 42 = 6 \times (40 + 2)$   
 $= 240 + 12$   
 $= 252$

2.  $7 \times 93 = 7 \times (90 + 3)$   
 $= 630 + 21$   
 $= 651$

3.  $5 \times 75 = 5 \times (70 + 5)$   
 $= 350 + 25$   
 $= 375$

4.  $315 \times 3 = 3 \times (300 + 10 + 5)$   
 $= 900 + 30 + 15$   
 $= 945$

5.  $812 \times 4 = 4 \times (800 + 10 + 2)$   
 $= 3200 + 40 + 8$   
 $= 3248$

6.  $46 \times 3 = 3 \times (40 + 6)$   
 $= 120 + 18$   
 $= 138$

7.  $81 \times 7 = 7 \times (80 + 1)$   
 $= 560 + 7$   
 $= 567$

8.  $1.25 \times 4 = 4 \times (1 + 0.25)$   
 $= 4 + 1$   
 $= 5$

9.  $7.36 \times 2 = 2 \times (7 + 0.36)$   
 $= 14 + 0.72$   
 $= 14.72$

10.  $3.4 \times 7 = 7 \times (3 + 0.4)$   
 $= 21 + 2.8$   
 $= 23.8$

## APPLICATIONS

Sanjit has an agreement with the bank which means that he can spend more money than he actually has in his account.

1. Sanjit has \$250 in his account. He withdraws \$450.  
How much does he now have in his account?

-\$200

2. Sanjit now banks his salary of \$325.  
How much does he now have in his account?

\$125

3. Sanjit spends \$200 using his EFTPOS card.  
How much does he now have in his account?

-\$75

4. Sanjit makes a further deposit of \$80.  
How much does he now have in his account?

\$5

## DIVISION STRATEGIES

Changing into a simpler number.

$$\begin{array}{ll} 24 \div 8 & \text{divide both by 2} \\ 12 \div 4 & \text{divide both by 2 again} \\ 6 \div 2 = 3 & \text{The Answer} \end{array}$$

Divide the following:

- $36 \div 9$   
 $\div 3$   
 $12 \div 3 = 4$
- $64 \div 8$   
 $32 \div 4$   
 $16 \div 2 = 8$
- $192 \div 16$   
 $96 \div 8$   
 $48 \div 4 = 12$
- $648 \div 24$   
 $108 \div 4$   
 $54 \div 2 = 27$
- $360 \div 24$   
 $120 \div 8$   
 $60 \div 4 = 15$

Changing to multiplication

$$\begin{array}{l} 84 \div 6 \\ 6 \times \underline{\quad} = 84 \text{ or } 3 \times \underline{\quad} = 42 \\ 6 \times 14 = 84 \quad 3 \times 14 = 42 \end{array}$$

Rewrite these as multiplications:

- $42 \div 7$   
 $6 \times 7 = 42$
- $84 \div 12$   
 $7 \times 12 = 84$
- $128 \div 8$   
 $16 \times 8 = 128$
- $63 \div 9$   
 $7 \times 9 = 63$
- $45 \div 5$   
 $9 \times 5 = 45$

## FRACTIONS, DECIMALS AND PERCENTAGES

Complete the table below.

Fraction	Decimals	Percentages
$\frac{3}{5}$	0.6	60%
$\frac{3}{25}$	0.12	12%
$\frac{9}{50}$	0.18	18%
$\frac{1}{8}$	0.125	12.5%
$1\frac{1}{4}$	1.25	125%
$\frac{9}{20}$	0.45	45%

# BLUE - Worksheet 14

## ODD ARITHMETIC

Calculate the answer to these. You might need help from a calculator.

1.  $7 + 3^6$

$$= 736$$

6.  $2^7 \times 6^3 - 9$

$$= 27639$$

2.  $3 + (9 \times 7)^2$

$$= 3972$$

7.  $(4 + 9 + 1 + 3)^3$

$$= 4913$$

3.  $(6^4 - 5) \times 5$

$$= 6455$$

8.  $5^6 + 4^6 + 8^6 + 8^6 + 3^6 + 4^6$

$$= 548834$$

4.  $(1 + 2^8) \times 5$

$$= 1285$$

9.  $9^7 + 9^7 + 2^7 + 6^7 + 3^7 + 1^7 + 5^7$

$$= 9926315$$

5.  $(3^6 + 8) \times 5$

$$= 3685$$

10.  $8^8 + 8^8 + 5^8 + 9^8 + 3^8 + 4^8 + 7^8 + 7^8$

$$= 88593477$$

## COUNTER EXAMPLES

A counter example is used to disprove a mathematical statement.

e.g. "When multiplying by 10, just add a zero."

Counter Example: " $4.72 \times 10 \neq 4.720$ " disproves the statement.

Give a counter example for each of these statements about decimals:

1. "A longer number means a larger number."

$$0.0876 < 1$$

2. "Putting zeros in front of a number makes no difference to the value."

$$0.05 \neq 0.5$$

3. "Numbers are things that you use to count."

you don't usually count in fractions or decimals but with whole numbers

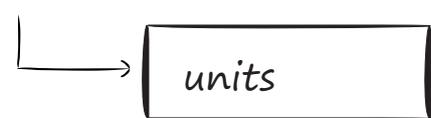
## COMPARING DECIMAL NUMBERS

Write the value of the 5 in each of these numbers.

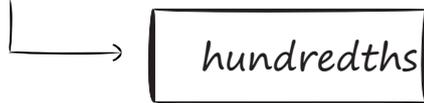
1. 4138.56



3. 35.83



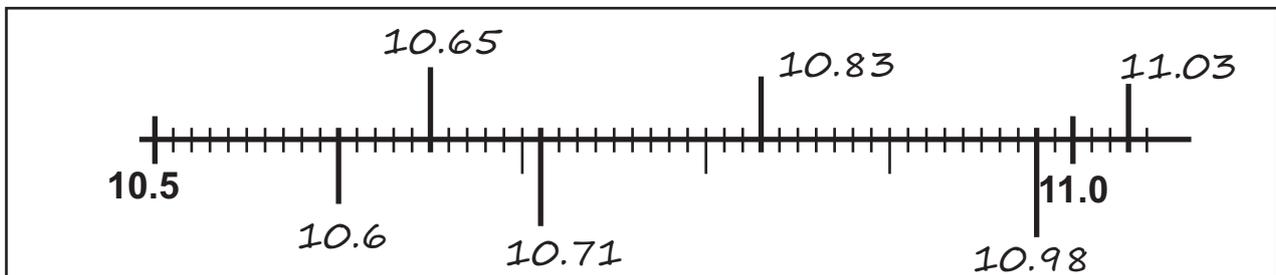
2. 126.05



4. 507.89



5. Locate each number on the number line.



6. Use a greater than (>), equals (=), or less than (<), to make each statement true.

9.0 < 9.06

55.10 > 55.01

15.41 < 16.60

2.34 < 4.12

0.20 > 0.03

13.7 > 13.08

10 > 0.23

80.03 < 80.3

3 = 3.0

### IMPORTANT DECIMAL FRACTIONS

Complete the decimals and fractions.

$$\frac{1}{2} = \frac{5}{10} = 0.5$$

$$\frac{1}{5} = \frac{20}{100} = \underline{0.2}$$

$$\frac{1}{4} = \frac{25}{100} = \underline{0.25}$$

$$\frac{2}{5} = \frac{40}{100} = \underline{0.4}$$

$$\frac{3}{4} = \frac{75}{100} = \underline{0.75}$$

$$\frac{3}{5} = \frac{60}{100} = \underline{0.6}$$

$$\frac{1}{8} = \frac{125}{1000} = \underline{0.125}$$

$$\frac{4}{5} = \frac{80}{100} = \underline{0.8}$$

## MORE DECIMALS AND FRACTIONS

Write these decimals in simplest fraction form.

1.  $0.88 = \frac{88}{100} = \frac{22}{25}$

5.  $0.825 = \frac{33}{40}$

2.  $0.375 = \frac{3}{8}$

6.  $0.025 = \frac{1}{40}$

3.  $0.15 = \frac{3}{20}$

7.  $0.005 = \frac{1}{200}$

4.  $0.04 = \frac{1}{25}$

8.  $0.125 = \frac{1}{8}$

9. Round these numbers to each of the decimal places indicated.

	1 decimal place	2 decimal places
1.541	<u>1.5</u>	<u>1.54</u>
4.328	<u>4.3</u>	<u>4.33</u>
6.255	<u>6.3</u>	<u>6.26</u>
0.198	<u>0.2</u>	<u>0.20</u>
3.091	<u>3.1</u>	<u>3.09</u>

10. Write a cheque for \$125.48 to the Maths Department. Then complete the cheque stub. You might have to research what a cheque is.

Cheque 13836 Date <u>Today's Date</u> To <u>Mahobe</u> For <u>Goods</u> Previous Balance <u>\$228.76</u> Deposit _____ This cheque <u>\$125.48</u> Balance <u>\$103.28</u>	 <b>Bank Kiwi</b> Mission Beach Auckland	date <u>Today's Date</u>
	Pay <u>Maths Department</u>	
	The sum of <u>one hundred and</u>	\$ <u>125.48</u>
	<u>twenty five dollars and forty eight cents</u>	
	NOT NEGOTIABLE <u>Kim GJ Freeman</u>	
	13836 091587 0024742 00	K Freeman

## THE PROBLEM WITH MOST MATHS EXAMS.

Complete each of the decimal arithmetic sums.

Use the letter beside each sum to crack the code below.

$$\begin{array}{r} 1.4 \\ + 2.3 \\ \hline \end{array}$$

**A** 3.7

$$\begin{array}{r} 38.86 \\ + 1.25 \\ \hline \end{array}$$

**E** 40.11

$$\begin{array}{r} 7.052 \\ 0.143 \\ + 2.585 \\ \hline \end{array}$$

**T** 9.78

$$\begin{array}{r} 4.26 \\ - 2.35 \\ \hline \end{array}$$

**U** 1.91

$$\begin{array}{r} 16.32 \\ - 8.75 \\ \hline \end{array}$$

**H** 7.57

$$\begin{array}{r} 44.19 \\ - 27.27 \\ \hline \end{array}$$

**Q** 16.92

$$\begin{array}{r} 0.4 \\ \times 0.3 \\ \hline \end{array}$$

**S** 0.12

$$\begin{array}{r} 0.45 \\ \times 6 \\ \hline \end{array}$$

**N** 2.7

$$\begin{array}{r} 51.8 \\ \times 0.4 \\ \hline \end{array}$$

**L** 20.72

$5.9 \times 10 =$  59 **R**

$6.2 \times 1000 =$  6200 **O**

$58.14 \times 100 =$  5814 **I**

$0.18 \div 0.3 =$  0.6 **G**

$0.54 \div 9 =$  0.06 **U**

$100 \div 0.01 =$  10 000 **Y**

$18 \div 8 =$  2.25 **W**

$10.5 \div 0.5 =$  21 **V**

$21.6 \div 0.3 =$  72 **B**

T H E      Q U E      S T I O N S  
 9.78 7.57 40.11      16.92 1.91 40.11      0.12 9.78 5814 6200 2.7 0.12

A R E      E A S Y      E N O U G H  
 3.7 59 40.11      40.11 3.7 0.12 10000      40.11 2.7 6200 1.91 0.6 7.57

I T S      T H E      A N S W E R S  
 5814 9.78 0.12      9.78 7.57 40.11      3.7 2.7 0.12 2.25 40.11 59 0.12

Y O U      H A V E  
 10000 6200 0.06      7.57 3.7 21 40.11

T R O U B L E      W I T H  
 9.78 59 6200 0.06 72 20.72 40.11      2.25 5814 9.78 7.57

# BLUE - Worksheet 15

## PERCENTAGES

1. Correct the following statement.

“ $\frac{1}{10}$  is 10% therefore  $\frac{1}{5}$  must be half and therefore 5%.”

one fifth is twice one tenth so must be 20%

2. Warren tells Jake that if you increase a price by 10%, then decrease it by 10% you must end up with the price you first started with.  
Is Warren correct?

Not correct.  $\$100 + 10\% = \$110$ , subtract 10% ( $\$11$ ) =  $\$99$

Calculate the following

3. 15% of \$60

$0.15 \times \$60 = \$9$

6. 25% of \$160

$0.25 \times \$160 = \$40$

4. 5% of \$1200

$0.05 \times \$1200 = \$60$

7. Increase \$180 by 15%

$1.15 \times \$180 = \$207$

5. 27.5% of \$2200

$0.275 \times \$2200 = \$605$

8. Decrease \$160 by 40%

$0.6 \times \$160 = \$96$

9. Ronan works in a clothing store. Staff in the store are allowed 20% discount off the retail price of clothing.

Calculate the discount that Ronan will receive if he purchases a \$40 shirt and the final price that he will pay for the shirt.

Discount is  $0.2 \times \$40 = \$8$ , final price =  $\$32$

## PERCENTAGE APPLICATIONS

Jessica deposits \$5000 in her account with the bank. The bank is offering 5% interest for deposits held for 1 year.

1. If Jessica leaves the \$5000 in her account for 1 year, how much interest would she have earned?

$$0.05 \times \$5000 = \$250$$

---

2. The government taxes all interest payments at 30%. Use your answer in 1. to calculate how much tax Jessica will pay from her interest earned and how much money she will have in her account at the end of the year.

$$0.3 \times \$250 = \$75$$

---

Therefore Jessica will have \$5175 in her account

---

In the store "Cut Price Fabrics" there is a 15% discount on all winter materials.

3. Lambert purchases 1.8 metres of tweed costing \$25 per metre. Below is the docket for the sale. Complete all the missing spaces and calculate the final amount Lambert has to pay.

### CUT PRICE FABRICS

Cash Sales

Customer: Lambert Mahobe

1.8 metre Tweet @ \$25 per metre	\$45
15% discount	\$ 6.75
Amount to pay	\$38.25

## ANSWERS IN REVERSE

Answer these quick questions.

4.  $9 + 9 = \underline{18}$      $9 \times 9 = \underline{81}$

5.  $24 + 3 = \underline{27}$      $24 \times 3 = \underline{72}$

6.  $47 + 2 = \underline{49}$      $47 \times 2 = \underline{94}$

7.  $497 + 2 = \underline{499}$      $497 \times 2 = \underline{994}$

## MULTIPLICATION PALINDROMES

8.  $12 \times 42 = 24 \times 21 = \boxed{504}$

9.  $13 \times 62 = 26 \times 31 = \boxed{806}$

10.  $34 \times 86 = 68 \times 43 = \boxed{2924}$

## WHY DOES IT WORK?

Are these fraction multiplications really correct?

Give the simplified answers and show that each answer is correct.

---

1.  $\frac{1}{4} \times \frac{8}{5} = \frac{18}{45}$      Answer =  $\frac{2}{5}$  which is equivalent

---

2.  $\frac{1}{2} \times \frac{5}{4} = \frac{15}{24}$      Answer =  $\frac{5}{8}$  which is equivalent

---

3.  $\frac{1}{6} \times \frac{4}{3} = \frac{14}{63}$      Answer =  $\frac{2}{9}$  which is equivalent

---

4.  $\frac{1}{9} \times \frac{9}{5} = \frac{19}{95}$      Answer =  $\frac{1}{5}$  which is equivalent

---

5.  $\frac{2}{6} \times \frac{6}{5} = \frac{26}{65}$      Answer =  $\frac{2}{5}$  which is equivalent

---

6.  $\frac{4}{9} \times \frac{9}{8} = \frac{49}{98}$      Answer =  $\frac{1}{2}$  which is equivalent

---

## QUICK QUESTIONS

Try and answer without a calculator.

1.  $6.4 \div 0.2 =$

2.  $56 \div 0.7 =$

3.  $0.9 \div 10 =$

4.  $85 \div 0.5 =$

5.  $7 \div 10 =$

6.  $429 \div 100 =$

7. Use a calculator to calculate:

$$\frac{19.9 - 3 \times 3.02}{12.1 - 9.9} = \underline{4.927 \text{ (3dp)}}$$

8. Write down approximate values for these values:

19.9	<input type="text" value="20"/>	3.02	<input type="text" value="3"/>
12.1	<input type="text" value="12"/>	9.9	<input type="text" value="10"/>

9. Use your values from 8. to calculate the approximate answer to question 7.

$$\underline{5.5}$$

10. How close is the approximate answer to the actual answer?

it seems a lot bigger

## APPLICATIONS

1. Clarice wants to go to Singapore for a holiday. At the bank she changes NZ\$500 to Singapore currency. The exchange rate is S\$1 = NZ\$0.96. How much Singapore money did she receive?

$$\$500 \div 0.96 = \$520.83$$


---

2. Boxes of maths textbooks weigh 15.25 kg. If the cardboard box weighs 0.25 kg and there are 30 books in a box, how much does each book weigh?

$$15 \text{ kg} \div 30 = 0.5 \text{ kg}$$


---

3. Here is part of a bank account statement that has not been fully calculated. Each withdrawal and deposit should be balanced. Fill in the missing 5 balances.

Date	Particulars	Withdrawal	Deposit	Balance
	Balance Forward			\$588.60
July 10	Rent	\$290		\$298.60
14	Wages		\$525.77	\$824.37
16	Petrol	\$88.55		\$735.82
17	Rent	\$290		\$445.82
19	Clothes	\$99.90		\$345.92

4. According to the newspaper, New Zealand families open the refrigerator 27 times a day. Is this number reasonable? Explain your answer.

*Yes. Consider a family of 3 or 4, each person opens door the 6-9 times, taking items like milk out, then putting it back.*

---

5. Look at the numbers below. Can you give the next number in the sequence? Explain your answer.

**4      12      28**



*52 pattern of differences between numbers 8, 16, 24 ... (+8)*

---

*60 - pattern of differences 8, 16, 32 ...*

---

*60 - squares of odd numbers + 3 (1<sup>2</sup> + 3, 3<sup>2</sup> + 3, 5<sup>2</sup> + 3)*

---

*4, 12, 28, 32, 36, 38 were the \$1 million lotto winning numbers!*

---

*Not all number sequences have to have a mathematical base!*

# BLUE - Worksheet 16

1. If petrol costs \$1.98 per litre, calculate the cost of 12 litres.

$$\underline{\$1.98 \times 12 = \$23.76}$$

2. Gwyneth fills up the petrol tank in her car at \$1.98 per litre. If it costs her \$88.11, how many litres of petrol does she purchase?

$$\underline{\$88.11 \div \$1.98 \text{ per litre} = 44.5 \text{ litres}}$$

3. Write down the next 3 prime numbers greater than 29.

31

37

41

4. Write the number 805 in words. eight hundred and five

5. Write the number one hundred thousand and sixty three in figures.

100 063

6. Look at the numbers 6432, 3015, 566, 3107, 727.  
Write the numbers in ascending order.

566

727

3015

3107

6432

7. Write down the next four numbers in the sequence

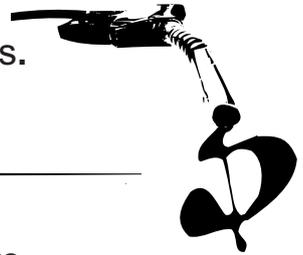
1, 7, 13, 19, 25,

31

37

43

49



8. Calculate the cost of 2 breakfasts, 1 with tea and 1 with coffee.

$$\underline{\$18.95 \times 2 = \$37.90}$$

$$\underline{\$1.70 + \$3.50 = \$5.20}$$

$$\underline{\text{Total} = \$43.10}$$

## Kim's Cafe

- Tea \$1.70
- Coffee: \$3.50
- Breakfast: \$18.95
- Today's Special: \$15.99



9. How many combinations of tea and coffee can be purchased for \$10?  
 (TC) 1 tea + 1 coffee = \$5.20, (TCC) 1 tea + 2 coffees = \$8.70  
 (CTTT) 1 coffee + 3 teas = \$8.70, (CTT) 1 coffee + 2 teas = \$6.90

10. Calculate the cost of "Today's Special" if it has been reduced by 25%.

$$\underline{\$15.99 \times 0.75 = \$11.99}$$

11. Write 25% as a fraction.  $\frac{1}{4}$

12. Paris puts \$248 into a new Kiwi Saver Account.  
 At the end of each year the bank guarantees to add 4% interest.

However at the end of each year Paris pays tax of 18% on interest earned.

At the end of the first and second years, Paris' parents add \$500 to the account.

Complete the table below to calculate how much Paris will have in the account at the end of the 3 years.

	Amount	Interest Received	Interest Taxed	New Total
<b>Year 1</b>	\$248	$\$248 \times 0.04$ = \$9.92	$\$9.92 \times 0.18$ = \$1.79	\$256.13
<b>Year 2</b>	\$256.13	$\$256.13 \times 0.04$ = \$10.25	$\$10.25 \times 0.18$ = \$1.85	\$264.53
<b>Year 3</b>	\$264.53	$\$264.53 \times 0.04$ = \$10.58	$\$10.58 \times 0.18$ = \$1.90	\$273.21

13. The monthly payment for a medical insurance scheme for Casey is \$21.60. Because of a no claims bonus scheme, this is reduced to \$18.36. The calculation to find the percentage reduction has been started below. Complete the calculation.

$$\begin{array}{r}
 \\
 \\
 \text{Reduced amount} \quad - \quad \begin{array}{r} \$21.60 \\ \underline{\$18.36} \\ \$3.24 \end{array} \\
 \\
 \text{Percentage reduction} = \frac{\text{amount of profit / loss}}{\text{original amount}} \times \frac{100}{1} \\
 = \frac{\$3.24}{\$21.60} \times \frac{100}{1} \\
 = \underline{15} \%
 \end{array}$$

14. The table below shows monthly premiums for the Mahobe Insurance Company. Monthly payments for life insurance depend on the age at which the customer joins the scheme. There are two rates - Gold and Standard Cover. The table below gives the monthly premiums for each policy.

Age	Monthly Premium	
	Gold Cover (\$)	Standard Cover (\$)
0 - 16	10.80	9.18
17 - 19	18.90	15.26
20 - 39	25.50	21.68
40 - 59	35.10	29.84
60 - 74	62.10	52.79
75 and over	127.20	108.12

Mac Saville is aged 20. He has a Gold Cover Life Insurance Policy.

- a. Calculate the total amount Mac will pay in premiums each year.

$$\underline{\$25.50 \times 12 = \$306}$$

Jennifer Saville has taken out a Standard Cover Life Insurance Policy in which she will pay \$21.68 per month. If Jennifer was 1 year older she would have to pay \$29.84 per month.

- b. How old is Jennifer Saville?

39 years old

Jake Saville is aged 76. He considers taking out a Gold Cover Policy. Because the rest of the family have all taken out policies the insurance agent gives Jake a discount. Instead of paying \$127.20 the amount is reduced to \$114.48.

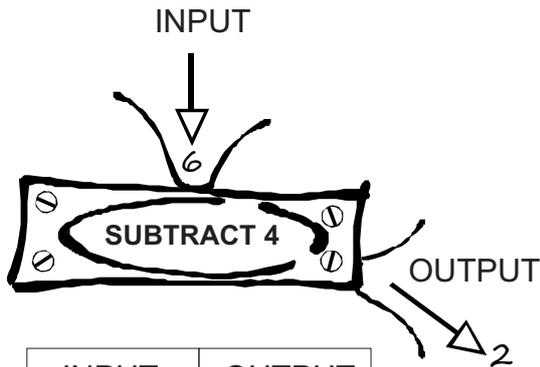
- c. Calculate the percentage reduction.

*Amount is reduced by \$12.72*

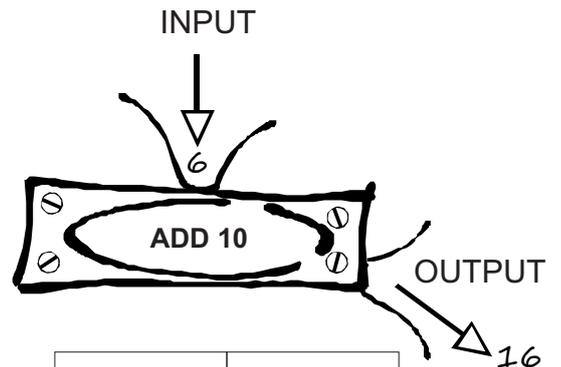
$$\$12.72 \div \$127.20 = 0.1$$

10%

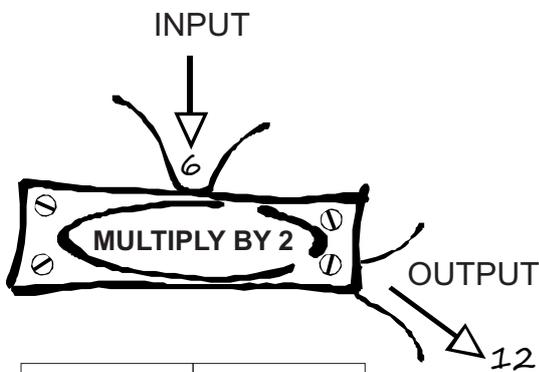
15. The diagrams below show different function machines. Numbers are input into the function machine and the output number is noted. Complete the table for each machine.



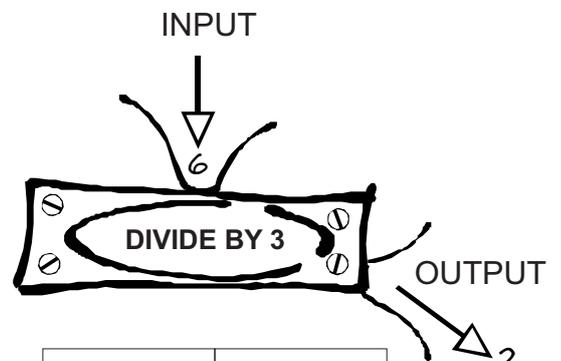
INPUT	OUTPUT
-5	-9
10	6
12	8
27	23
-8	-12
22	18
43	39
$n$	$n - 4$



INPUT	OUTPUT
-5	5
9	19
15	25
33	43
-22	-12
-2	8
17	27
$n$	$n + 10$



INPUT	OUTPUT
6	12
9	18
12	24
23	46
1	2
7.5	15
9	18
$n$	$2n$



INPUT	OUTPUT
-12	-4
9	3
18	6
48	16
-18	-6
27	9
66	22
$n$	$\frac{n}{3}$

# BLUE - Worksheet 17

## AND THE GOOD NEWS IS . . . .

Below is part of a report taken from a Bangkok newspaper. Complete the report by filling in the spaces with four of the six numbers given below.

**7      39      199      289      865      12000**

Hotel worker Thanesh Narkphong, 39, has had some good news and some bad news about his jail sentence according to a report by the Thai news agency.

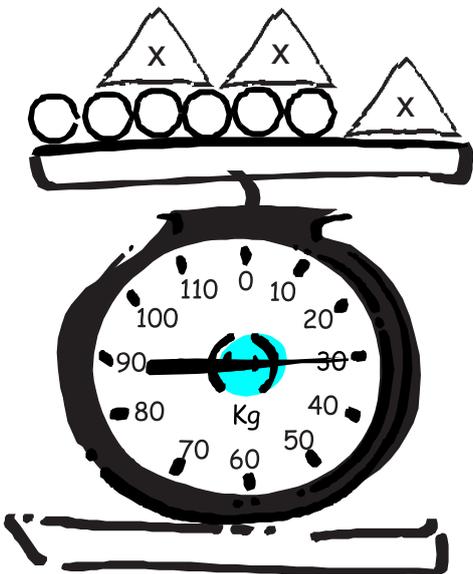
The good news was that his prison sentence for embezzling about \$ 12000 was cut yesterday by the appeals court.

The bad news was that the 865 year jail sentence was only reduced to 576 years.

The sentence was reduced 289 years on the grounds that Thanesh' testimony had proven useful.

## A WEIGHTY PROBLEM

The scales below show 6 circular 1 kilogram weights along with 3 triangular weights of unknown mass (x). The mass of all the weights is 30 kilograms. Find the mass of each triangular weights.



$$3x + 6 = 30$$

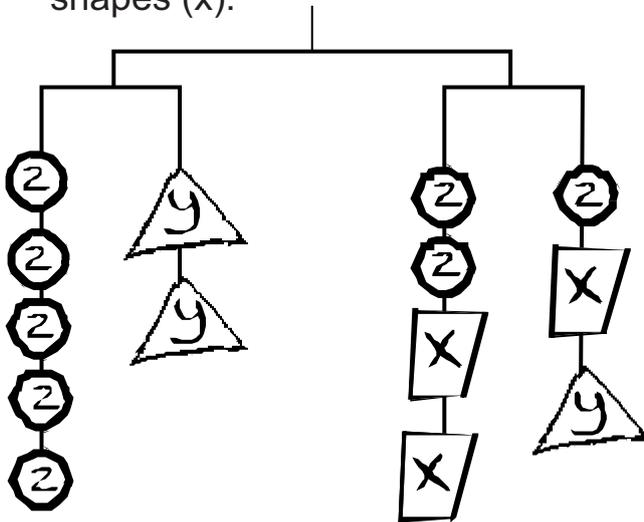
$$3x = 24$$

$$x = 8 \text{ kg}$$

## BALANCING EQUATIONS

The following mobile is hanging from the ceiling. The weight of each of the round balls is 2 grams, the weights of the triangular (y) and quadrilateral shapes (x) are not known.

1. By forming equations, find the weights of the triangular (y) and quadrilateral shapes (x).



$$10 = 2y$$

$$4 + 2x = 2 + x + y$$

$$10 = 2y, \text{ therefore } y = 5 \text{ grams}$$

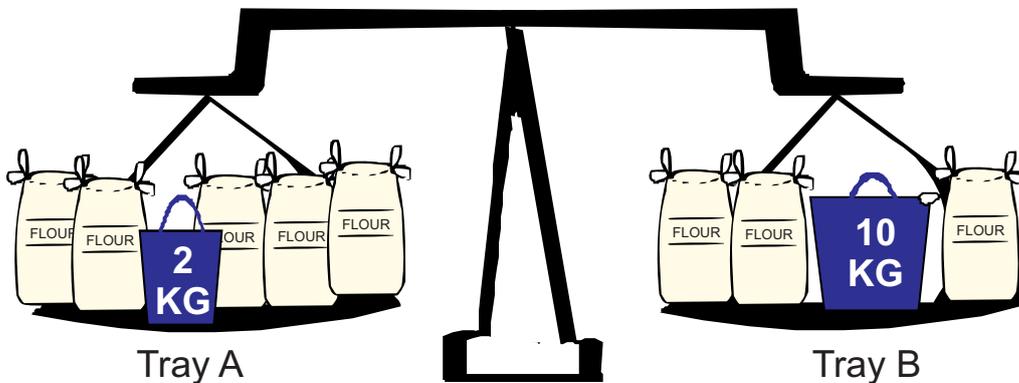
$$4 + 2x = 2 + x + y$$

$$4 + 2x = 2 + x + 5$$

$$2x - x = 2 + 5 - 4$$

$$x = 3 \text{ grams}$$

The diagram below shows a set of balance scales. On Tray A are 5 sacks of flour and a 2 kg weight. On Tray B there are 3 sacks of flour and a 10kg weight.



2. Write down two expressions - one for Tray A and one for Tray B. Use your expressions to calculate the weight of each sack of flour.

$$\text{Tray A} = 5x + 2$$

$$\text{Tray B} = 3x + 10$$

$$5x + 2 = 3x + 10$$

$$5x - 3x = 10 - 2$$

$$2x = 8$$

$$x = 4 \text{ kg}$$

## ROUNDING

Use a calculator to work out the answer to each problem below.

Round your answer to 1 decimal point (1 dp).

Each time the answer appears in the code write the letter of that problem above.

$$28.64 + 15.3 + 12.85 = \underline{56.8} \quad \mathbf{T}$$

$$0.231 + 6.487 + 9.106 = \underline{15.8} \quad \mathbf{W}$$

$$103.6 + 654.2 + 185.2 = \underline{943.0} \quad \mathbf{R}$$

$$34.39 - 18.66 = \underline{15.7} \quad \mathbf{G}$$

$$123.07 - 88.58 = \underline{34.5} \quad \mathbf{B}$$

$$56.98 - 19.68 = \underline{37.3} \quad \mathbf{E}$$

$$2.4 \times 8.3 = \underline{19.9} \quad \mathbf{N}$$

$$6.91 \times 0.11 = \underline{0.8} \quad \mathbf{O}$$

$$18.6 \times 7 = \underline{130.2} \quad \mathbf{C}$$

$$0.063 \times 10 = \underline{0.6} \quad \mathbf{A}$$

$$18.41 \div 3.5 = \underline{5.3} \quad \mathbf{U}$$

$$0.057 \div 0.6 = \underline{0.1} \quad \mathbf{I}$$

$$123.6 \div 2.4 = \underline{51.5} \quad \mathbf{R}$$

$$58.6 \div 100 = \underline{0.6} \quad \mathbf{Y}$$

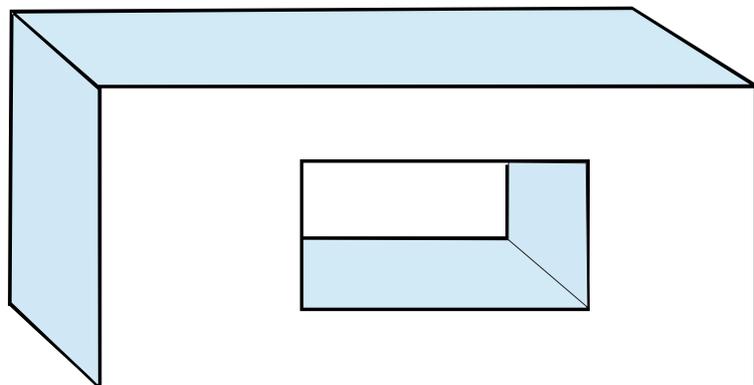
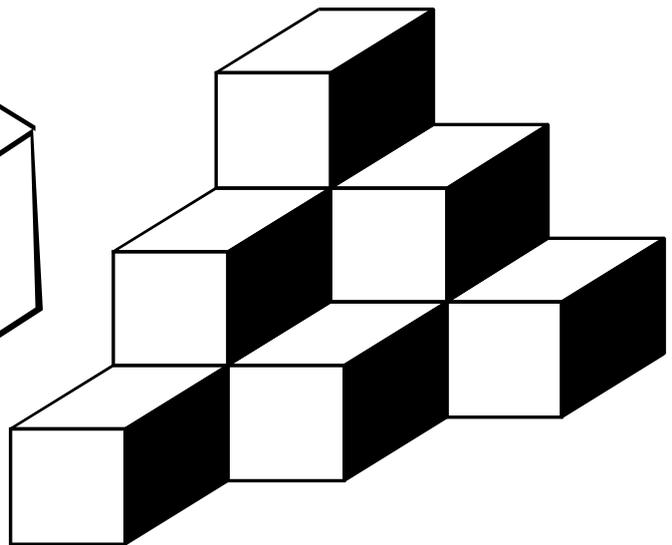
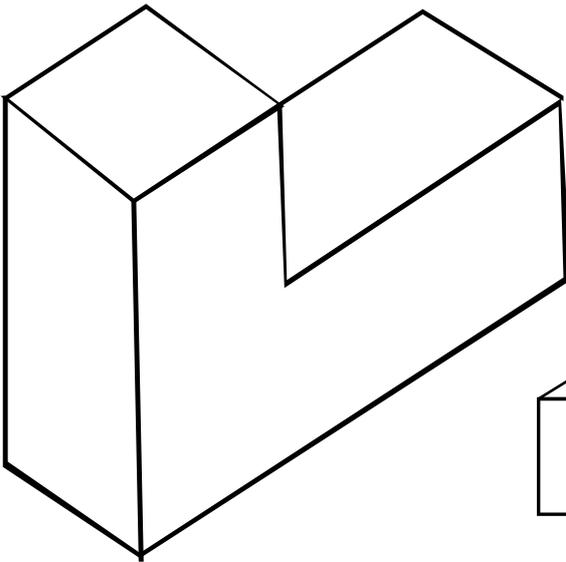
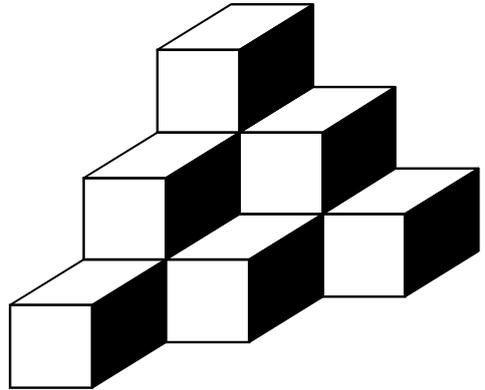
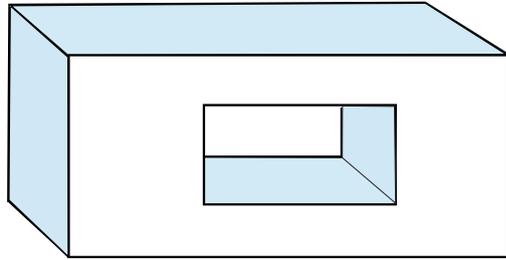
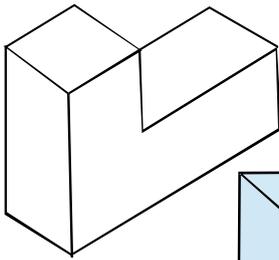
Sign on a teacher's door.

### FREE MATHS KNOWLEDGE

<u>B</u>	<u>R</u>	<u>I</u>	<u>N</u>	<u>G</u>		<u>Y</u>	<u>O</u>	<u>U</u>	<u>R</u>		
34.5	943.0	0.1	19.9	15.7		0.6	0.8	5.3	51.5		
<u>O</u>	<u>W</u>	<u>N</u>	<u>C</u>	<u>O</u>	<u>N</u>	<u>T</u>	<u>A</u>	<u>I</u>	<u>N</u>	<u>E</u>	<u>R</u>
0.8	15.8	19.9	130.2	0.8	19.9	56.8	0.6	0.1	19.9	37.3	51.5

# SKETCHING SOLIDS

Redraw at least 2 of the following figures using the grid provided.



# BLUE - Worksheet 18

## HOWLERS

The following fractions are known as “howlers”. Are the answers correct? Why can't you simplify fractions this way?

$$\frac{1\cancel{6}}{\cancel{6}4} = \frac{1}{4}$$

$$\frac{2\cancel{6}}{\cancel{6}5} = \frac{2}{5}$$

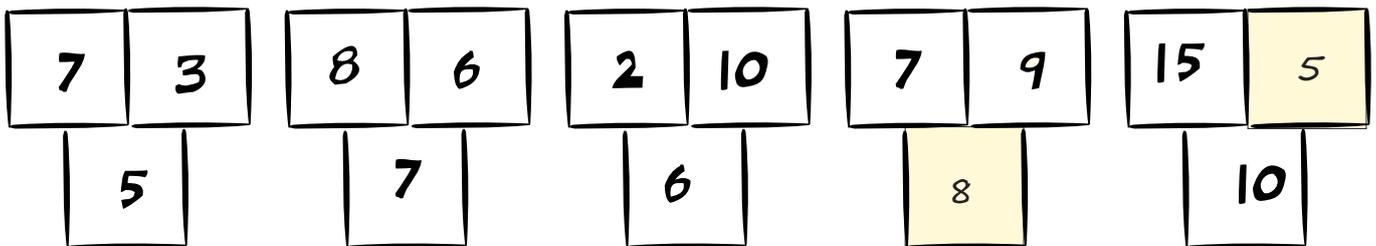
$$\frac{1\cancel{7}}{\cancel{7}5} = \frac{1}{5}$$

$$\frac{4\cancel{9}}{\cancel{9}8} = \frac{4}{8} = \frac{1}{2}$$

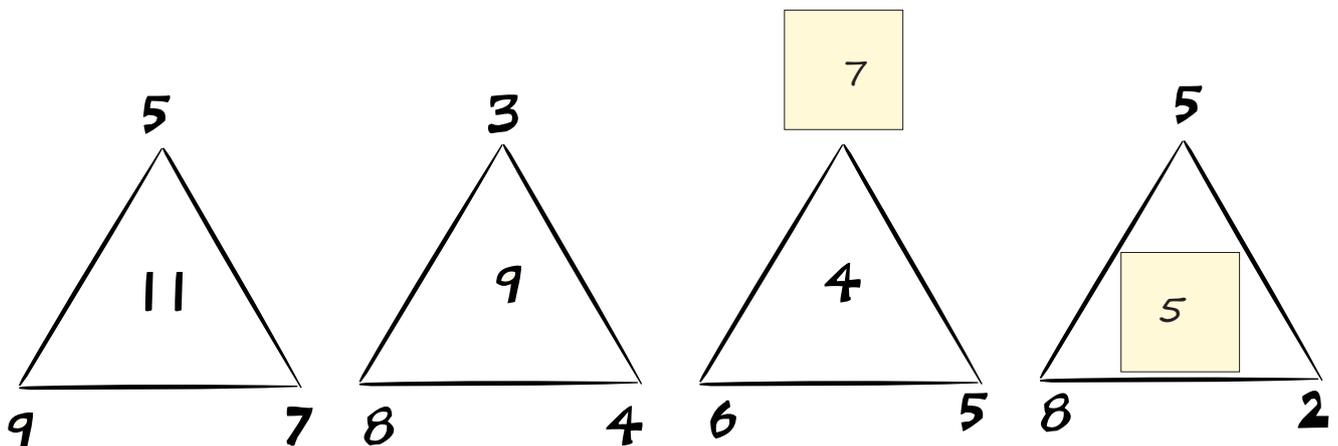
ALL the answers are correct but the numerators and denominators can only be canceled by dividing or multiplying by the same number.

## MIND BENDERS

Find the missing numbers in the shaded boxes.



Bottom square is  $\frac{1}{2}$  the sum of the top two



Sum the bottom numbers and subtract the top number

## EASY EQUATIONS

For each of the following, find the value of  $x$ .

1.  $x + 9 = 13$

$x = 4$

$x - 12 = 10$

$x = 22$

$x + 4 = 30$

$x = 26$

2.  $5x = 60$

$x = 12$

$2x = 28$

$x = 14$

$7x = 42$

$x = 6$

3.  $x - 9 = -1$

$x = 8$

$x + 7 = 5$

$x = -2$

$2 + x = 0$

$x = -2$

4.  $8x = -56$

$x = -7$

$-3x = 12$

$x = -4$

$9x = -117$

$x = -13$

5.  $x + 4 = 7.3$

$x = 3.3$

$x - 8.7 = 3.1$

$x = 11.8$

$x + 8.2 = 7.5$

$x = -0.7$

6.  $8x = 16.8$

$x = 2.1$

$7x = 24.5$

$x = 3.5$

$3.4x = 17$

$x = 5$

## TELLING THE TIME

Complete the following table.

24 hour time

12 hour time

08:30	8.30 am	Half past eight in the morning
12:15	12.15 pm	Fifteen past noon
13:40	1.40 pm	Twenty to two in the afternoon
21:25	9.25 pm	Twenty five past nine in the evening

## HARDER EQUATIONS

For each of the following, find the value of x.

1.  $2x + 8 = 20$

$x = 6$

---

---

$7x + 9 = 44$

$x = 5$

---

---

$9x + 2 = 29$

$x = 3$

---

---

2.  $5x - 4 = 11$

$x = 3$

---

---

$4x - 12 = 20$

$x = 8$

---

---

$7x - 8 = 20$

$x = 4$

---

---

3.  $2x - 8 = 14$

$x = 11$

---

---

$6x - 4 = -4$

$x = 0$

---

---

$12 - 4x = -4$

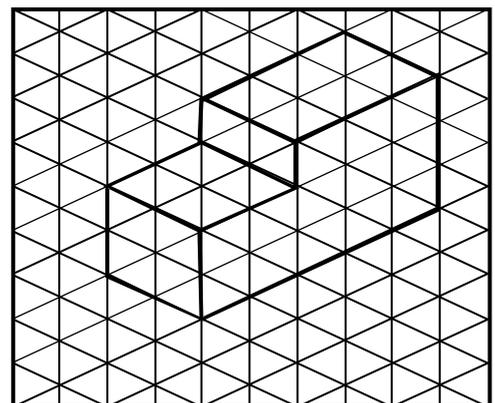
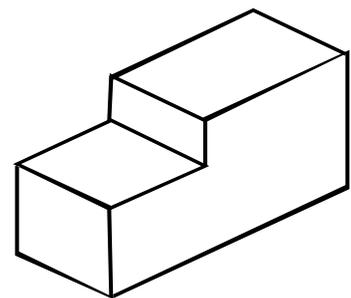
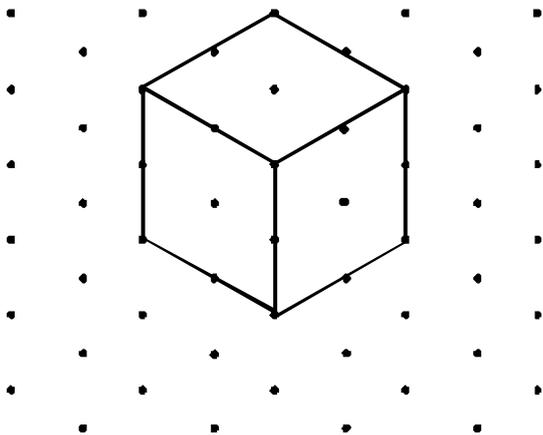
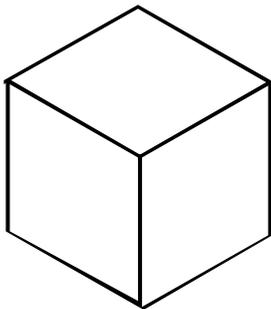
$x = 4$

---

---

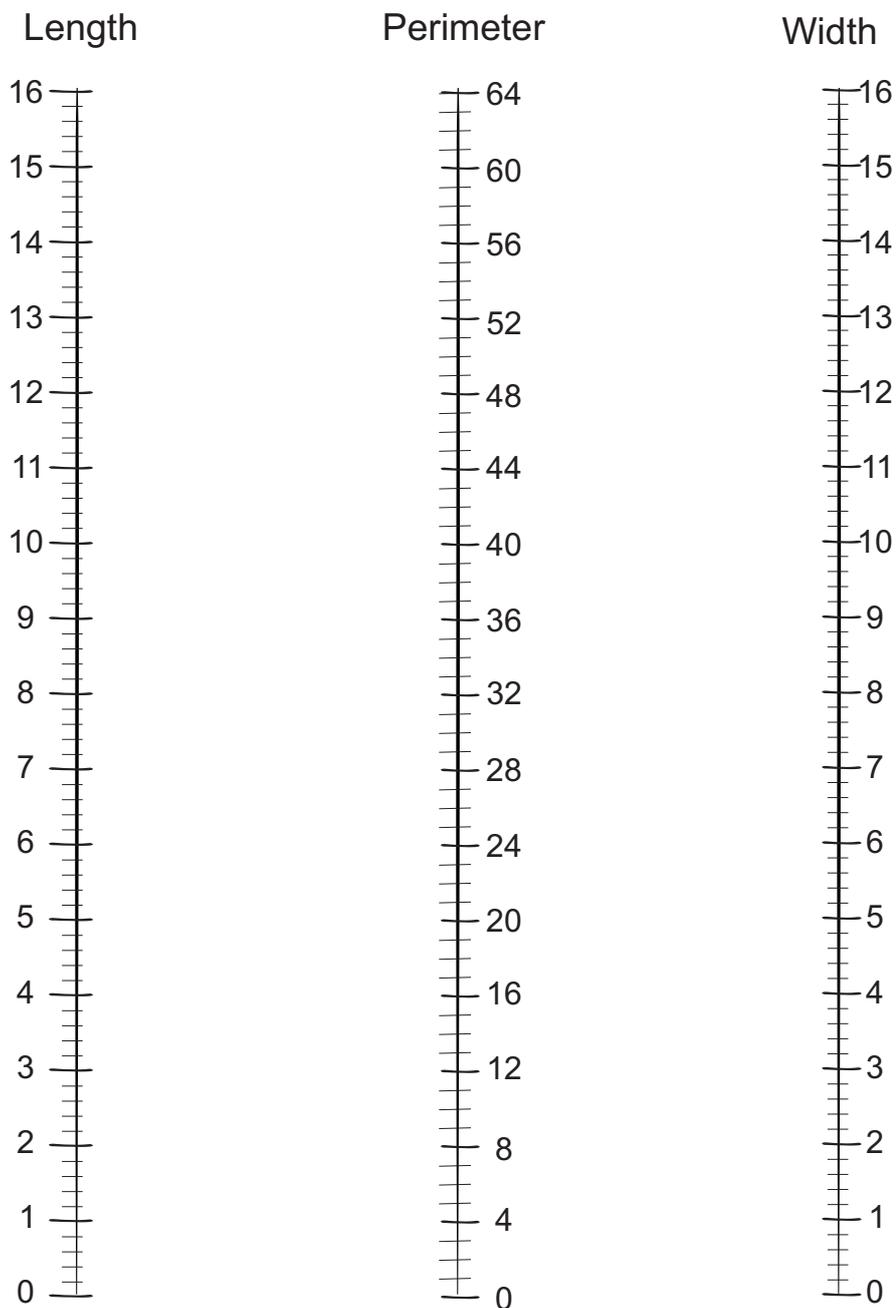
## SKETCHING SOLIDS

Redraw the figures using each of the grids provided.



### PERIMETER NOMOGRAM

The nomogram below can be helpful for working out perimeters of rectangles and squares. Place one end of your ruler on the size of the length and the other on the size of the width. Find the perimeter from the scale in the middle.



### PERIMETER NOMOGRAM

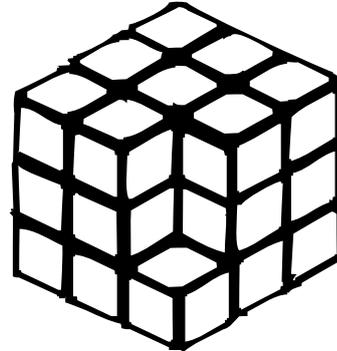
Use the nomogram to find the missing measurements of these rectangles.

Length	14cm	11.6cm	12cm	15.8cm	14cm	9.5cm
Width	9cm	9.4cm	5.5cm	4.2cm	11 cm	4.5 cm
Perimeter	46 cm	42 cm	35 cm	40 cm	50cm	28cm

# BLUE - Worksheet 19

## VOLUME

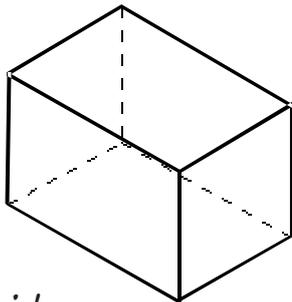
If the shape on the right was made up of 1 cm cubes, how many cubes would be required to build the shape?



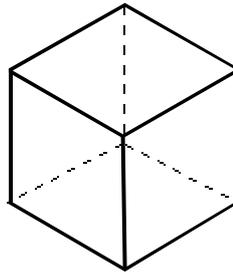
$$3 \times 3 \times 3 - 2 = 25 \text{ cubes}$$

## SOLID FIGURES

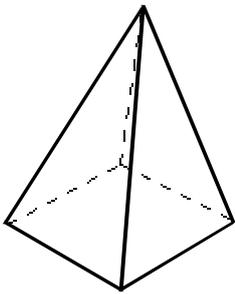
In mathematics a solid is a three dimensional geometric figure. Common solids have sides made up of polygons. These are called polyhedra (plural) or polyhedron for a singular solid. Some common solids are shown below. Name each of these solids.



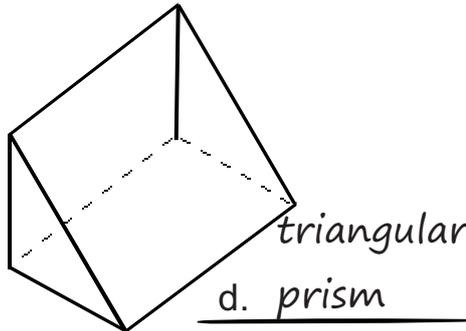
a. cuboid



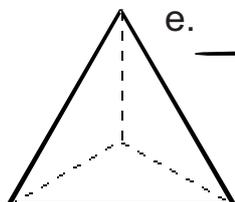
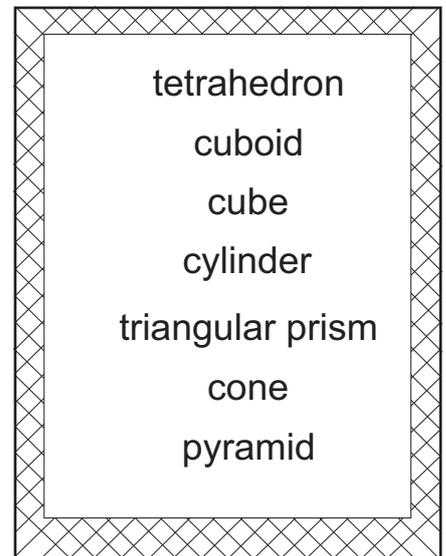
b. cube



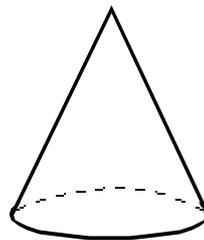
c. pyramid



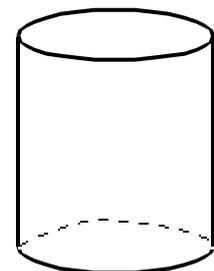
d. triangular prism



e. tetrahedron



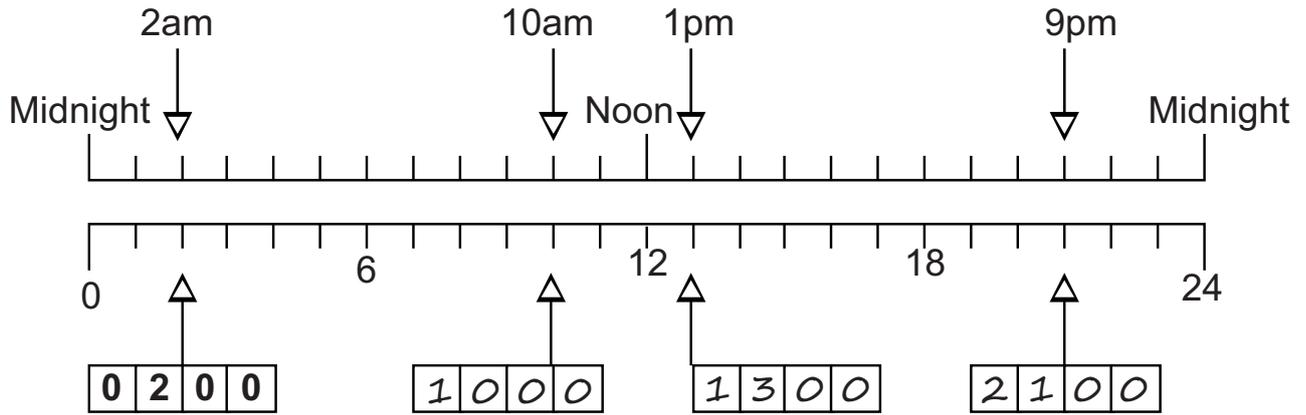
f. cone



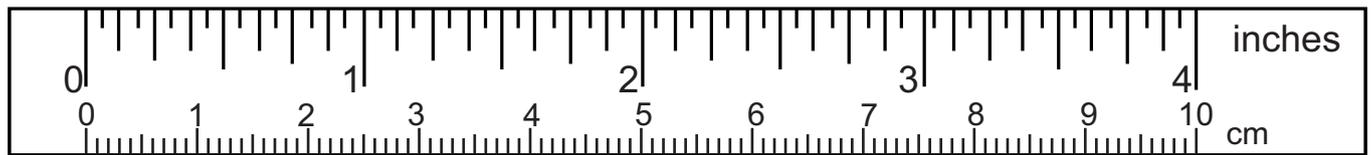
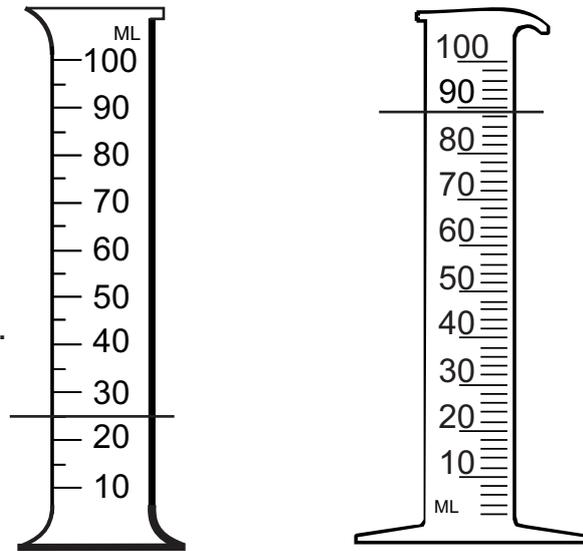
g. cylinder

# MEASURING AND READING SCALES

1. The scale below illustrates clock and 24 hour time. Complete the missing 24 hour times.



2. On the first beaker mark 25 ml.  
On the second beaker mark 89 ml.



3. Some countries measure length using the imperial system of inches, feet, yards and miles. This system is based on fractional values. Others countries use the metric system based on units of ten of millimetres, centimetres, metres and kilometres. A typical ruler showing inch and centimetre measurements is shown above. Use the ruler to give the centimetre equivalent for each of the following.

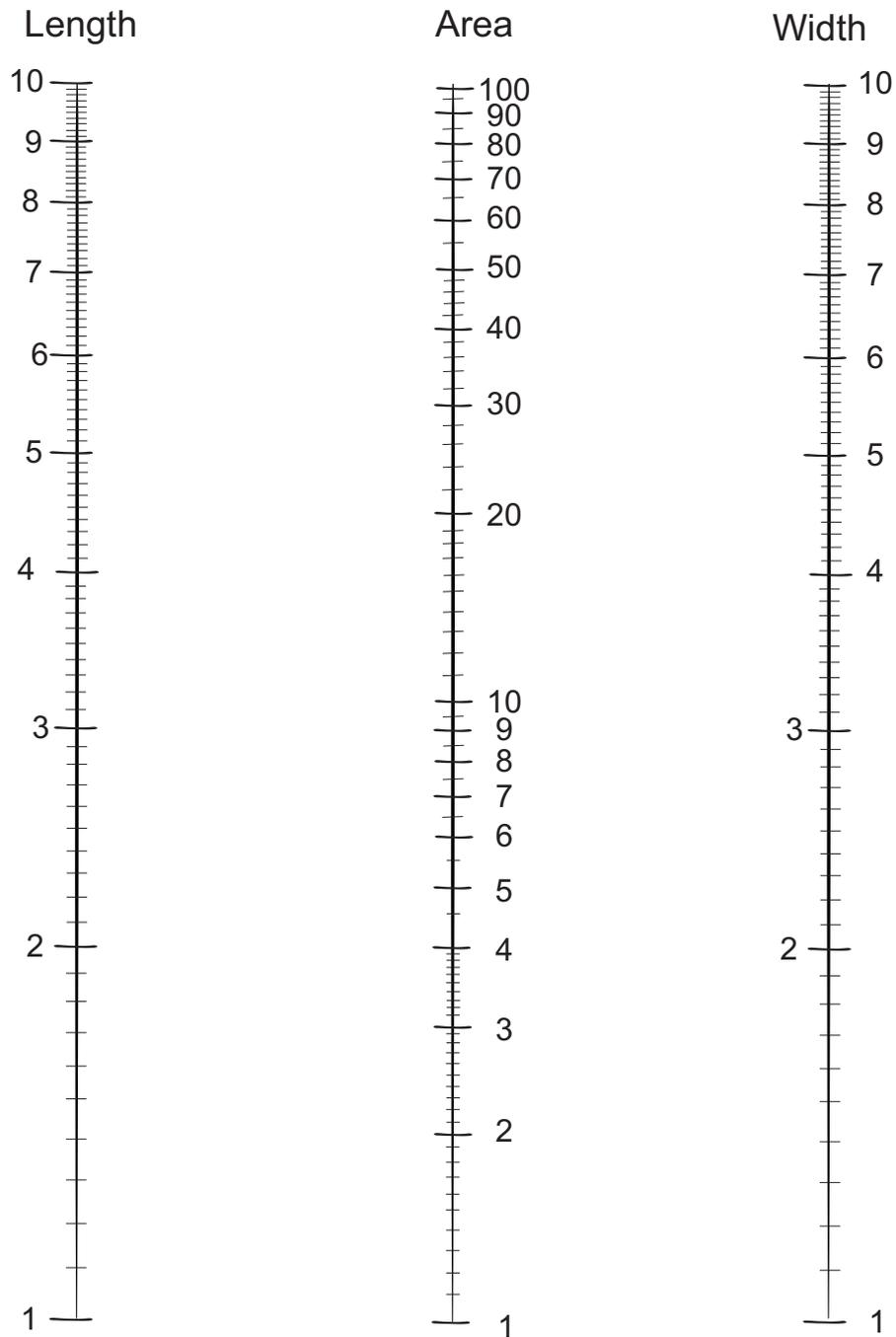
2 inches	$2\frac{1}{2}$ inches	$3\frac{3}{4}$ inches
<u>5 cm</u>	<u>6.3 cm</u>	<u>9.4 cm</u>

Give the closest inches measurement to:

$15\text{ mm}$ $\frac{5}{8}$ inch	50 mm 2 inches	85 mm: $3\frac{3}{8}$ inches
--------------------------------------	-------------------	---------------------------------

## AREA NOMOGRAM

The nomogram below can be helpful for working out areas of rectangles and squares. Place one end of your ruler on the size of the length and the other on the size of the width. Find the area from the scale in the middle.



Use the nomogram to find the missing measurements of these rectangles.

Length	3 cm	7.8 cm	4 cm	1.5 cm	5 cm	9.6 cm
Width	9 cm	5 cm	6.5 cm	3.2 cm	1.2 cm	5 cm
Area	27 cm <sup>2</sup>	39 cm <sup>2</sup>	26 cm <sup>2</sup>	4.8 cm <sup>2</sup>	6 cm <sup>2</sup>	48 cm <sup>2</sup>

## HARDER EQUATIONS

For each of the following, find the value of x.

$$\begin{aligned} 1. \quad 5(x + 8) &= 55 \\ \underline{5x + 40} &= \underline{55} \\ x &= 3 \end{aligned}$$

---

---

$$\begin{aligned} 2(3 + x) &= 2 \\ \underline{6 + 2x} &= \underline{2} \\ x &= -2 \end{aligned}$$

---

---

$$\begin{aligned} 6(x - 8) &= 24 \\ \underline{6x - 48} &= \underline{24} \\ x &= 12 \end{aligned}$$

---

---

$$\begin{aligned} 2. \quad 4(9 - x) &= 20 \\ \underline{36 - 4x} &= \underline{20} \\ x &= 4 \end{aligned}$$

---

---

$$\begin{aligned} 3(x + 4) &= 2(x + 7) \\ \underline{3x + 12} &= \underline{2x + 14} \\ x &= 2 \end{aligned}$$

---

---

$$\begin{aligned} 5(x - 7) &= x + 5 \\ \underline{5x - 35} &= \underline{x + 5} \\ x &= 10 \end{aligned}$$

---

---

$$\begin{aligned} 3. \quad \frac{x}{3} + 4 &= 8 \\ x &= 12 \end{aligned}$$

---

---

$$\begin{aligned} \frac{x}{2} - 7 &= 13 \\ x &= 40 \end{aligned}$$

---

---

$$\begin{aligned} \frac{3x}{4} - 5 &= 1 \\ x &= 8 \end{aligned}$$

---

---

$$\begin{aligned} 4. \quad \frac{4x}{3} + 7 &= 23 \\ x &= 12 \end{aligned}$$

---

---

$$\begin{aligned} \frac{1}{2}x + 10 &= 35 \\ x &= 50 \end{aligned}$$

---

---

$$\begin{aligned} x^2 - 12 &= 52 \\ x &= 8 \end{aligned}$$

---

---

$$\begin{aligned} 5. \quad 5(x^2 + 2) &= 30 \\ \underline{5x^2 + 10} &= \underline{30} \\ 5x^2 &= 20 \\ x^2 &= 4 \\ x &= 2 \end{aligned}$$

---

---

$$\begin{aligned} 3\left(\frac{x}{2} - 3\right) &= 6 \\ \underline{\frac{3x}{2} - 9} &= \underline{6} \\ \frac{3x}{2} &= 15 \\ 3x &= 30 \\ x &= 10 \end{aligned}$$

---

---

$$\begin{aligned} 3(x^2 + 4) &= 60 \\ \underline{3x^2 + 12} &= \underline{60} \\ 3x^2 &= 48 \\ x^2 &= 16 \\ x &= 4 \end{aligned}$$

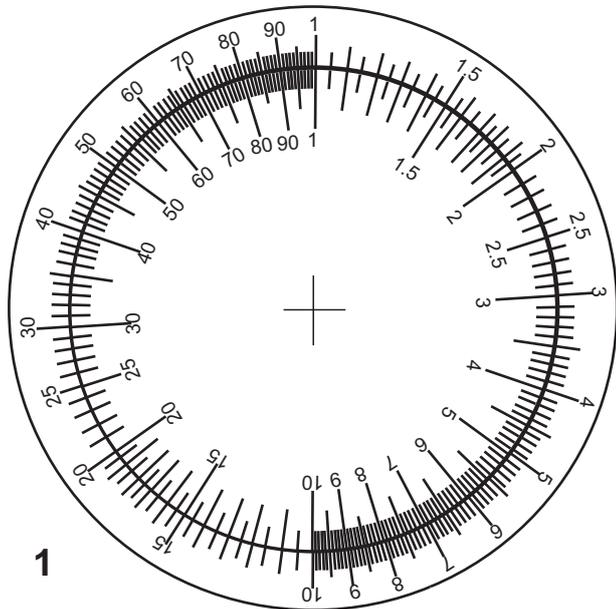
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# BLUE - Worksheet 20

## THE CIRCULAR CALCULATOR

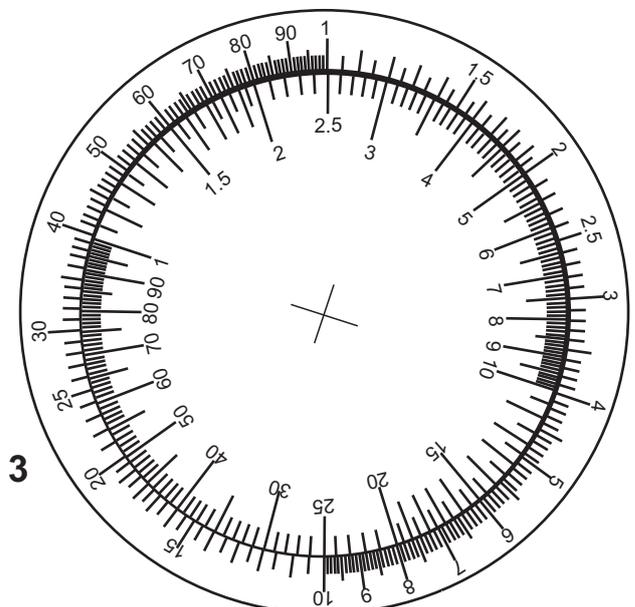
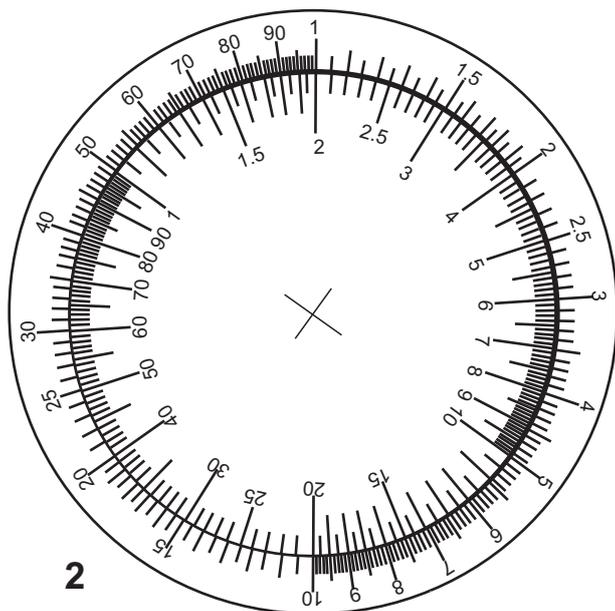
Before electronic calculators, mathematicians devised all sorts of interesting slide rules and methods for arithmetic. On the next page is a circular calculator. Glue the page onto some card and when dry cut out the two circles. Fasten the two circles through the centre so that the smaller circle can rotate around the larger.

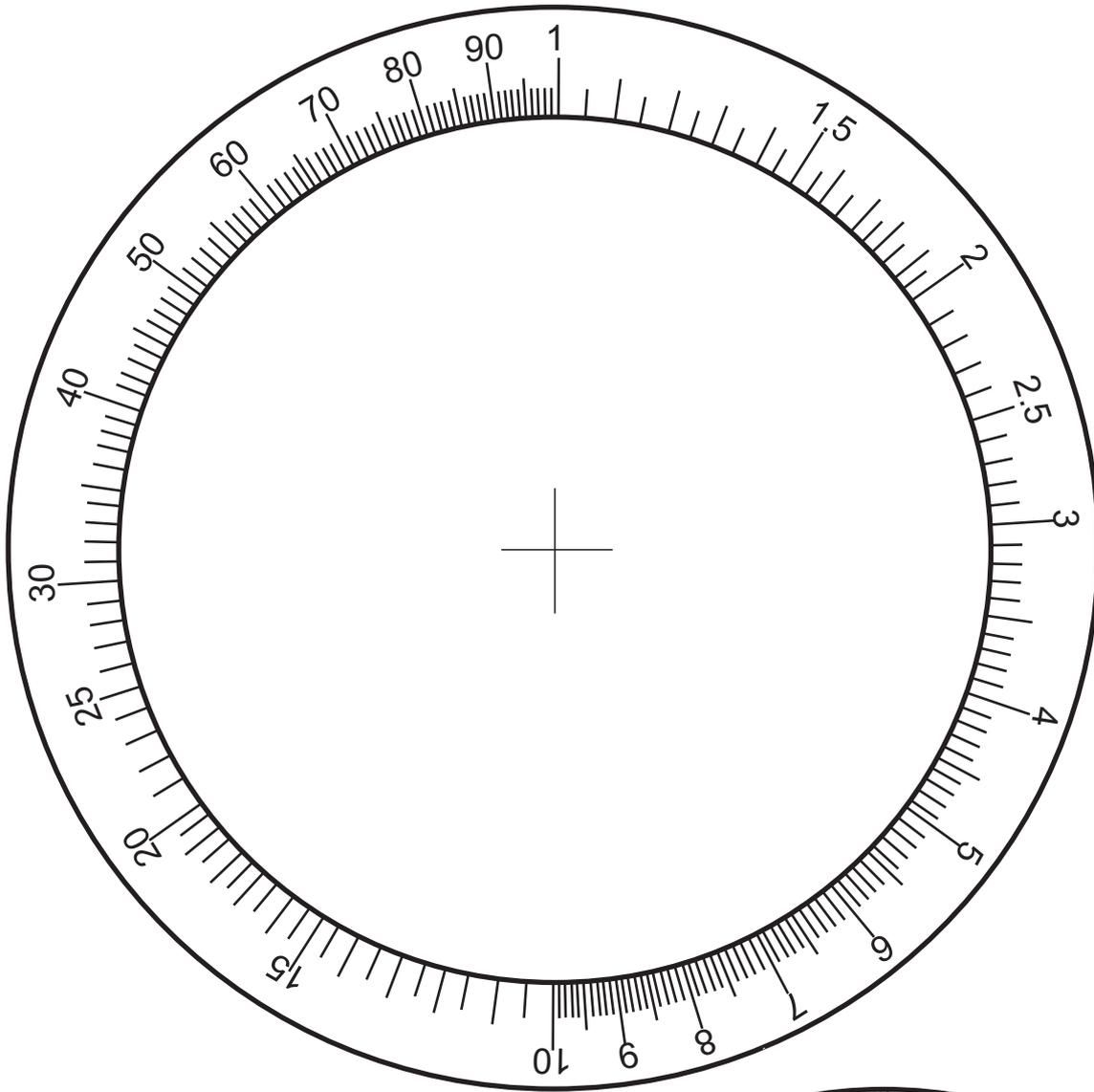


1. Place the calculator in front of you so that all the numbers on the inside dial line up with those on the outside. This is multiplying by 1.

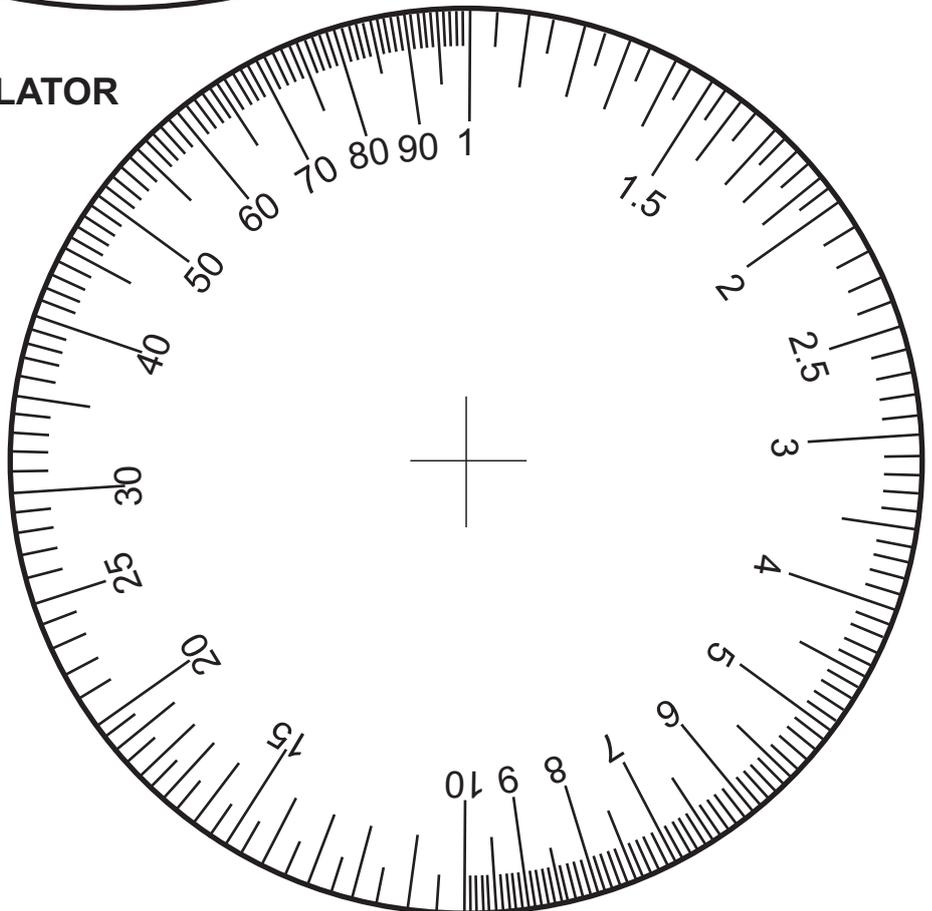
2. To multiply by 2 line up the 2 on the inside dial with the 1 on the outside dial. All the numbers on the inside are double those on the outside.

3. To multiply by 2.5 line up the 2.5 on the inside dial with the 1 on the outside dial. Can you now see how it works?





**THE CIRCULAR CALCULATOR**



## USING THE CIRCULAR CALCULATOR

Arrange the dials on your circular calculator so that you can multiply by 4.

Now use it to give the best answer for each of the following:

$$4 \times 7 = \underline{28} \quad 4 \times 13 = \underline{52} \quad 4 \times 15 = \underline{60} \quad 4 \times 75 = \underline{300}$$

Use your circular calculator to find the value of:

$$3.5 \times 2 = \underline{7} \quad 3.5 \times 4 = \underline{14} \quad 3.5 \times 6 = \underline{21} \quad 3.5 \times 21 = \underline{73.5}$$

$$1.8 \times 5 = \underline{9} \quad 18 \times 5 = \underline{90} \quad 2.5 \times 2.5 = \underline{6.25} \quad 15 \times 15 = \underline{225}$$

The circular calculator can also be used for division.

Use it to find answers to the following:

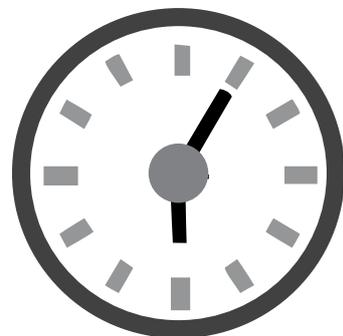
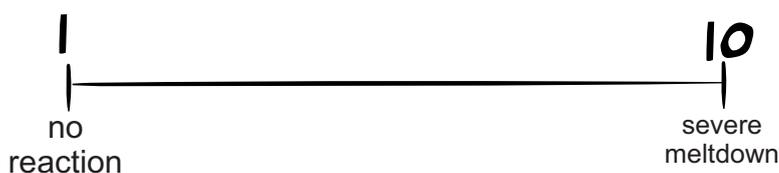
$$45 \div 9 = \underline{5} \quad 117 \div 9 = \underline{13} \quad 3.9 \div 3 = \underline{1.3} \quad 7.8 \div 6 = \underline{1.3}$$

$$21 \div 3.5 = \underline{6} \quad 45 \div 7.5 = \underline{6} \quad 9.9 \div 9 = \underline{1.1} \quad 8.1 \div 3 = \underline{2.7}$$

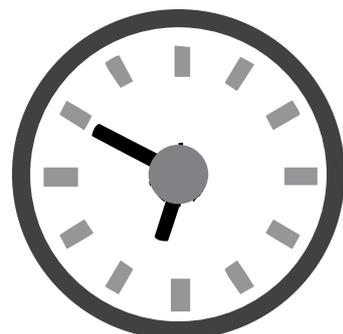
### Top 5 Questions Teachers HATE!

5. When do the holidays start?
4. What page are we on?
3. How come we have to do this?
2. Is this in the test?
1. Can we do something fun today?

Try one of them tomorrow on your teacher. Rate the reaction out of 10.

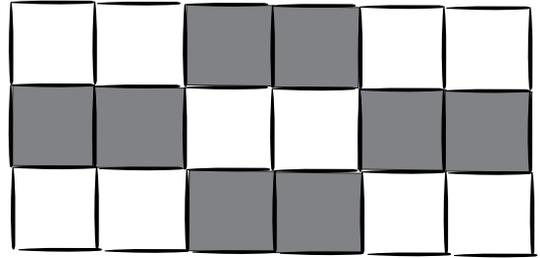


Jarella has just arrived at the train station and the clock shows the time above. The next train is in 45 minutes. On the clock face below show the time that the train should arrive.



## FRACTION AND RATIO APPLICATIONS

The panel shown is part of a mural.  
 Tiles in the panels are painted black and white in the pattern shown.



1. What fraction of the panel is painted white?

$$\frac{5}{9}$$

2. What is the ratio of black to white squares that make up the panel?

$$4 : 5$$

3. It takes 5 litres of paint to cover all the black squares.  
 How many litres of paint would be required to paint all the white squares?

$$5 \text{ litres} \div 8 \text{ squares} = 0.625 \text{ litres / square}$$

$$0.625 \times 10 \text{ squares} = 6.25 \text{ litres}$$

4. The whole mural consists of fifteen panels, identical to the one shown, placed side by side on a building wall. White paint costs \$27.50 per litre, black paint costs \$28 per litre. How much will it cost to paint the whole mural?

$$\text{White } 6.25 \times \$27.50 \times 15 \text{ panels} = \$2578.13$$

$$\text{Black } 5 \text{ litres} \times \$28 \times 15 \text{ panels} = \$2100$$

$$\text{Total cost} = \$4678.13$$

## THE BEAUTY OF MATHS

Calculate these sums. How long does it take you to find the pattern?

1.  $1 \times 8 + 1 = \underline{\hspace{2cm} 9 \hspace{2cm}}$

2.  $12 \times 8 + 2 = \underline{\hspace{2cm} 98 \hspace{2cm}}$

3.  $123 \times 8 + 3 = \underline{\hspace{2cm} 987 \hspace{2cm}}$

4.  $1234 \times 8 + 4 = \underline{\hspace{2cm} 9876 \hspace{2cm}}$

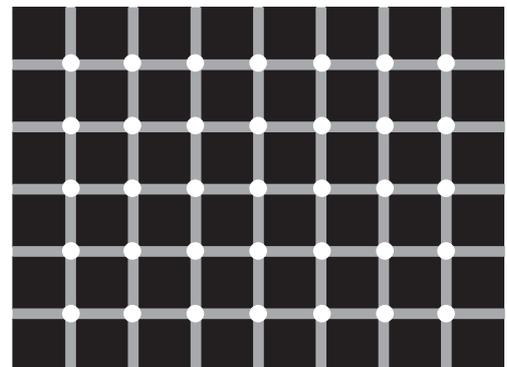
5.  $12345 \times 8 + 5 = \underline{\hspace{2cm} 98765 \hspace{2cm}}$

6.  $123456 \times 8 + 6 = \underline{\hspace{2cm} 987654 \hspace{2cm}}$

7.  $1234567 \times 8 + 7 = \underline{\hspace{2cm} 9876543 \hspace{2cm}}$

8.  $12345678 \times 8 + 8 = \underline{\hspace{2cm} 98765432 \hspace{2cm}}$

9.  $123456789 \times 8 + 9 = \underline{\hspace{2cm} 987654321 \hspace{2cm}}$



Stare and count the black balls.

# BLUE - Worksheet 21

## APPLICATION

1. A recent newspaper headline read "\$1 trillion to rescue Europe". Write \$1 trillion as a number.

*\$1 000 000 000 000 (it has 12 zeros)*

---

2. Krystal is buying a car. She goes to the bank and withdraws one hundred \$100 bills. The thickness of the packet is 12mm. Krystal then wonders what \$1 trillion would look like if it was made up of \$100 bills. Write a description of what \$1 trillion might look like.

*\$10,000 = 12 mm*

---

*\$1 million = 100 × \$10,000*

---

*Therefore 12mm × 100 = 1.2 metres high*

---

*\$1 billion = 1000 × \$1 million*

---

*Therefore 1.2m × 1000 = 1200 metres high (or 1.2 km)*

---

*\$1 trillion = 1000 × \$1 billion*

---

*Therefore 1.2 km × 1000 = 1200 km*

---

3. If you spent \$1 million a day, how long would it take to spend \$1 trillion?  
*You would have to live for 2738 years to spend that much money. If you started with that money in the bank and received interest it would take much longer!*
- 

## FASCINATING FACTS: How long is 1 trillion seconds?

1 million seconds takes 11.6 days

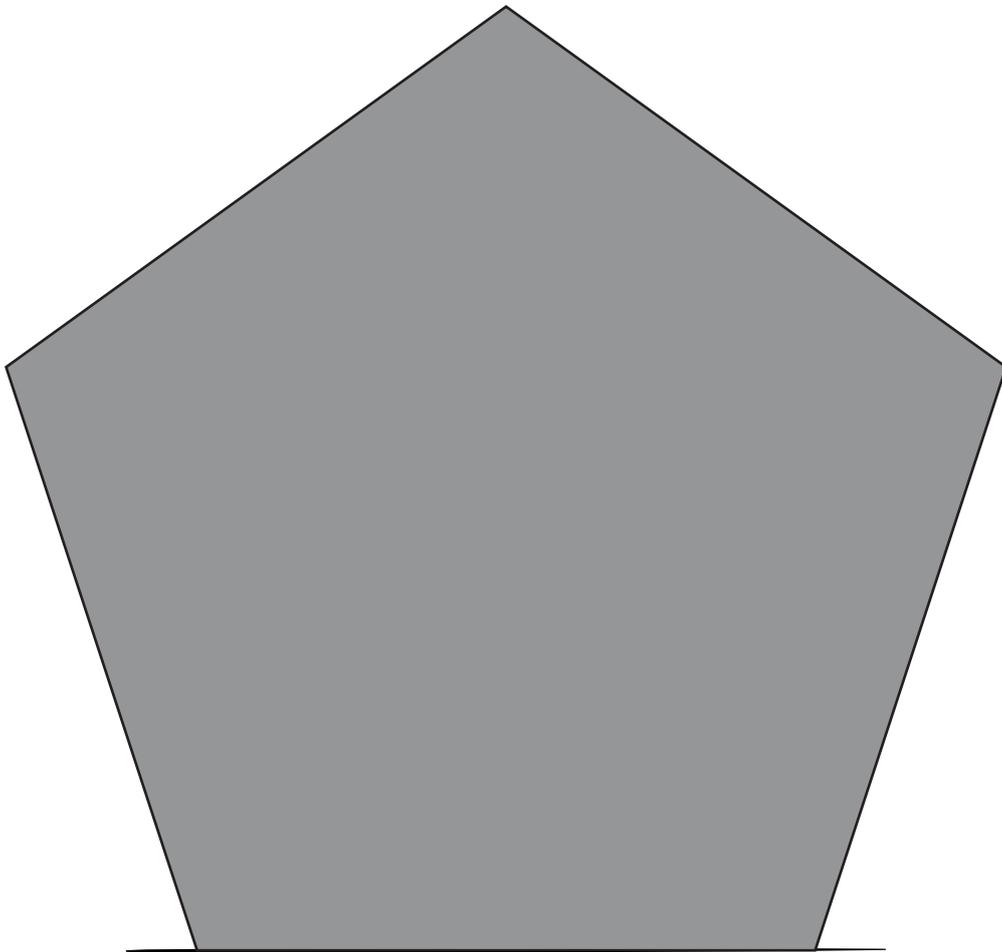
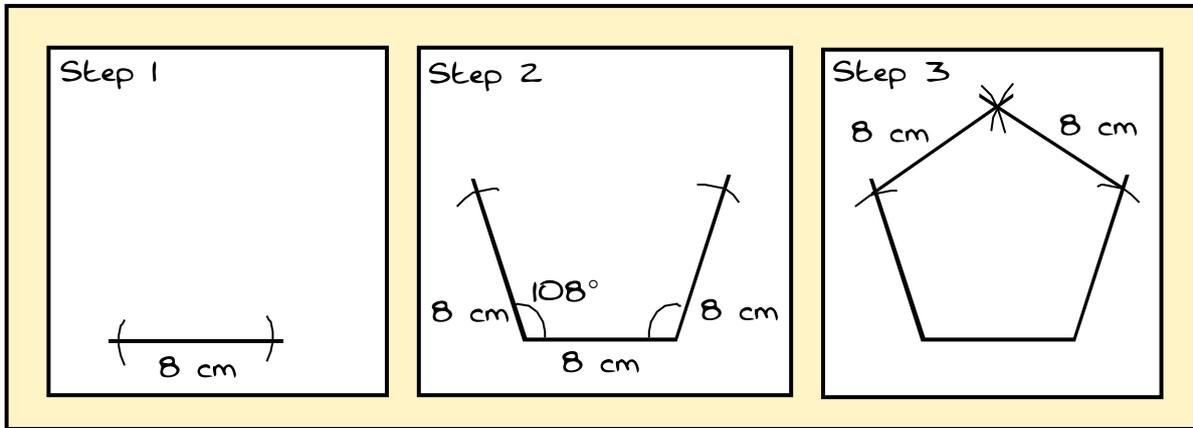
1 billion seconds takes 32 years

1 trillion seconds takes over 32,000 years

## DRAWING POLYGONS

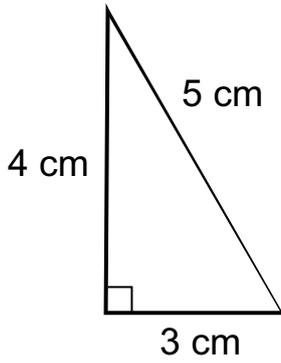
For this exercise you will need a pencil, ruler, compass and protractor.

Draw a pentagon with sides 8 cm. The steps are illustrated in the diagram below.

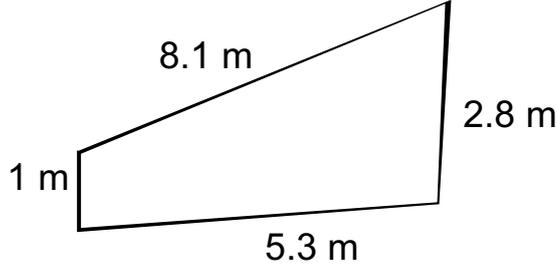


## PERIMETERS

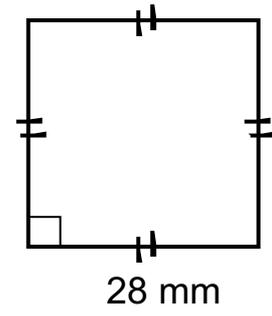
1. Find the perimeters of each of the following figures.



$$\begin{aligned} 4 + 3 + 5 \\ \hline = 12 \text{ cm} \end{aligned}$$



$$\begin{aligned} 1 + 8.1 + 2.8 + 5.3 \\ \hline = 17.2 \text{ m} \end{aligned}$$



$$\begin{aligned} 28 \times 4 \\ \hline = 112 \text{ mm} \end{aligned}$$

2. Find the perimeter of the following.

A rhombus with side lengths 18cm.

$$18 \times 4 = 72 \text{ cm}$$

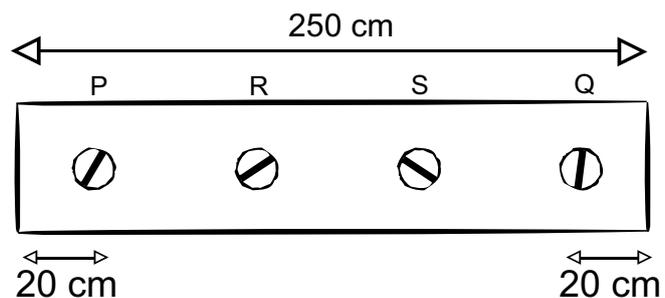
A kite with side lengths of 96 cm and 55 cm

$$96 \times 2 + 55 \times 2 = 302 \text{ cm}$$

An isosceles triangle with identical 15 m sides and a base of 9 m.

$$15 \text{ m} \times 2 + 9 \text{ m} = 39 \text{ m}$$

## INVESTIGATING WITH ALGEBRA



A piece of metal 250 cm long, is to be fixed to a wall with four screws. Two of the screws are placed 20cm from each end of the wood at P and Q.

1. What is the distance, in centimetres, between the centres of the screws at P and Q?

$$\text{Distance} = \underline{250 - 40 = 210} \text{ cm}$$

2. Screws are placed at R and S so that the distances between the centres of all the screws are equal. Calculate the distance between R and S.

$$\underline{210 \div 3 = 70 \text{ cm}}$$

## MEASURING HOW MANY

Complete the following statements.

1. 150 mm = 15 cm

2. 5000 g = 5 kg

3. 2000 ml = 2 litres

4. 2750 cents = \$27.50

5. 10 000 m = 10 km

6. 180 ° = 2 right angles

7. 240 minutes = 4 hours

8. 52 weeks = 1 year

9. 1800 seconds = half an hour

10. There are 31 days in January

## MEASUREMENT APPLICATION



1. A plumber is called to repair a malfunction in the school toilets at Mahobe Secondary School. The first day he is at the school for 1 hour 40 minutes and then the next day he is at the school for 2 hours and 50 minutes. What is the total time spent at the school?

3 hrs, 90 min = 4.5 hours, (4 hours 30 minutes)

2. The plumber measures the water from a dripping tap. After 15 minutes, 200 ml of water has been wasted. If the dripping tap is not fixed, how many litres of water will be wasted after 1 year?  $1000 \text{ ml} = 1 \text{ litre}$

$0.8 \text{ litres / hour} \times 24 \text{ hrs in a day} \times 365 \text{ days} = 7008 \text{ litres}$

3. In Auckland, water usage is charged at \$1.562 per cubic metre of water used ( $1 \text{ m}^3 = 1,000 \text{ litres}$ ), while there is an additional charge of \$3.745 per cubic metre of wastewater used, (wastewater is calculated as 75% of water consumption). Using these figures, calculate how much it costs if the dripping tap is not repaired for 1 year.

$\text{Water Usage } 7.008 \times 1.562 = \$10.95$

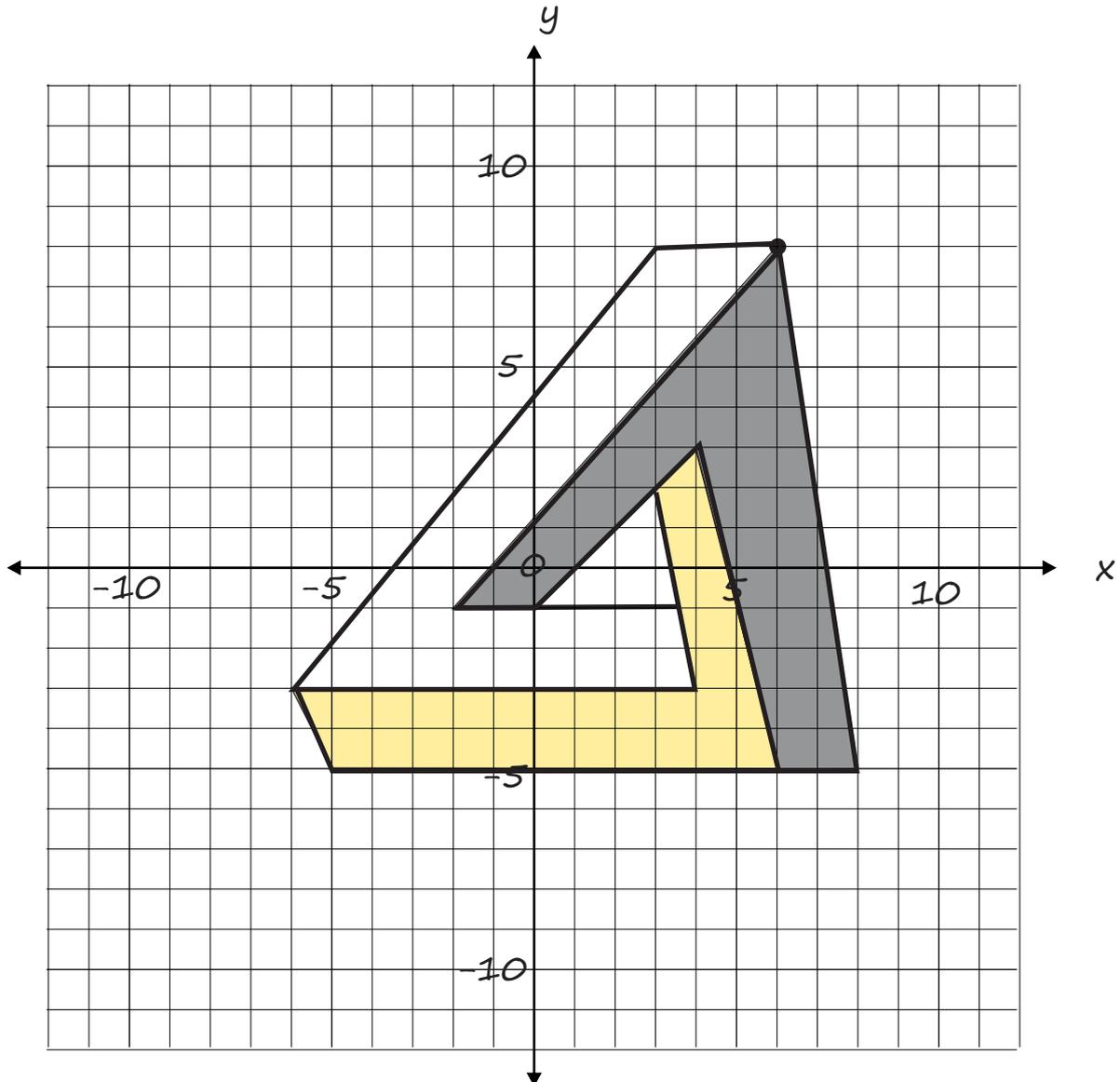
$\text{Waste Water } 7.008 \times 0.75 \times \$3.745 = \$19.68$

$\text{Total cost} = \$10.95 + 19.68 = \$30.63$

# BLUE - Worksheet 22

## COORDINATE DESIGNS

1. Label and number the axes (each square in the grid represents 1 unit).
2. Use the axes to join the following coordinate points:  
(6, 8), (3, 8), (-6, -3), (4, -3), (3, 2) in order.
3. Now, join these points:  
(-6, -3), (-5, -5), (8, -5), (6, 8), (-2, -1), (0, -1), (4, 3), (6, -5) in order.

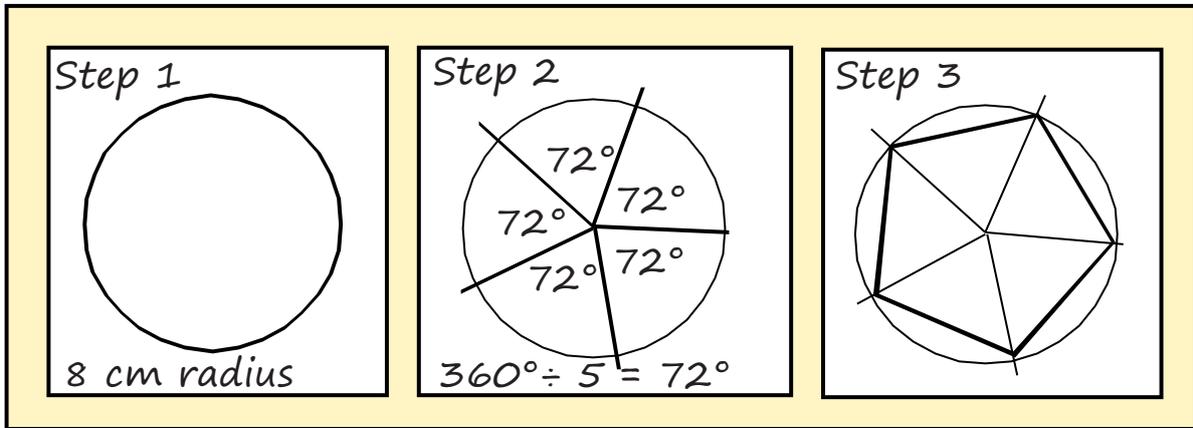


## DRAWING POLYGONS

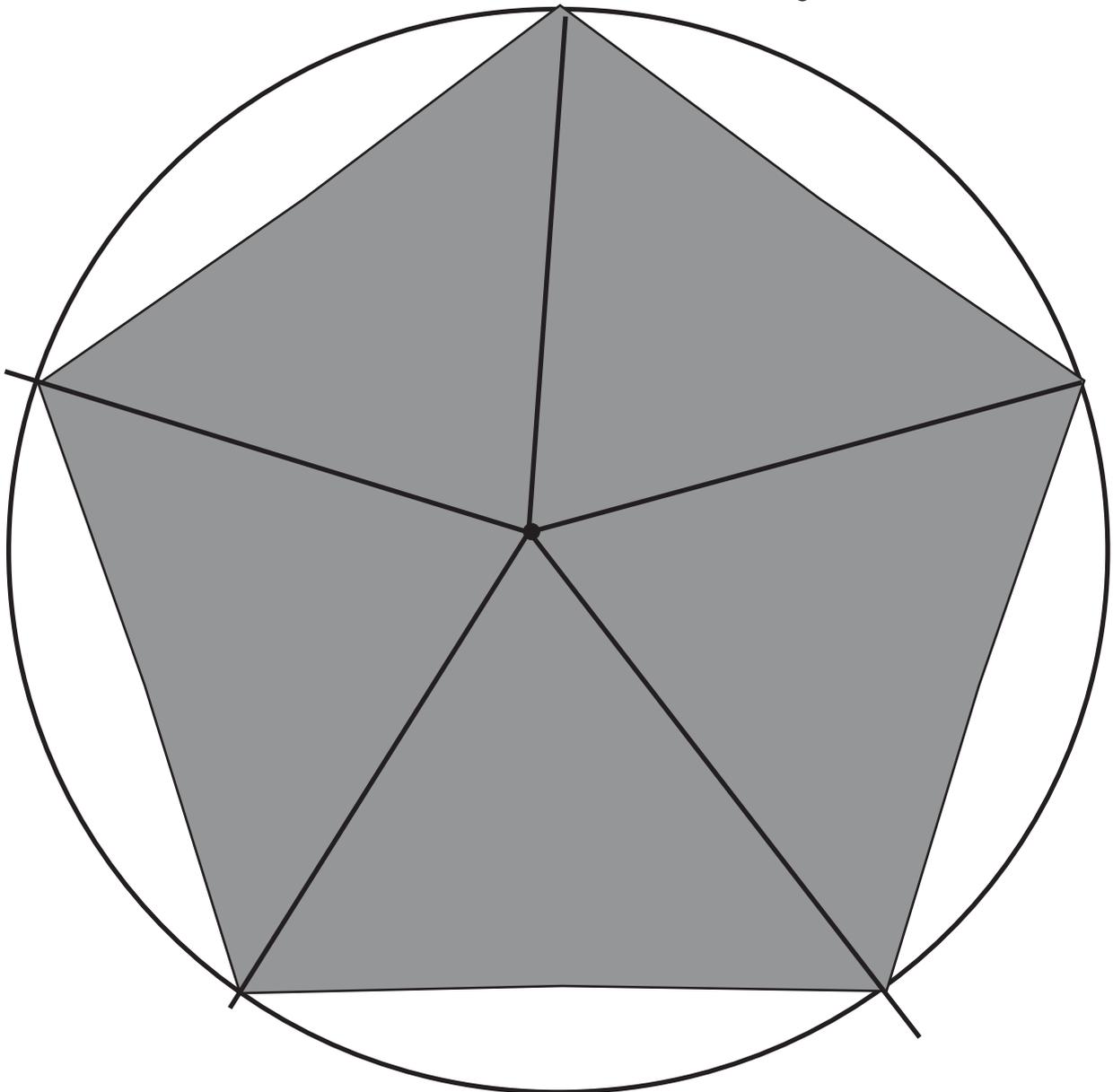
For this exercise you will need a pencil, ruler, compass and protractor.

Another method for drawing a pentagon is shown.

Use this method to draw a pentagon, then measure the length of the sides.

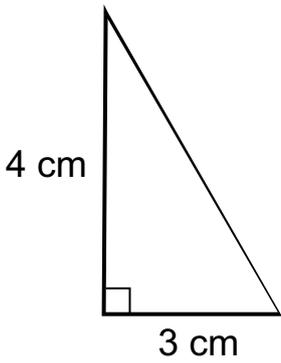


Side lengths = 9.4 cm



# AREA

1. Find the areas of each of the following figures:



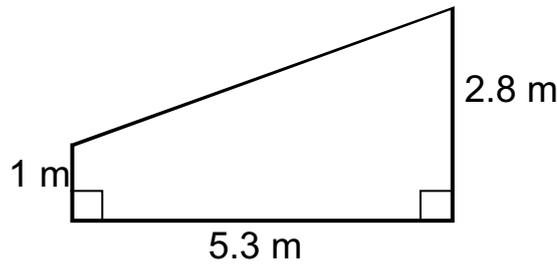
---


$$\text{Area} = \frac{1}{2} \times 3 \times 4$$


---


$$= 6 \text{ cm}^2$$


---



---

Area top triangle

$$\frac{1}{2} \times 1.8 \times 5.3 = 4.77 \text{ m}^2$$

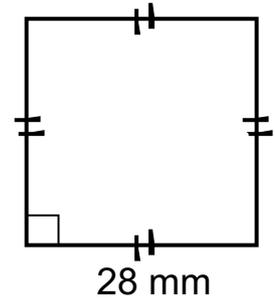

---

Bottom Rectangle

$$= 5.3 \text{ m}^2$$


---

total = 10.07 m<sup>2</sup>



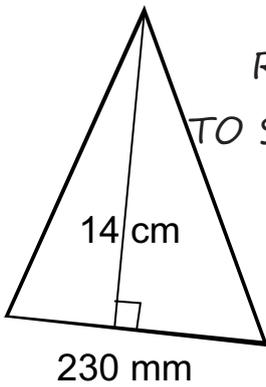
---


$$\text{Area} = 28 \times 28$$


---


$$= 784 \text{ mm}^2$$


---



---

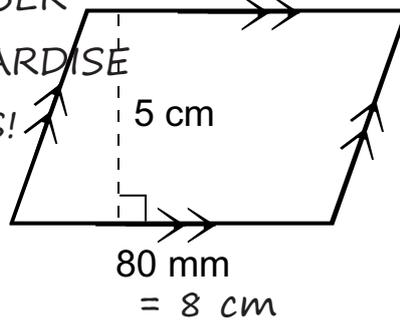

$$\text{Area} = \frac{1}{2} \times 23 \times 14$$


---


$$= 161 \text{ cm}^2$$


---

REMEMBER  
TO STANDARDISE  
UNITS!



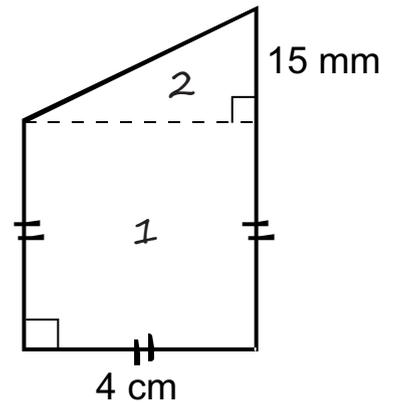
---


$$\text{Area} = 8 \times 5 \text{ (cm)}$$


---


$$= 40 \text{ cm}^2$$


---



---


$$\text{Area1} = 4 \times 4 \text{ (cm)}$$


---


$$= 16 \text{ cm}^2$$


---

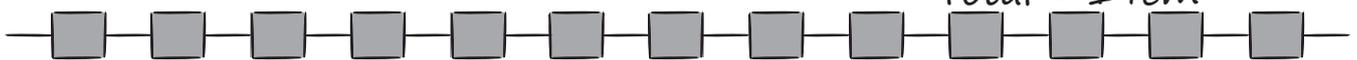

$$\text{Area2} = \frac{1}{2} \times 4 \times 1.5 \text{ (cm)}$$


---


$$= 3 \text{ cm}^2$$


---


$$\text{Total} = 19 \text{ cm}^2$$



## PATTERNS

What comes next?

1. (25) 20 (26) 19 (27) 18 (28) 17 (29) 16 (30)

2. 1 3 6 10

## MEASUREMENT APPLICATIONS

Answer each of the following measurement questions.

1. Give the best unit to measure the following:

A person's waist cm

Capacity of a bucket litres

Weight of a car kg

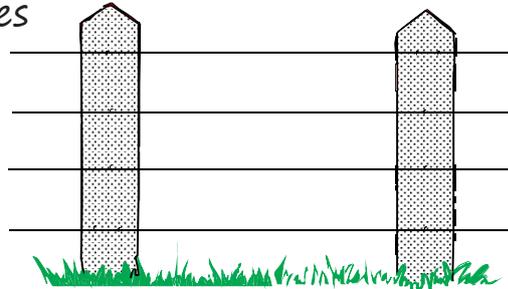
Area of a gymnasium floor m<sup>2</sup>

2. Fence posts are placed 3 metres apart. There are 4 strands of wire that help make up the fence. If a fence has 25 posts, how much wire is needed?

25 posts means 24 × 3m spaces

24 × 3m = 72 m

72m × 4 strands = 288 m



3. Sensible Statements. Circle the best answer.

The height of the old kauri tree is 2 5 9 **20** metres tall.

Cheyenne is 5 years old. She is 0.50 0.75 **1.00** 1.25 metres tall.

Cheyenne weighs 5 **25** 50 100 kg.

Jeeta measures one of the angles in a right angled triangle.

A possible measurement is **65** 99 105 120 degrees.

# BLUE - Worksheet 23

## ALGEBRAIC EQUATIONS

$$\begin{aligned}x &= Y \\ W &= x + Z \\ Z &= a + Y\end{aligned}$$

1. If  $x = 25$  and  $W = 125$  then find the value of a  
 $x = Y$ , therefore  $Y = 25$

---

$$W = x + Z$$

---

$$125 = 25 + Z, \text{ therefore } Z = 100$$

---

$$Z = a + Y$$

---

$$100 = a + 25, \text{ therefore } a = 75$$

---

2.  $xyz = 1$   
 $x = 100$  and  $y = 50$   
Find the value of  $z$ .

---

$$100 \times 50 \times z = 1$$

---

$$z = \frac{1}{100 \times 50}$$

---

$$z = 0.0002$$

---

3.  $ab = rs$   
 $a = 50$ ,  $r = 20$ ,  $b = 100$   
Find the value of  $s$

---

$$50 \times 100 = 20 \times s$$

---

$$s = \frac{50 \times 100}{20}$$

---

$$s = 250$$

---

4.  $P = \frac{h+w}{2}$

If  $P = 25$  and  $w = 34$ , find the value of  $h$ .

---

$$25 = \frac{h+34}{2} \quad h+34 = 50$$

---

$$h = 16$$

---

5.  $R = \frac{n(n-3)}{2}$        $S = n^2 + n$

If  $n = 10$ , find the value of  $R + S$

---

$$R = \frac{10(10-3)}{2} \quad R = 35, S = 10^2 + 10, \therefore S = 110$$

---

$$R + S = 110 + 35, \therefore R + S = 145$$

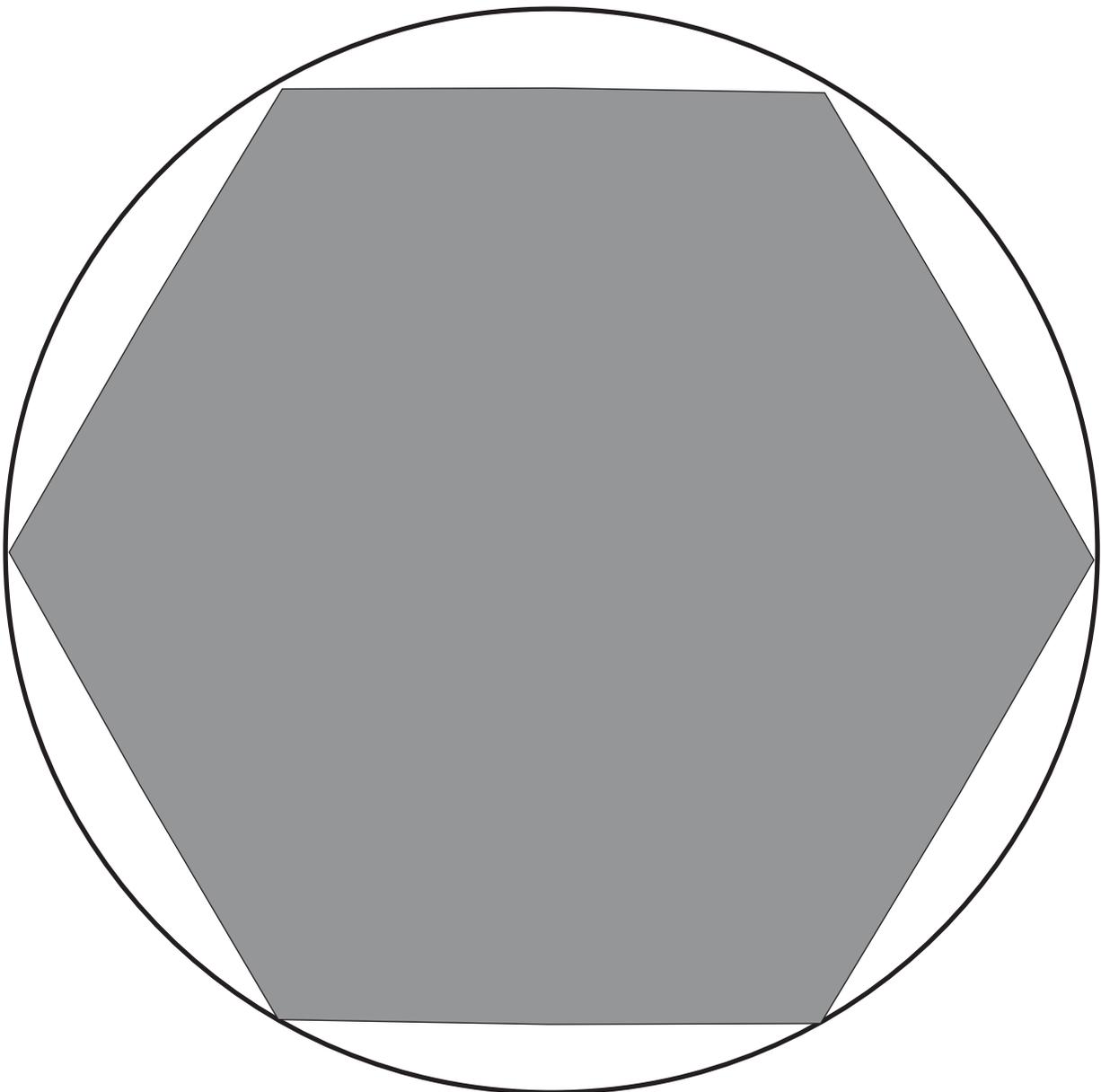
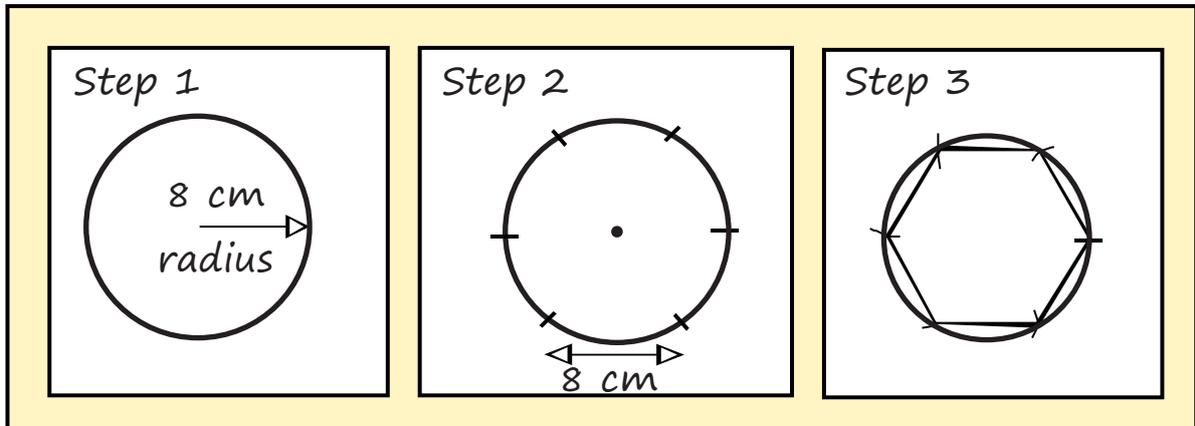
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## DRAWING POLYGONS

For this exercise you will need a pencil, ruler and compass.

Draw a regular hexagon with sides 8 cm.

The steps are illustrated in the diagram below.



## AREA APPLICATIONS

1. A swimming pool with dimensions 30 m × 10 m is surrounded by a brick path 2 m wide. Calculate the area of the path.

$$\text{Pool Area} = 30 \times 10$$

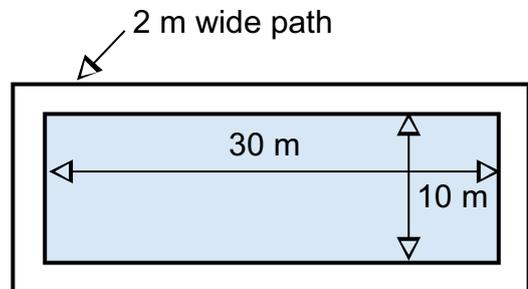
$$= 300 \text{ m}^2$$

$$\text{Total Area} = 34 \times 14$$

$$= 476 \text{ m}^2$$

$$\text{Path Area} = 476 - 300$$

$$= 176 \text{ m}^2$$



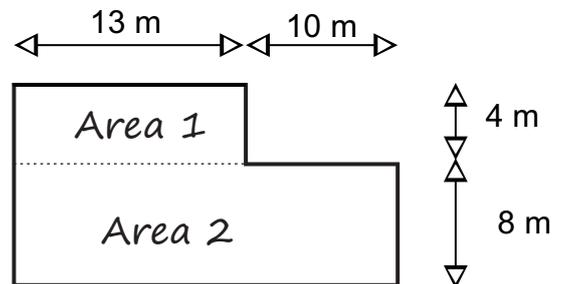
The Rolled Turf company sells rolls of ready made lawn. The rolls are 0.8 m wide and 2 m long. The plan below shows a section that needs to be covered in turf.

2. Calculate the area of the section.

$$\text{Area 1: } 13 \times 4 = 52 \text{ m}^2$$

$$\text{Area 2: } 23 \times 8 = 184 \text{ m}^2$$

$$\text{Total Area} = 236 \text{ m}^2$$



3. How many rolls of turf are needed to cover the section?

$$\text{Total Area} = 236 \text{ m}^2$$

$$\text{Area of Turf} = 0.8 \text{ m} \times 2 \text{ m}$$

$$\text{Area of Turf} = 1.6 \text{ m}^2$$

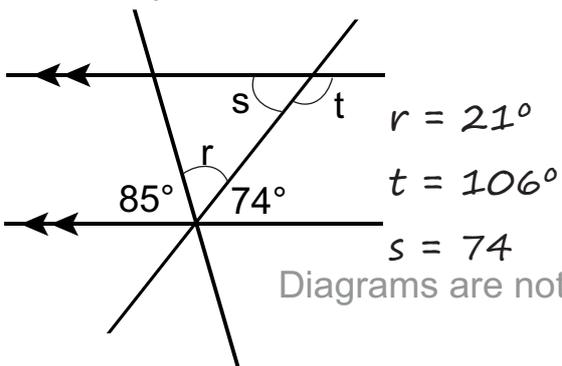
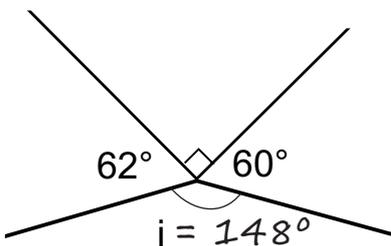
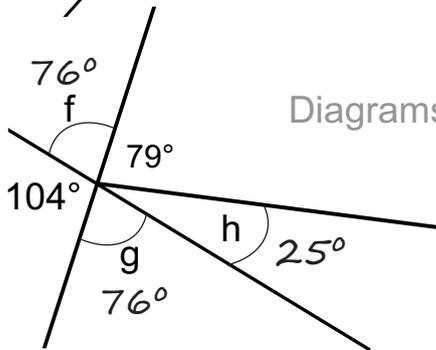
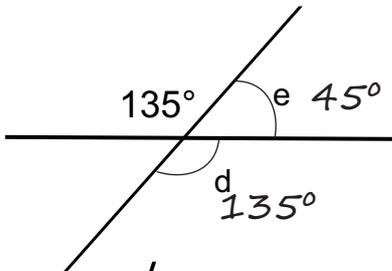
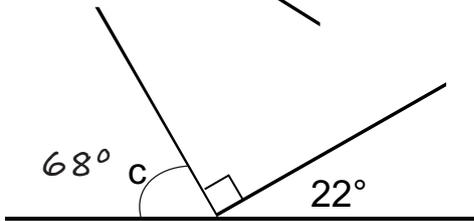
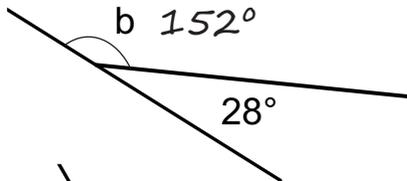
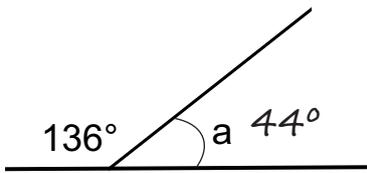
$$236 \div 1.6 = 147.5 \text{ (148 rolls of turf)}$$

4. Turf costs \$18 per roll. How much will it cost to complete the job?

$$148 \text{ rolls} \times \$18 \text{ per roll} = \$2664$$

# ANGLES

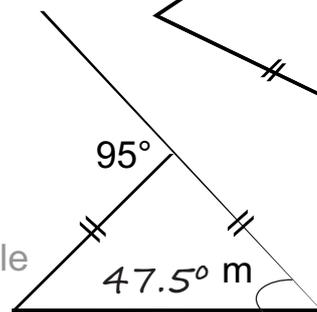
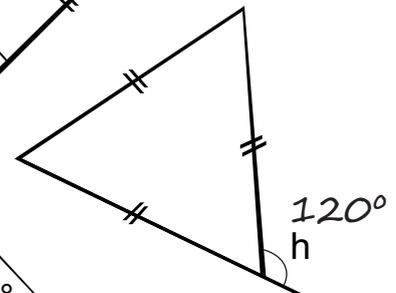
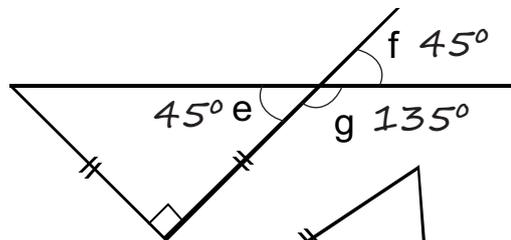
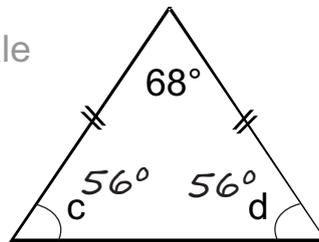
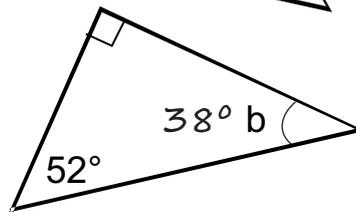
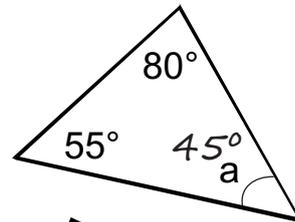
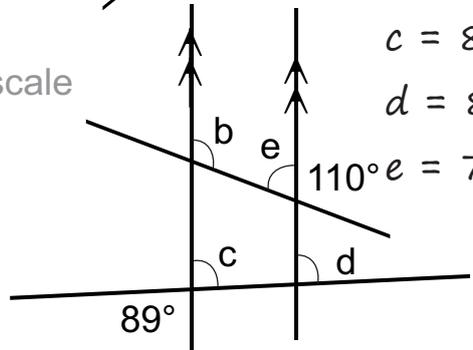
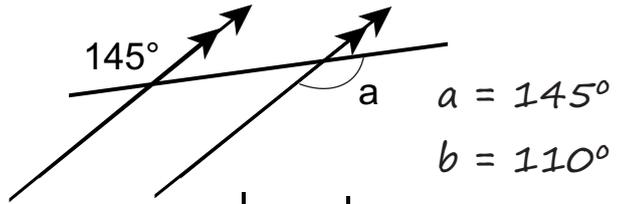
Find all the missing angles.



Diagrams are not to scale

Diagrams are not to scale

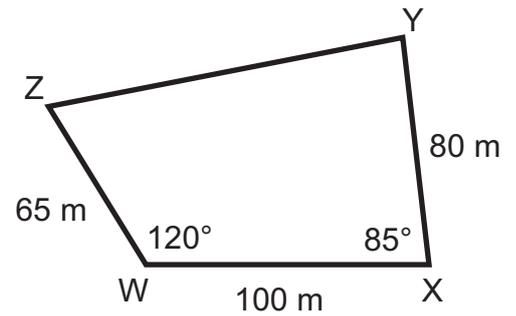
Diagrams are not to scale



$a = 145^\circ$   
 $b = 110^\circ$   
 $c = 89^\circ$   
 $d = 89^\circ$

$e = 70^\circ$

# BLUE - Worksheet 24



## SCALE DRAWINGS

The diagram represents a field WXYZ.

1. Make a scale drawing of WXYZ on the grid below using 1 square representing 10 m × 10 m.
2. Find the length of YZ.

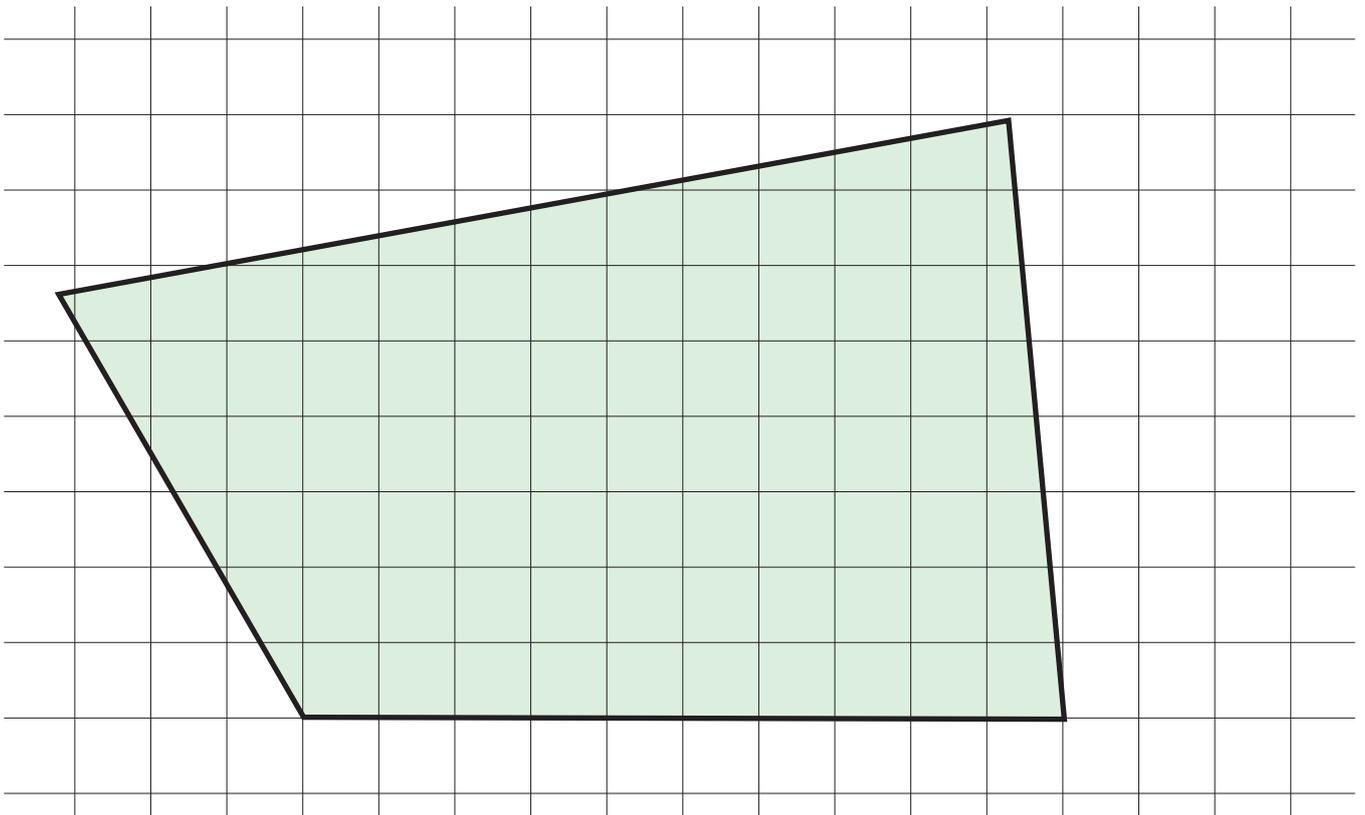
127 m (allow for 1 or 2 m accuracy)

3. What is the perimeter of the field?

(100 + 65 + 127 + 80) m = 372 m

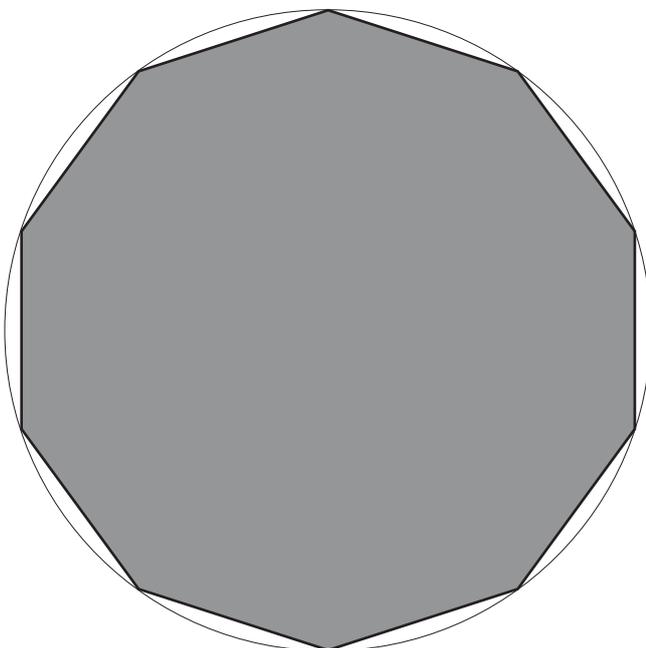
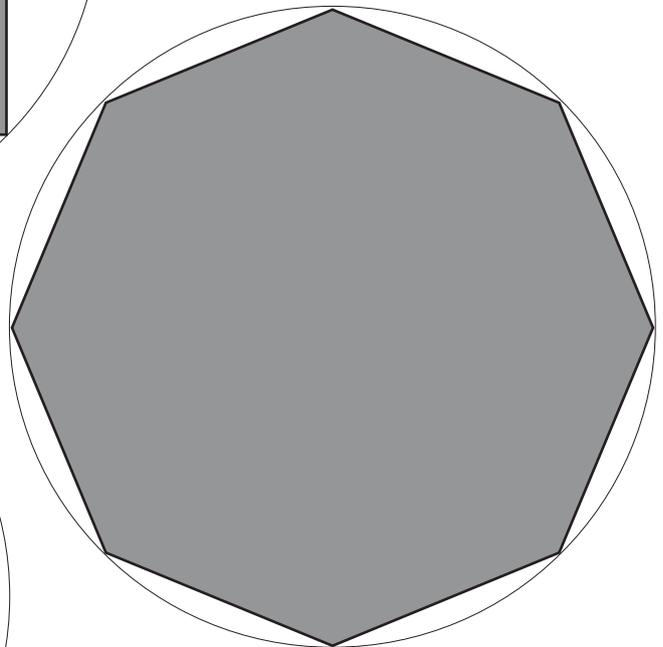
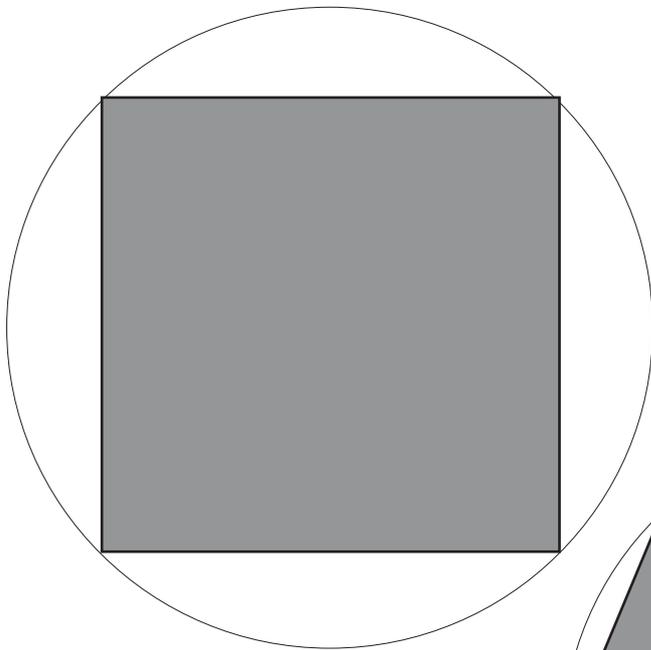
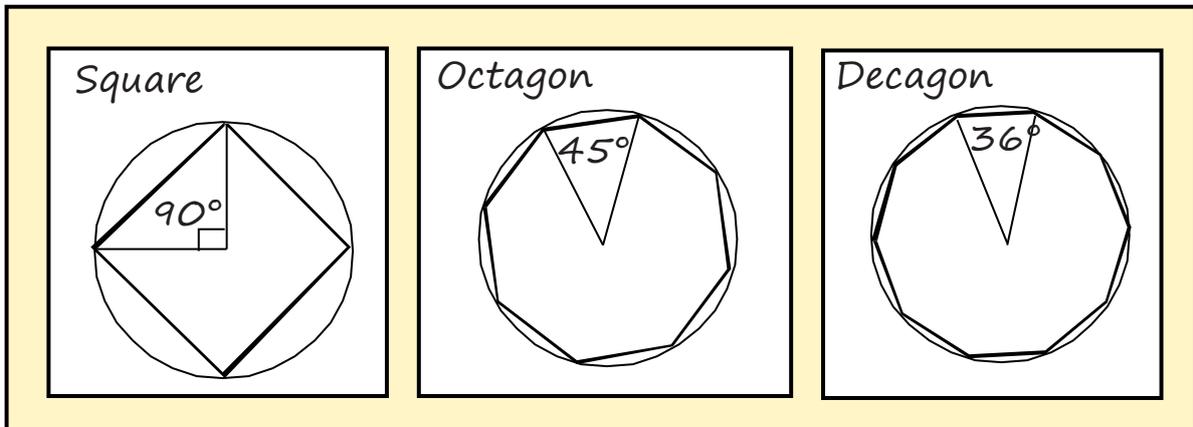
4. Use your scale diagram to calculate the area of the field.

Area = 8040. If you get between 7900 and 8100 you are doing well.



## DRAWING POLYGONS

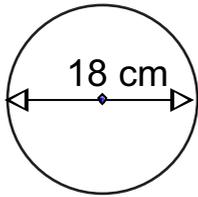
Polygons can also be drawn by using a centre point and a circle, e.g. if a regular polygon is to be drawn, then  $360^\circ \div$  "the number of sides" = "the sector angle". Draw the following regular polygons by using the circles given below.



## CIRCUMFERENCE AND AREA

1. Calculate the circumference and area of each of the following circles:

$$C = \pi D, A = \pi r^2, \pi = 3.141$$

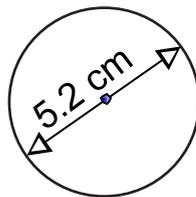


$$C = 3.141 \times 18 \text{ cm}$$

$$= 56.54 \text{ cm}$$

$$A = 3.141 \times 9^2$$

$$= 254.42 \text{ cm}^2$$

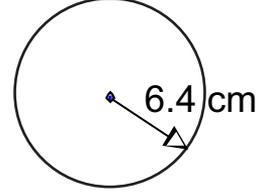


$$C = 3.141 \times 5.2 \text{ cm}$$

$$= 16.33 \text{ cm}$$

$$A = 3.141 \times 2.6^2$$

$$= 21.23 \text{ cm}^2$$



$$C = 3.141 \times 12.8 \text{ cm}$$

$$= 40.20 \text{ cm}$$

$$A = 3.141 \times 6.4^2$$

$$= 128.66 \text{ cm}^2$$

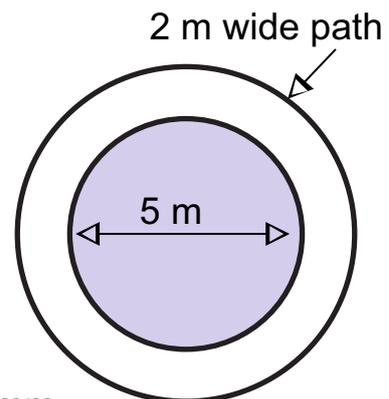
2. A circular fish pond with a diameter of 5 metres has a 2 metre path around the outside. Calculate the area of the path.

$$\text{Radius 1} = 2.5 \text{ m} \quad \text{Radius 2} = 4.5 \text{ m}$$

$$\text{Area 1: } 3.141 \times 2.5^2 = 19.63 \text{ m}^2$$

$$\text{Area 2: } 3.141 \times 4.5^2 = 63.61 \text{ m}^2$$

$$\text{Total Area: } 63.61 - 19.63 = 43.98 \text{ m}^2$$



3. The New Zealand \$1 coin has a diameter of 23 mm.

Calculate the circumference of a \$1 coin.

Check your calculations by following these instructions:

- Put a pen or pencil mark on the outside of a \$1 coin and then place the coin upright on the line drawn below.
- Roll the coin along the line until the mark has completed a full circle and is back on the line.
- Mark this finishing position, then measure the distance from the start to the finish position.
- Is your measurement close to the answer you calculated?

$$C = \pi D$$

$$C = 3.141 \times 23$$

$$C = 72.24 \text{ mm}$$



## ANGLES

You will need a protractor for this.

1. Measure the following angles:

$$AOB = \underline{22^\circ}$$

$$AOC = \underline{89^\circ}$$

$$BOC = \underline{67^\circ}$$

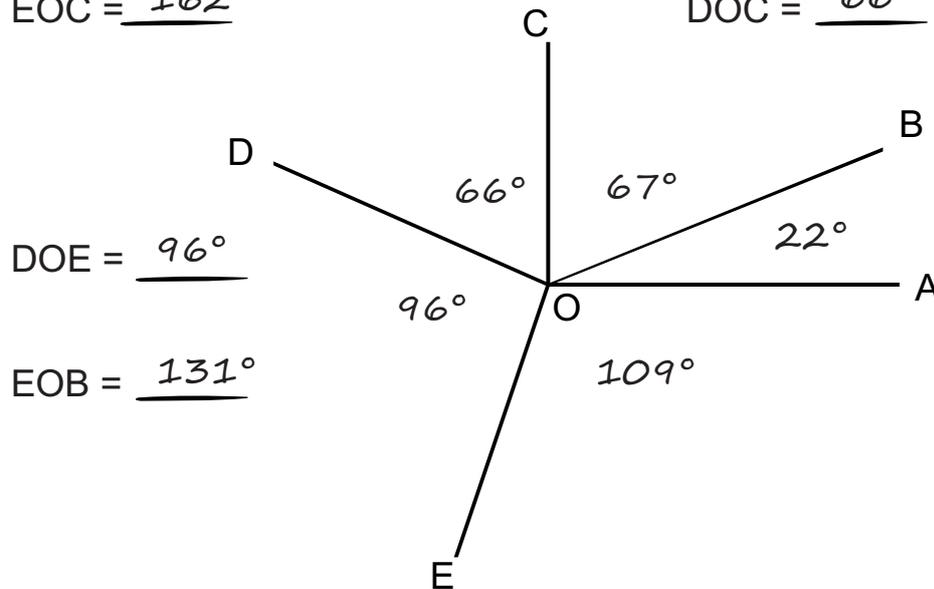
$$BOD = \underline{133^\circ}$$

$$EOA = \underline{109^\circ}$$

$$DOA = \underline{155^\circ}$$

$$EOC = \underline{162^\circ}$$

$$DOC = \underline{66^\circ}$$



2. The sum of the measurements  $AOB + BOC$  should equal  $AOC$ .  
Check to see if you got this result.

$$AOB = \underline{22^\circ}$$

$$BOC = \underline{67^\circ}$$

$$AOB + BOC = \underline{89^\circ}$$

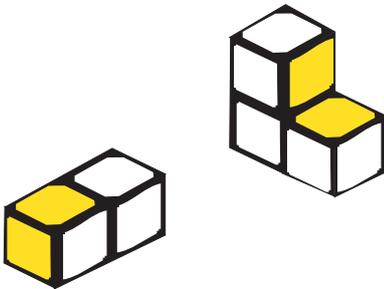
$$AOC = \underline{89^\circ}$$

3. A rotation of  $270^\circ$  anticlockwise is the same as a rotation of  $90^\circ$  clockwise.

## COMPETITION

You win \$1, 000, 000 but you need to spend the total on at least 10 items in as many different areas as you can. For example you may purchase a house, and car but you will also need furniture, other essential items and food to eat. Collect pictures and prices of what you intend to purchase. These can be from newspapers, magazines or pamphlets. Paste all these items on paper along with a tally of the sums of money involved. Your final total must be exactly \$1,000,000.

# BLUE - Worksheet 25



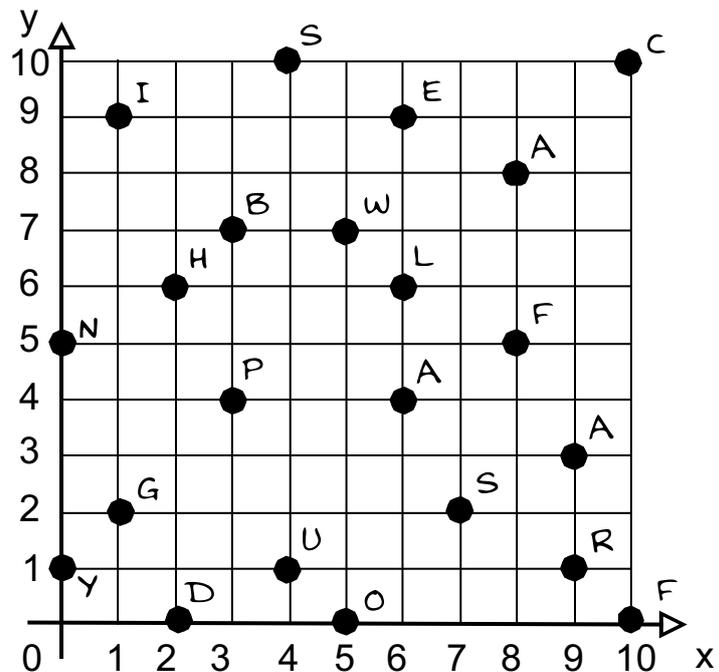
Sketch the result if the two solids are fitted with the shaded faces together.



## MATHEMATICAL EXCURSIONS

How many times does your maths teacher take you on an excursion?

1. How can you make  $10 \text{ plus } 4 = 2$ ?  $10 \text{ o'clock} + 4 \text{ hours} = 2 \text{ o'clock.}$
2. How many  $\text{m}^3$  of soil are in a hole 1 m deep, 3 m long, and 2 m wide?  
 $NONE.$  Holes are empty.
3. On a farm in the Hawkes Bay is the world's perfect peach tree. The main trunk has exactly 25 branches, each branch exactly 15 boughs, each bough exactly 5 twigs, and each twig bears 1 fruit.  
How many apples are on the tree?  
 $None.$  It's a peach tree, so it doesn't bear apples.
4. What is the largest number you can write with just 3 digits?  
 $999$  is a start,  $99^9$  is ok,  $9^{99}$  is better but  $9^{(9^9)}$  is the best
5. How many times can you subtract 2 from the number 21?  
 $Once.$  After that, you are subtracting from 19, 17, ... or  
as many times as you like as long as you start from 21 each time.



Write the correct letter that corresponds to each co-ordinate pair.

What is the best thing to do if your ship starts to sink?

G R A B A P I E C E  
 (1, 2) (9,1) (6,4) (3,7) (8,8) (3,4) (1,9) (6,9) (10,10) (6,9)

O F S O A P A N D  
 (5,0) (8,5) (7,2) (5,0) (6,4) (3,4) (8,8) (0,5) (2,0)

W A S H Y O U R S E L F  
 (5,7) (9,3) (4,10) (2,6) (0,1) (5,0) (4,1) (9,1) (7,2) (6,9) (6,6) (10,0)

A S H O R E  
 (9,3) (7,2) (2,6) (5,0) (9,1) (6,9)

**QUICK QUESTION**

You empty your pockets one day and discover that you have exactly \$38 in coins. No wonder your pants feel heavy! You then discover that you have exactly the same number of 10c, 20c, 50c, \$1 and \$2 coins.

How many of each coin do you have?

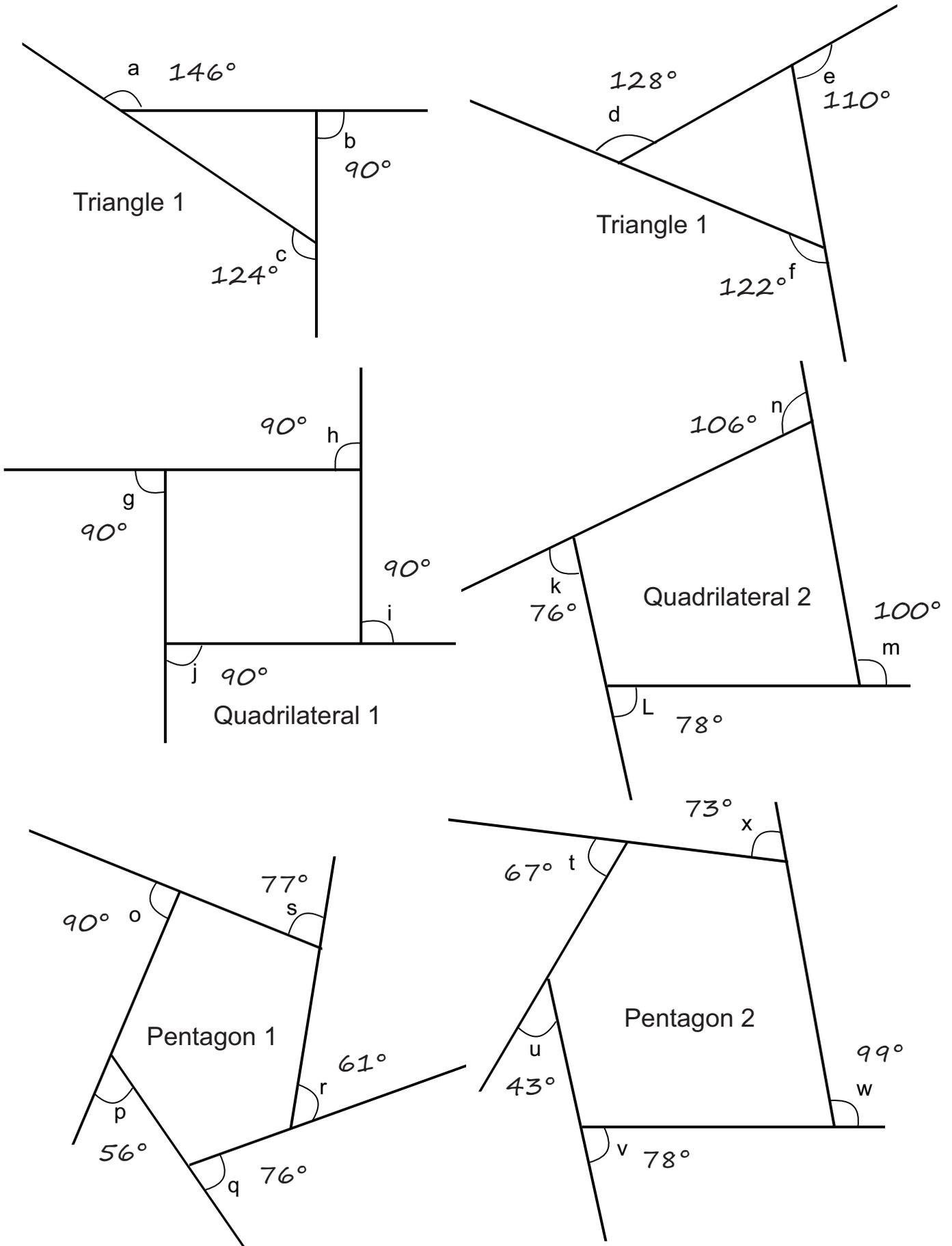
$$10x + 20x + 50x + 100x + 200x = 3800$$

$$380x = 3800$$

$$x = 10 \text{ i.e. } 10 \text{ of each coin}$$

# ANGLE SUM OF THE EXTERIOR OF A POLYGON

For each of these polygons, measure the exterior angles then record the sums of each in the table on the next page.



Polygon Name	Angle Sizes	Total of all Exterior Angles
Triangle 1	$146^\circ$ $90^\circ$ $124^\circ$	$360^\circ$
Triangle 2	$128^\circ$ $110^\circ$ $122^\circ$	$360^\circ$
Quadrilateral 1	$90^\circ$ $90^\circ$ $90^\circ$ $90^\circ$	$360^\circ$
Quadrilateral 2	$76^\circ$ $78^\circ$ $100^\circ$ $106^\circ$	$360^\circ$
Pentagon 1	$90^\circ$ $56^\circ$ $76^\circ$ $61^\circ$ $77^\circ$	$360^\circ$
Pentagon 2	$67^\circ$ $43^\circ$ $78^\circ$ $99^\circ$ $73^\circ$	$360^\circ$
Rule for exterior angles of a polygon: <i>Exterior Angles sum to <math>360^\circ</math></i>		

## MATHEMATICAL EXCURSIONS

Because everybody loves going on an excursion.

1. How many boxes measuring 1m x 1m x 50cm can be packed into a container measuring 6m x 5m x 4m?

$$1 \times 1 \times 0.5 = 0.5 \text{ m}^3, \quad 6 \times 5 \times 4 = 120 \text{ m}^3$$

---


$$120 / 0.5 = 240$$

2. A clock loses 10 minutes each hour. If the clock is set correctly at noon, what time is it when it reads 3 PM?

*The clock loses 10 minutes each hour, 5 minutes every  $\frac{1}{2}$  hour, 1 minute every 6 minutes.*

*Therefore it shows 12:50 pm at 1:00 o'clock, 1:40 pm at 2:00 o'clock, 2:30 pm at 3:00 o'clock*

3. Rachel, Phil and Sue share a sum of money between them. Rachel gets three fifths, Phil gets 0.35 and Sue gets \$900. How much is the original sum of money?

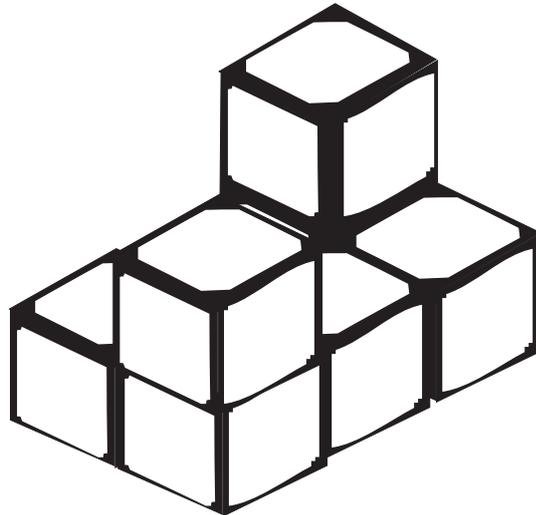
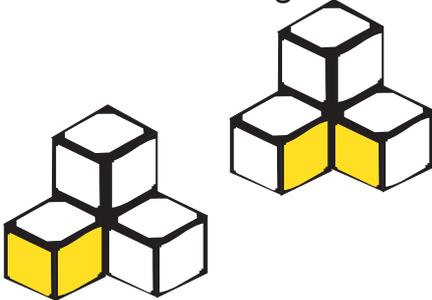
$$\frac{3}{5} + \frac{35}{100} = \frac{19}{20} \quad \text{Sue} = \frac{1}{20} = \$900$$

---


$$\text{Rachel} = \frac{12}{20} = \$10,800 \quad \text{Phil} = \frac{7}{20} = \$6300 \quad \text{Total} = \$18,000$$

# BLUE - Worksheet 26

Sketch the result if the two solids are fitted with the shaded faces together.



## IMPOSSIBLE SOLID STRUCTURES

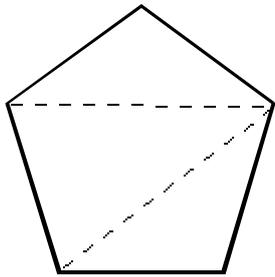
Sketch the following solid on the grid below.



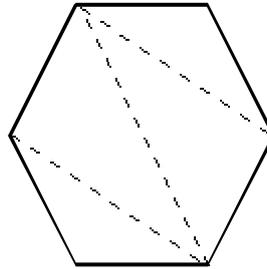
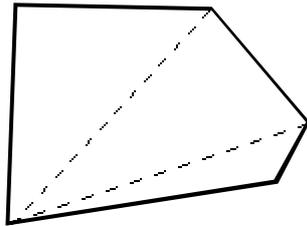
## ANGLE SUM OF THE INTERIOR OF A POLYGON

The angle sum of the interior of a triangle is  $180^\circ$ .

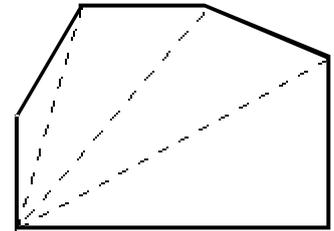
Use this information to complete the table below and discover a formula that gives the interior angle sum inside any polygon.



Pentagons



Hexagons



Polygon Name	Number of Sides	Number of Triangles	Sum of Interior Angles
Triangle	3	1	$180^\circ$
Quadrilateral	4	2	$360^\circ$
Pentagon	5	3	$540^\circ$
Hexagon	6	4	$720^\circ$
Heptagon	7	5	$900^\circ$
Octagon	8	6	$1080^\circ$
Nonagon.	9	7	$1260^\circ$
Decagon	10	8	$1440^\circ$

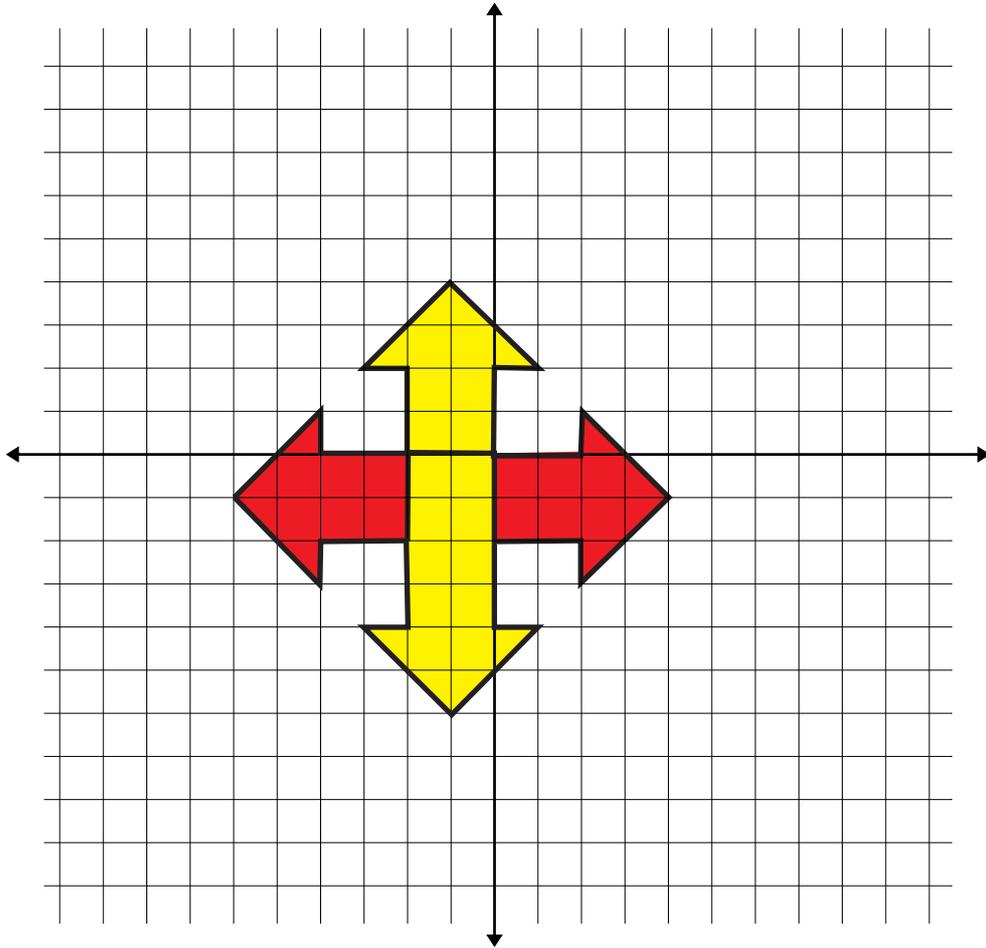
Rule for interior angles of a polygon:

$n = \text{number of sides}$

$\text{sum} = (n - 2) \times 180^\circ$

# COORDINATES

1. On the grid below, plot and join each of these co-ordinates in order.  
 (0, -2), (-2, -2), (-2, 0), (0, 0), (0, -2), (2, -2), (2, -3), (4, -1), (2, 1), (2, 0)  
 (0, 0), (0, 2), (1, 2), (-1, 4), (-3, 2), (-2, 2), (-2, 0), (-4, 0), (-4, 1), (-6, -1),  
 (-4, -3), (-4, -2), (-2, -2), (-2, -4), (-3, -4), (-1, -6), (1, -4), (0, -4), (0, -2).



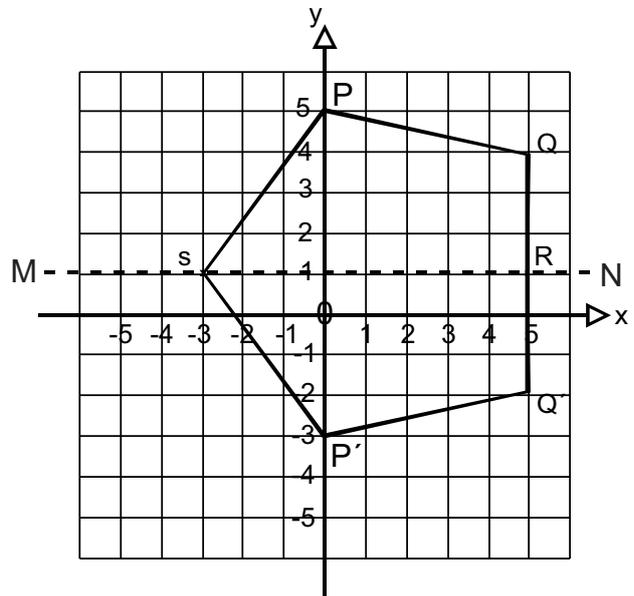
2. Complete the figure below so that MN is a line of symmetry.

3. Write below the co-ordinates of the new points.

$Q' = (5, -2)$   
 $P' = (0, -3)$

4. What is the name of the shape that has been formed?

pentagon

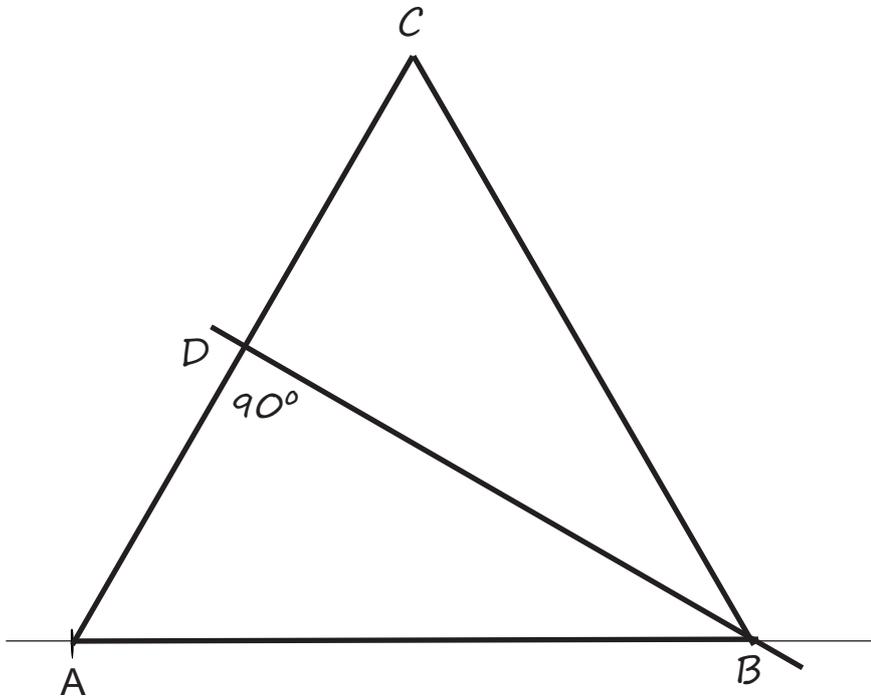
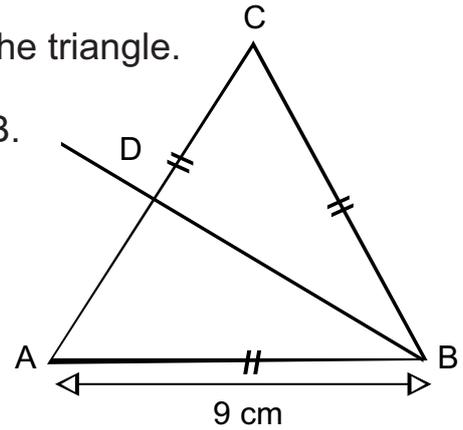


## CONSTRUCTIONS

The equilateral triangle ABC shown below has sides lengths of 9 cm.

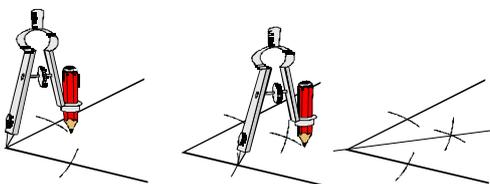
- Using a ruler, pencil and compass construct the triangle.
- Bisect the angle ABC and draw in the line DB.
- Measure the angle ADB.

$$\angle ADB = \underline{90^\circ}$$

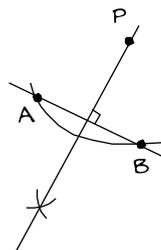


- Bisect means to divide into . . . <sup>2</sup> . . . equal parts.

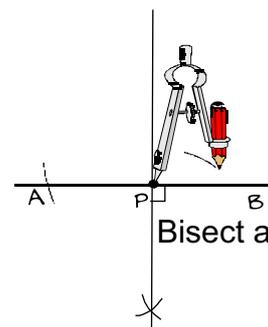
How to bisect using a compass.



Bisect an angle.



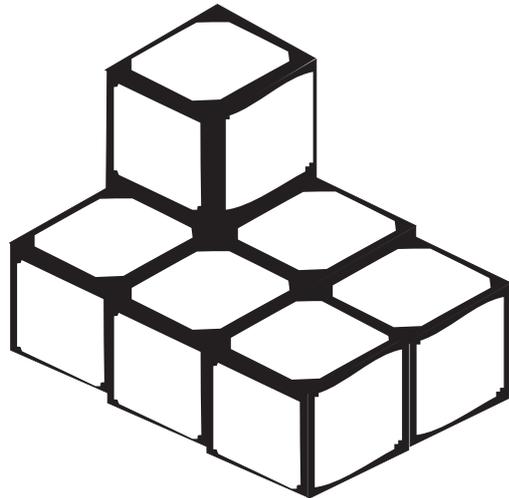
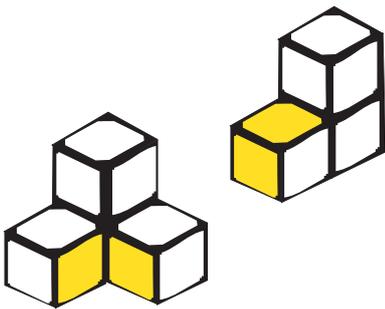
Bisect from a point.



Bisect at a point.

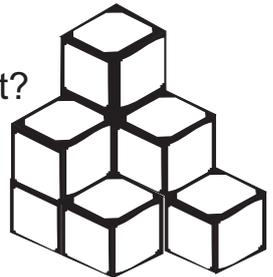
# BLUE - Worksheet 27

1. Sketch the result if the two solids are fitted with the shaded faces together.

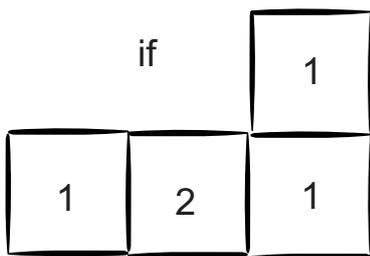


2. How many blocks are needed to build the model on the right?

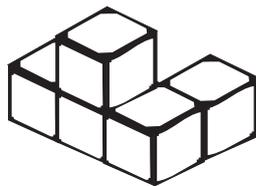
*9 blocks*



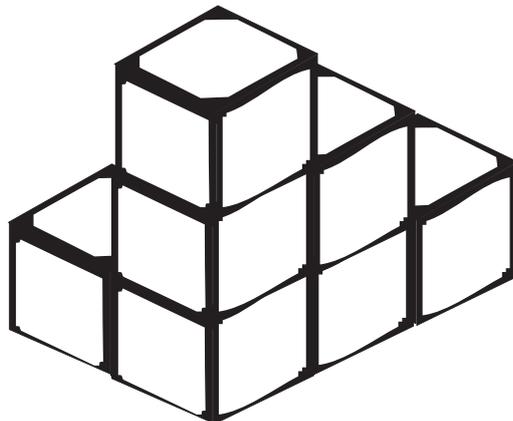
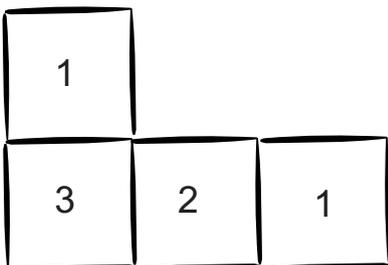
3. if



represents



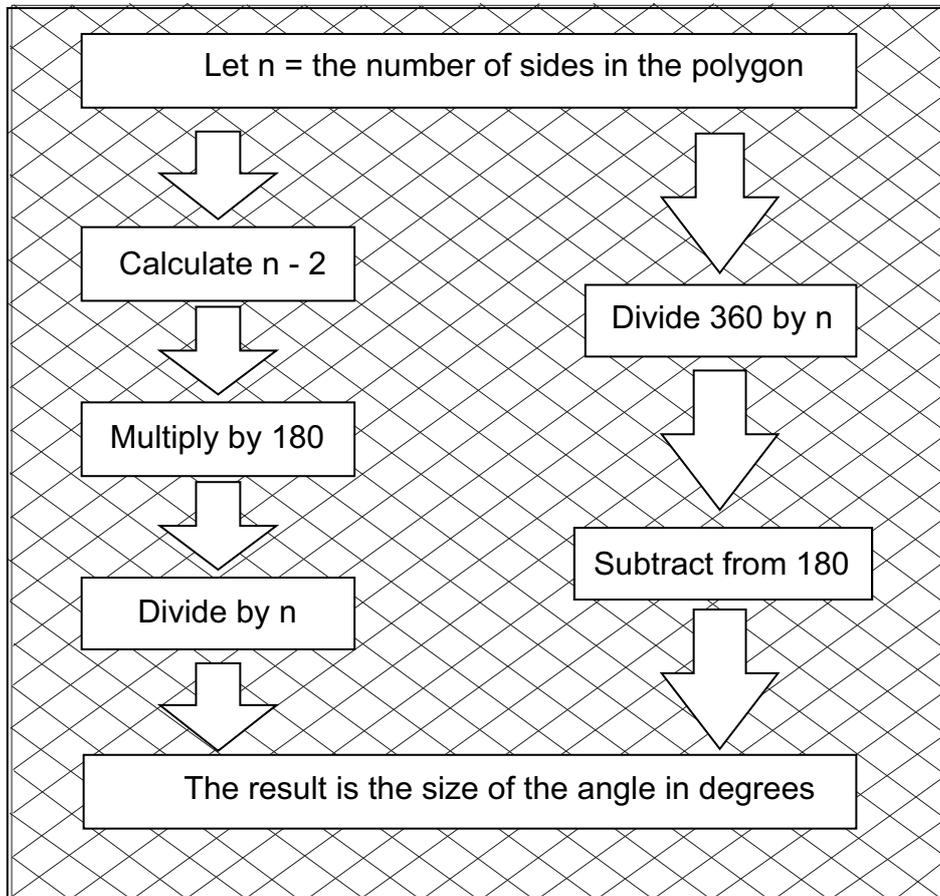
then draw:



## INTERIOR ANGLES OF POLYGONS

Below are two flow charts to find the interior angles of a regular polygon.

1. Use each flow chart to calculate the size of the interior angle of two regular polygons, one with 12 sides and one with 20 sides.



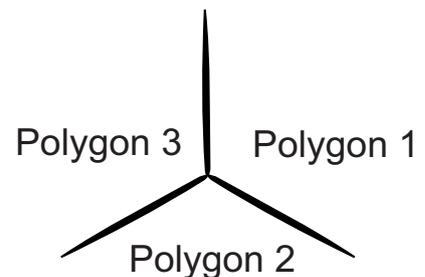
	Method 1	Method 2
Interior angle size of a 12 sided polygon:	<u>150°</u>	<u>150°</u>
Interior angle size of a 20 sided polygon:	<u>162°</u>	<u>162°</u>

2. In the diagram, three regular polygons fit together exactly at point P. One possible situation is that the polygons could be three regular hexagons. Give another possible combination of polygons that could fit together way (it could be more than 3 polygons).

4 squares

6 equilateral triangles

Combinations of hexagons (120°)  
and equilateral triangles.



## COORDINATES

1. On the grid below, plot and join each of these co-ordinates.  
A(-4, 4), B(-3, -3), C(2, -3), D(3, 4), A(-4, 4).

2. Write the name of the shape that was formed.

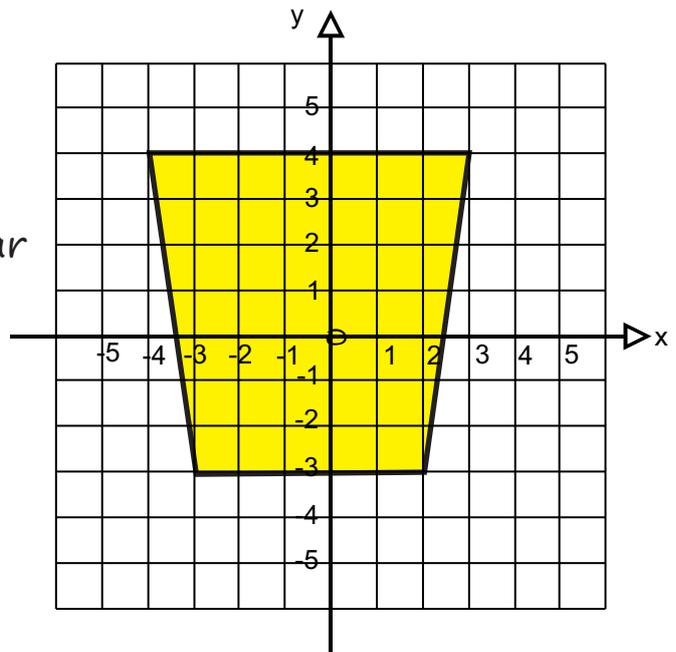
trapezium

3. If each of the co-ordinates were placed at 1 cm intervals, what would the area of the shape be?

Area =  $\frac{1}{2}$  sum of parallel sides multiplied by the perpendicular height

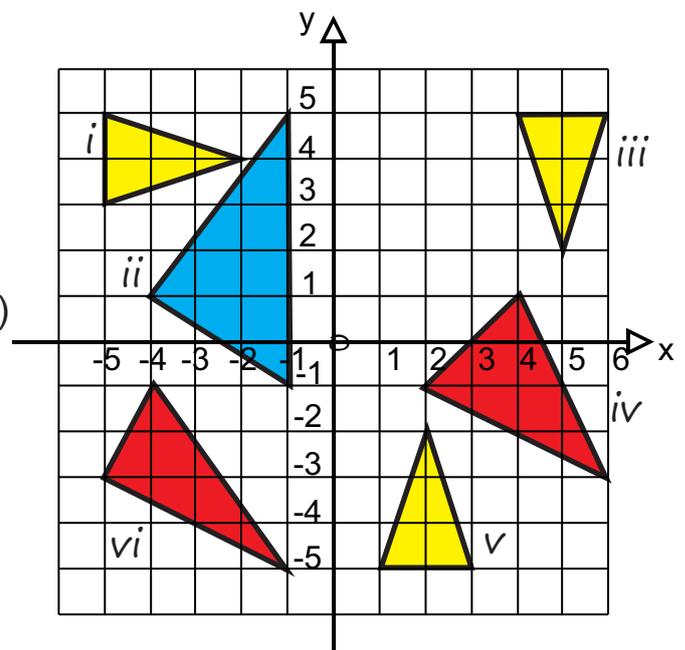
$$A = \frac{1}{2}(5 + 7) \times 7 \text{ (cm}^2\text{)}$$

Area = 42 cm<sup>2</sup>



4. On the axes below draw the following six triangles.

- (-5, 3), (-5, 5), (-2, 4), (-5, 3)
- (-4, 1), (-1, 1), (-1, 5), (-4, 1)
- (4, 5), (5, 2), (6, 5), (4, 5)
- (4, 1), (2, -1), (6, -3), (4, 1)
- (2, -2), (3, -5), (1, -5), (2, -2)
- (-1, -5), (-5, -3), (-4, -1), (-1, -5)



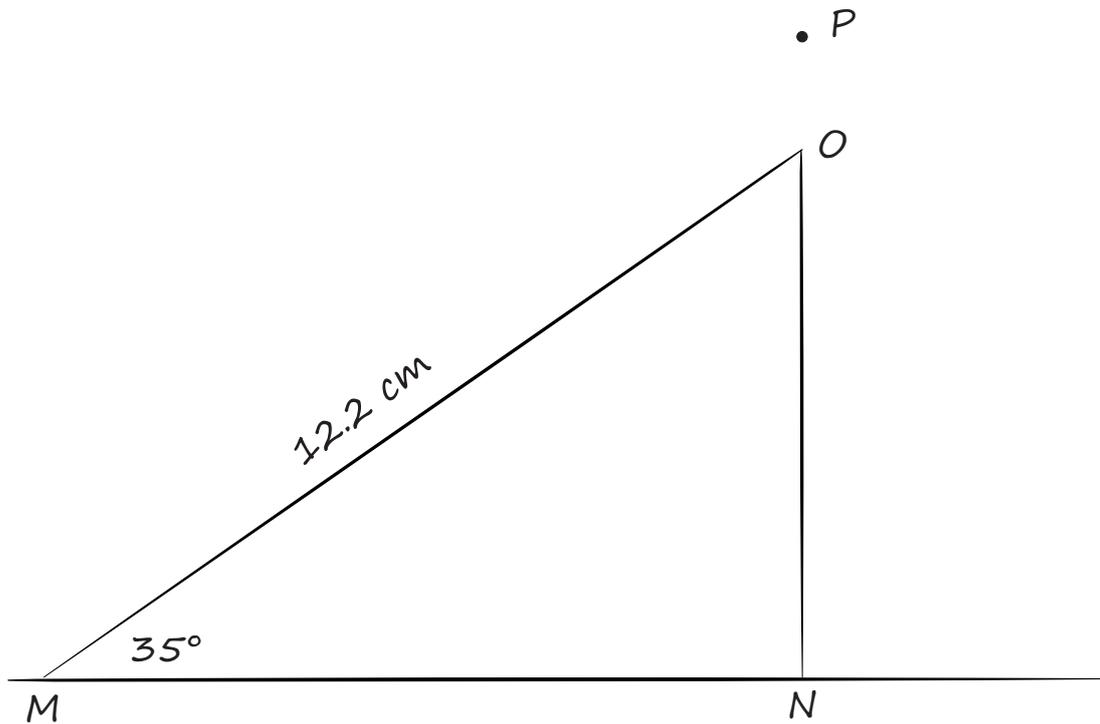
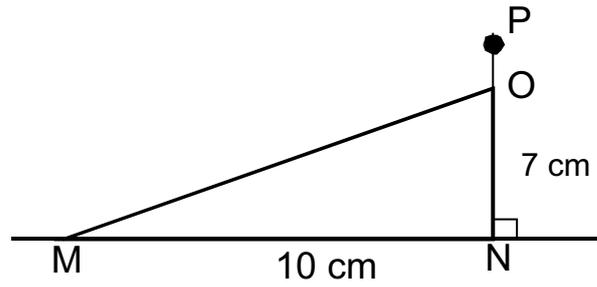
5. Name the groups of triangles that are congruent.

See the triangles

i, iii, v

## CONSTRUCTIONS

1. Using the point and the line given, construct the following triangle.

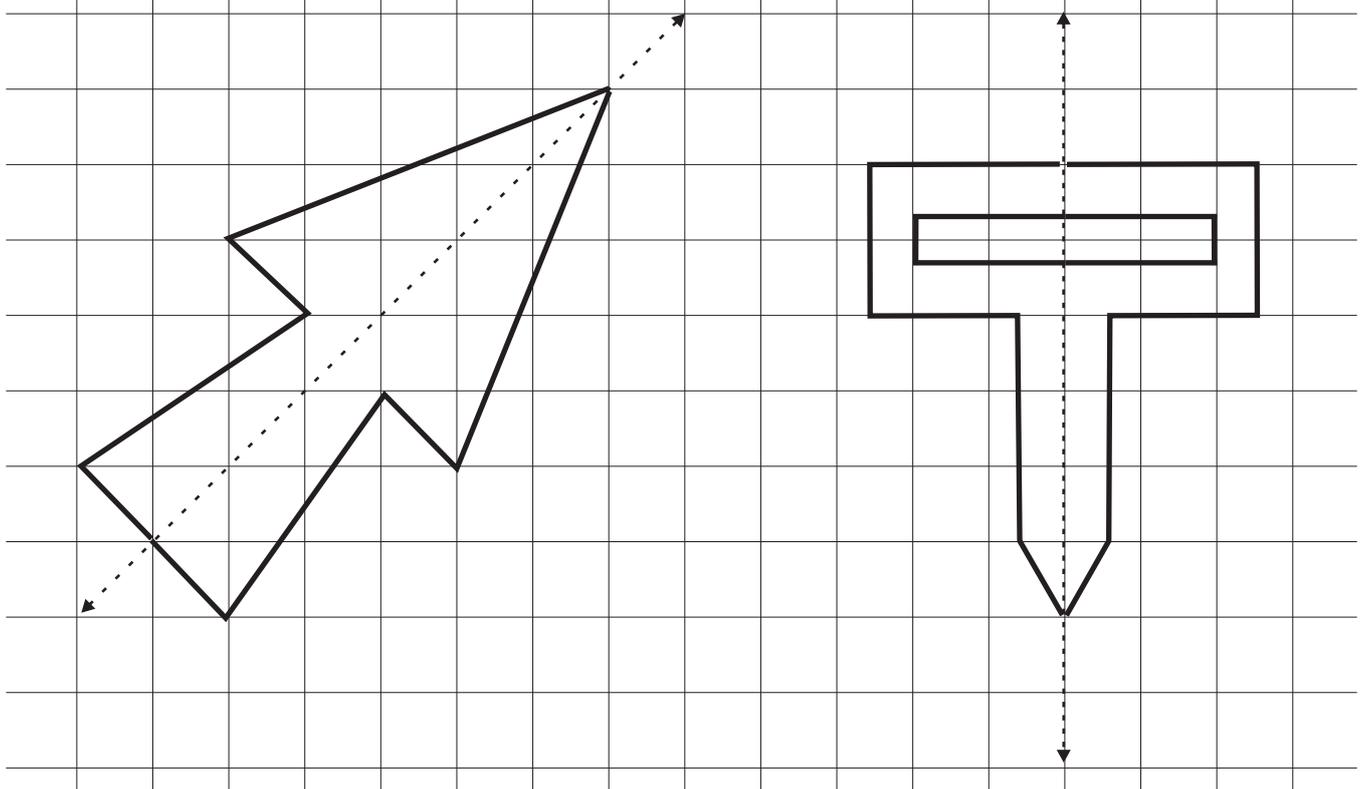
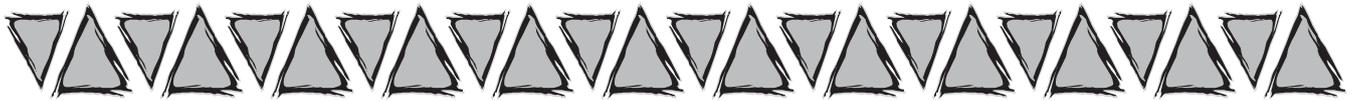
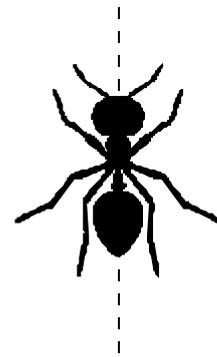
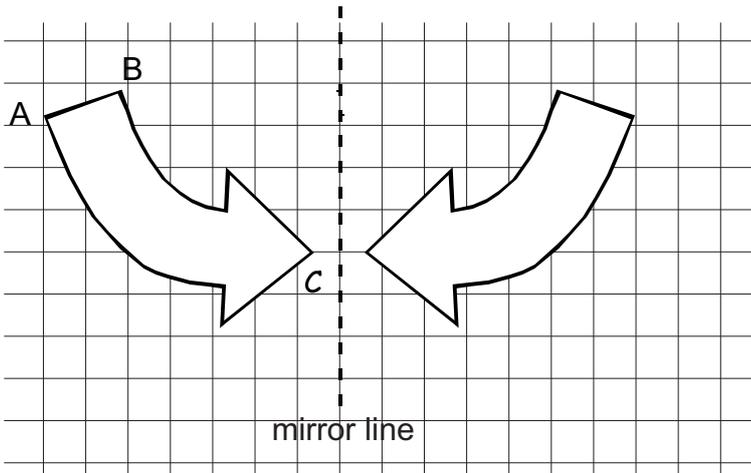


2. On your diagram, measure the angle OMN. = 35°
3. On your diagram measure the length of side MO. = 12.2 cm

# BLUE - Worksheet 28

REFLECTION NOITCEJREFR  
REFLECTION NOITCEJREFR

Sketch what each figure looks like when reflected.

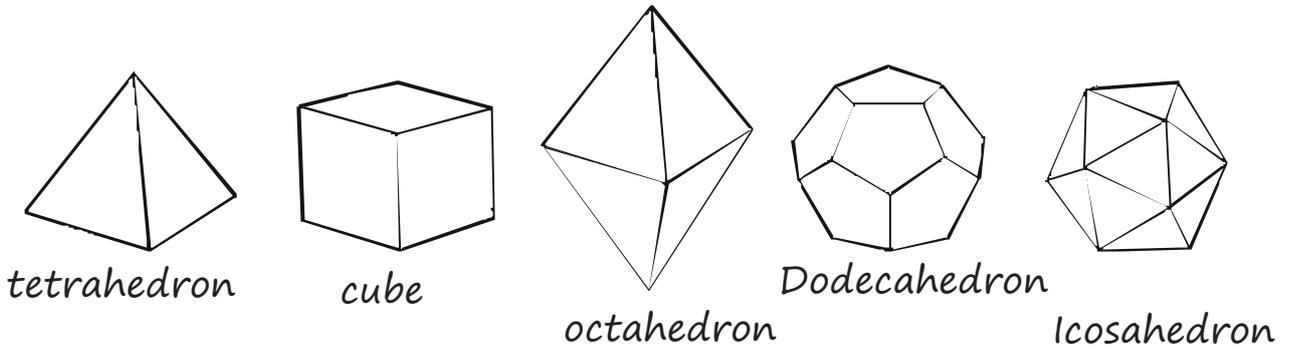


## REGULAR EVERYDAY SOLIDS

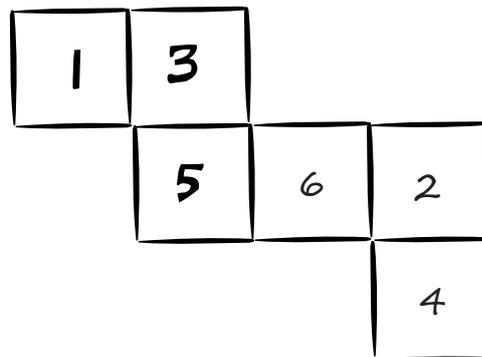
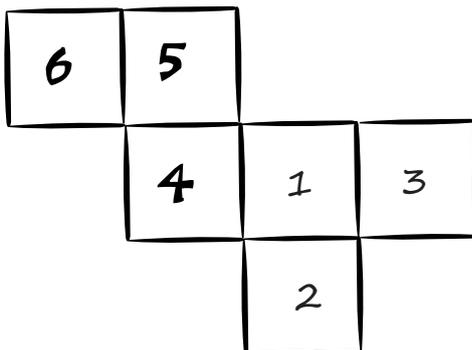
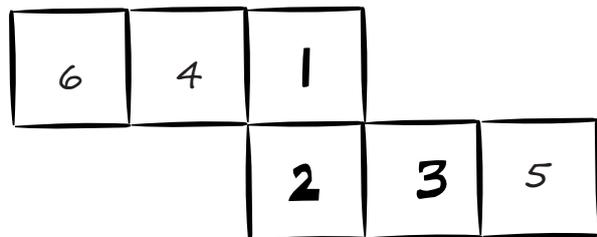
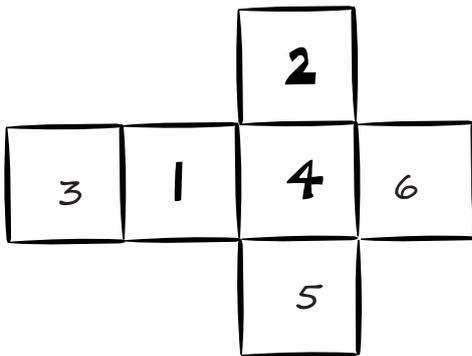
There are only five possible regular solids. They are:

- i. Regular Tetrahedron- four equilateral triangular faces
- ii. Cube - six square faces
- iii. Regular Octahedron - eight equilateral triangular faces
- iv. Regular Dodecahedron - twelve pentagonal faces
- v. Regular Icosahedron - twenty equilateral triangular faces

1. Using the list and descriptions above, write the name of each of the solids.

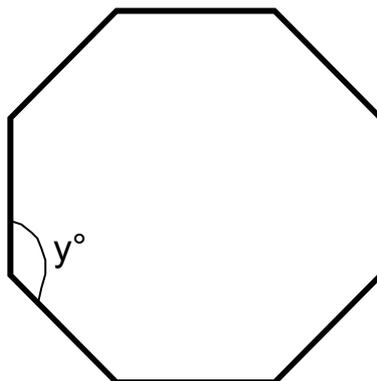
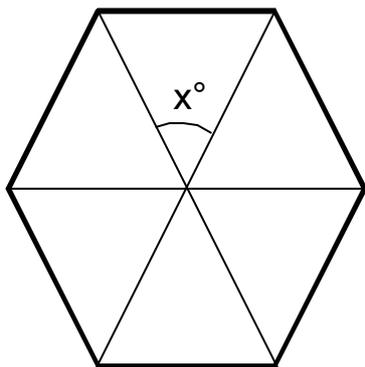


2. For dice to be "fair" the numbers on opposite sides of the cubes must sum to 7. Below are a series of 4 nets that could be folded to form a die. Some of the faces have already been labeled. On each of the other faces, write the numbers so that the opposite face, when folded to be a cube, will add to 7.



## POLYGON ANGLES

The diagram below shows a regular hexagon and a regular octagon.



1. What is the size of the angle marked  $x^\circ$ ?  $\frac{360^\circ}{6} = 60^\circ$
2. What is the size of the angle marked  $y^\circ$ ? Use  $\frac{180(n-2)}{n}$   
 $n = 8, y = 135^\circ$

## MATHEMATICAL EXCURSIONS

1. What number divided by 4 is the same as that number minus 4?  
 Equation is  $\frac{x}{4} = \frac{x-4}{1}$       $x = 5\frac{1}{3}$
2. Using eight eights and addition only, make a sum that equals 1000.  
 $888 + 88 + 8 + 8 + 8 = 1000$
3. Arrange four 7's with any mathematical symbols to make the total 100.  
 $77 \div 0.77 = 100$
4. Use four 9's in a mathematical equation that equals 100.  
 $99 + 9 \div 9$  or as above  $99 \div 0.99$
5. Use only 7, 8, 9 and any mathematical symbols to make total 50 and 100.  
 $7 \times 7 + 9 - 8 = 50$   
 $99 + 8 - 7 = 100$
6. What is the next number?    1    8    27    64    125  
 $216$  (cubes of 1 to 6)
7. If  $x - 5 = 50$  then  $x + 7 = \dots\dots ?$       $x = 45$   
 $x + 7 = 62$

## ANGLES

Look at the shapes then answer the questions.

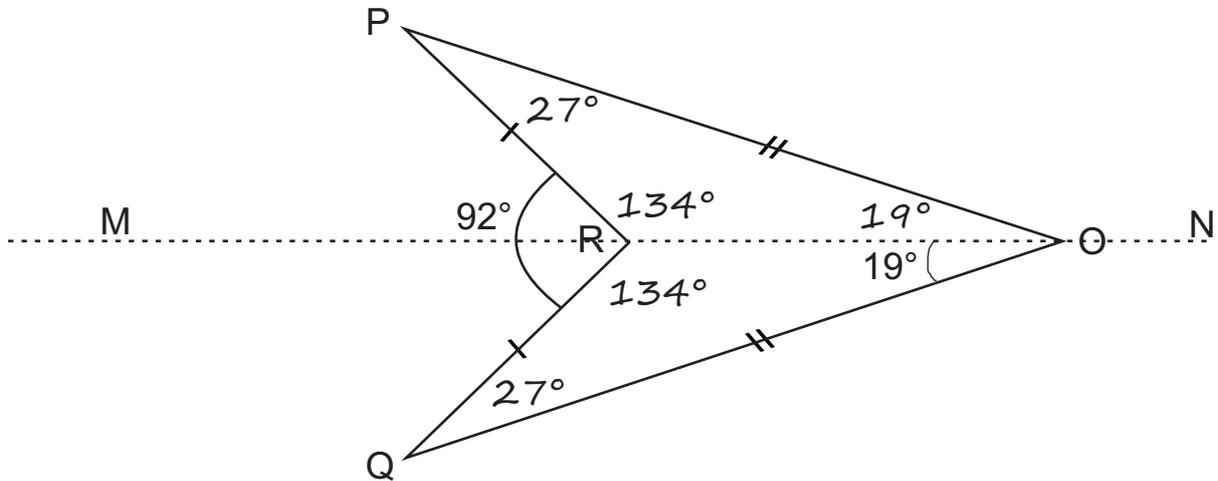
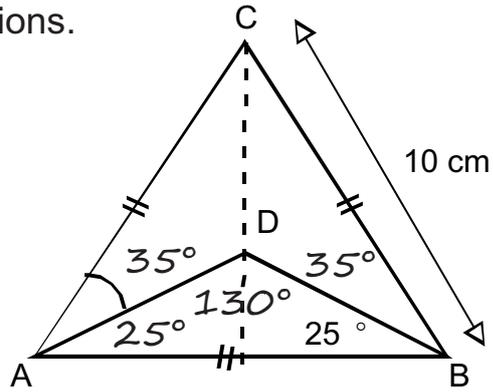
1. Angle ACB = 60°

2. Angle CAD = 35°

3. Angle ADB = 130°

4. What sort of triangle is ABC? Equilateral

5. What sort of triangle is ABD? Isosceles



6. Angle MRQ = 46°

7. Angle POQ = 38°

8. Angle OQR = 27°

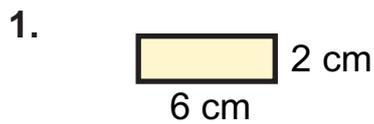
## REFLECTION

Draw what the window looks like from the other side.



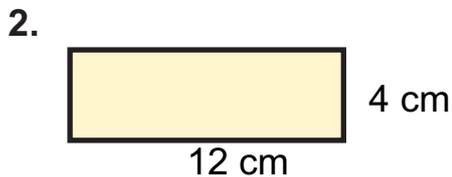
# BLUE - Worksheet 29

If a figure is enlarged by scale factor  $k$ , then the area of the figure is enlarged by the factor  $k^2$ . To demonstrate this, complete the areas of the rectangles below.



Scale Factor = 1

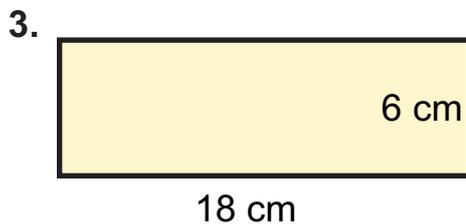
Area = 12 cm<sup>2</sup>



Scale Factor = 2

Area = 48 cm<sup>2</sup>

i.e.  $2^2 \times 12\text{cm}^2 = \underline{48\text{ cm}^2}$



Scale Factor = 3,

Area = 108 cm<sup>2</sup>

i.e.  $3^2 \times 12\text{cm}^2 = \underline{108\text{ cm}^2}$



4. This diagram is made up of equilateral triangles. The smallest (black) triangle has an area of  $10\text{m}^2$ . What is the area of the largest triangle?

160 m<sup>2</sup>

5. The milk carton shown holds 1 litre of milk. What is the height of the carton if it has a  $7\text{cm} \times 7\text{cm}$  square base?

Height =  $1000\text{ cm}^3 = 1\text{ litre}$ , height = 20.4 cm

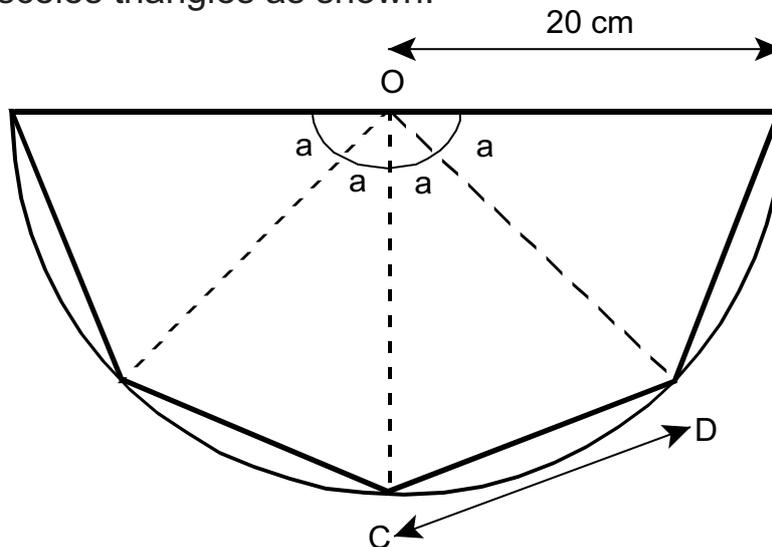
6. What will the height of the carton be if the base is the same dimensions but the carton holds 300 ml?

$7 \times 7 \times h = 300$ ,  $h = 6.1\text{ cm}$

## PYRAMIDS

Below are the steps to make a pyramid with a square base. Complete each of the steps and answer the questions.

- On a piece of cardboard, draw a semicircle, centre O, radius 10 cm and make 4 isosceles triangles as shown.



- Calculate the measurements of the following:

The lengths OD and OC. 20 cm i.e. the radius measurement

The length CD. 15.3 cm

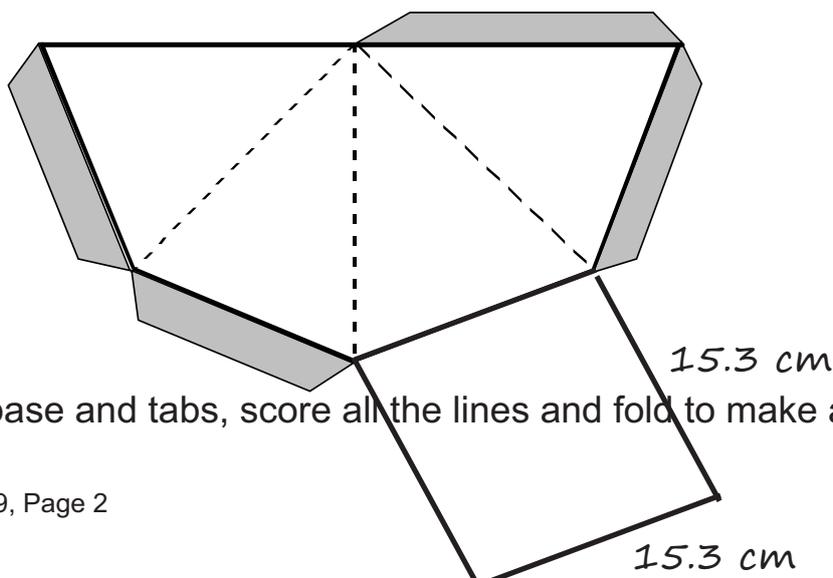
The angles labeled a. 45°

- What is the name of the triangle formed by OCD?

isosceles triangle

- To complete the pyramid, you will have to add a base. What will be the shape and what will be the measurements of the base?

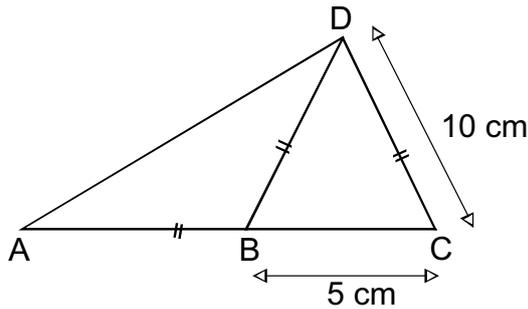
Shape will be a square with side lengths 15.3 cm



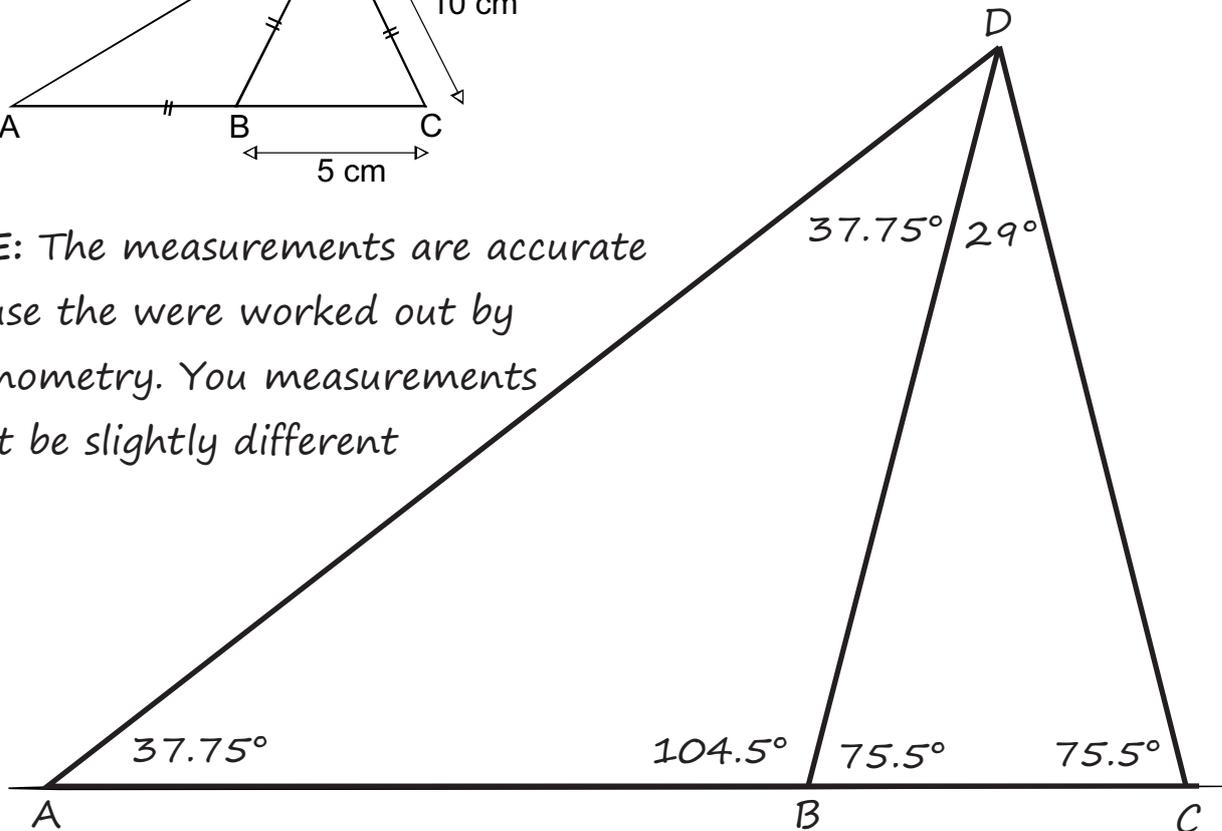
- Add the base and tabs, score all the lines and fold to make a pyramid.

## MORE MEASUREMENT

In the space below, construct the triangle diagram shown.



*NOTE: The measurements are accurate because they were worked out by trigonometry. Your measurements might be slightly different*



Use a protractor on your diagram to measure the size of all angles, then use your measurements to show that the following statements are true.

1. "Angles in a triangle sum to  $180^\circ$ ."

$$\angle CAD + \angle ADC + \angle DCA = 180^\circ \quad \underline{37.75^\circ + 66.75^\circ + 75.5^\circ = 180^\circ}$$

$$\angle BAD + \angle ADB + \angle DBA = 180^\circ \quad \underline{37.75^\circ + 37.75^\circ + 104.5^\circ = 180^\circ}$$

$$\angle CBD + \angle BDC + \angle DCB = 180^\circ \quad \underline{75.5^\circ + 29^\circ + 75.5^\circ = 180^\circ}$$

2. "Angles on a straight line sum to  $180^\circ$ ."

$$\angle DBA + \angle DBC = 180^\circ \quad \underline{104.5^\circ + 75.5^\circ = 180^\circ}$$

3. "An isosceles triangle has two equal angles."

$$\angle DBC = \angle DCB \quad \underline{75.5^\circ = 75.5^\circ}$$

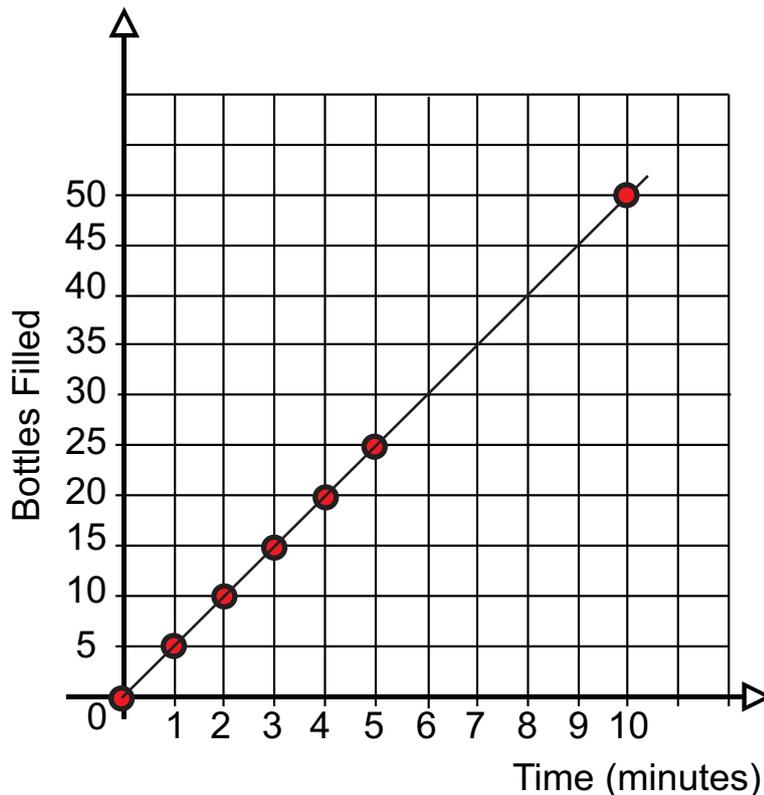
$$\angle BDA = \angle BAD \quad \underline{37.75^\circ = 37.75^\circ}$$

## GRAPHS

At the Mahobe Orange Juice Factory, bottles of fresh orange juice are produced for despatch to supermarkets. The bottling machine is able to fill and seal five, 2 litre bottles of juice every minute.

1. Complete the table below, then use the co-ordinates to construct a line graph of the production.

Time	Bottles Filled	Co-ordinates
0	0	(0, 0)
1	5	(1, 5)
2	<u>10</u>	<u>(2, 10)</u>
3	<u>15</u>	<u>(3, 15)</u>
4	<u>20</u>	<u>(4, 20)</u>
5	<u>25</u>	<u>(5, 25)</u>



2. How long does it take to fill 50 bottles?

10 minutes

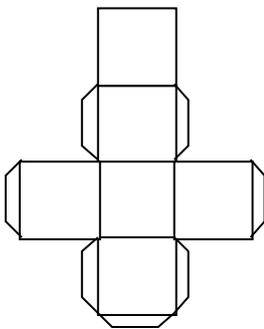
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# BLUE - Worksheet 30

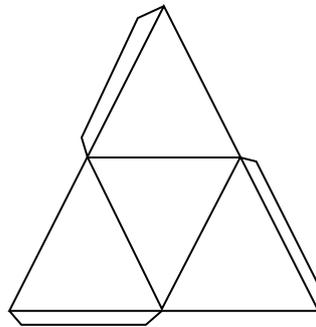
## NETS AND SOLIDS

In mathematics, a net is a pattern of polygons that can be cut out and folded up to make a solid object. Below are some common nets.

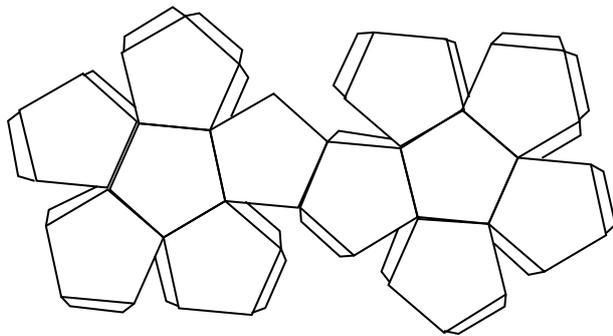
1. Choose at least one of the nets. Note whether it is made up of squares, equilateral triangles or pentagons. Use this information to draw it onto a larger piece of card and fold to make the shape.



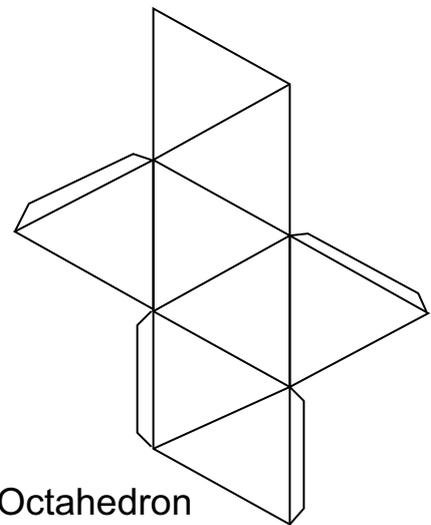
Cube



Tetrahedron

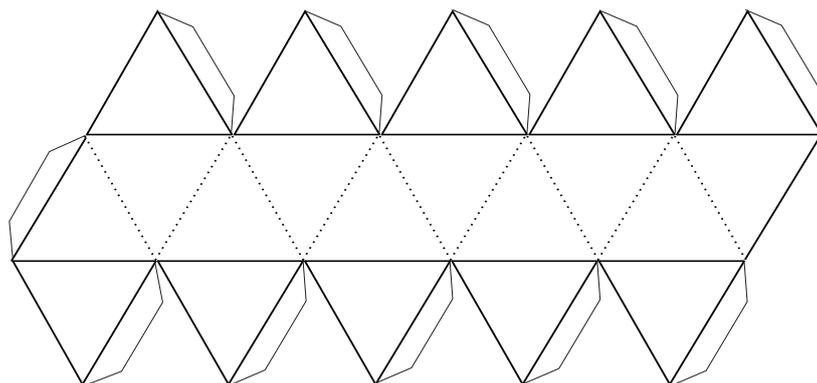


Dodecahedron



Octahedron

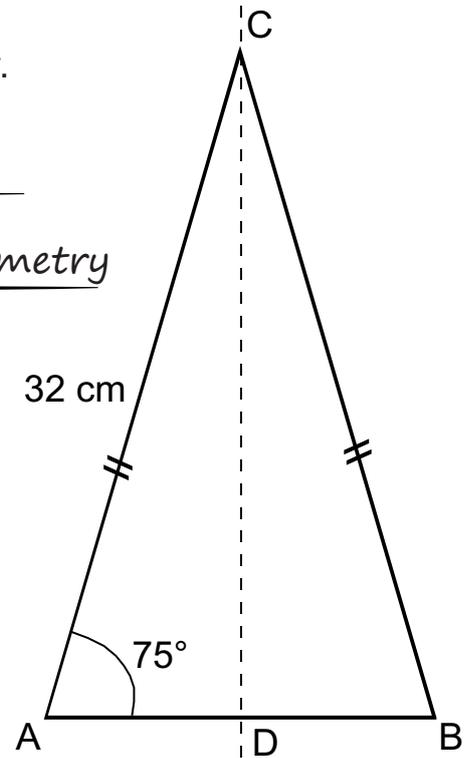
Icosahedron



## TRIANGLES AND ANGLES

Answer the questions that refer to the triangle below.

1. ABC is called an isosceles triangle
2. The dashed line CD is called line of symmetry
3. The length of BC is 32 cm
4. Angle B = 75°
5. Angle C = 30°
6. Angles in a triangle sum to 180°

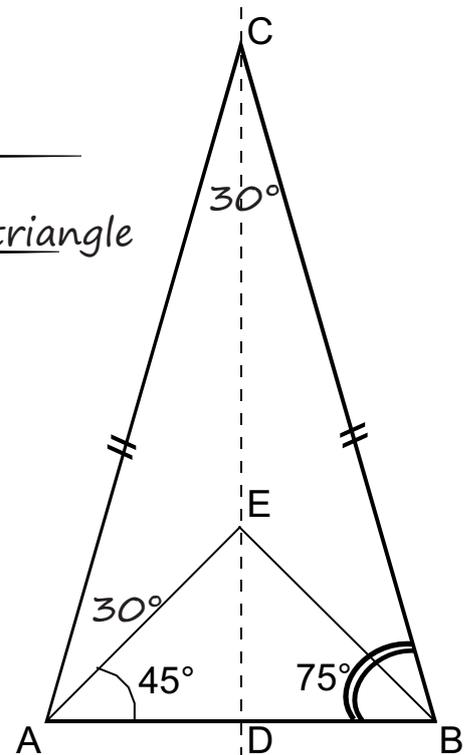


The triangle above has had another triangle drawn inside it (see below). Use this information to answer the next set of questions.

7.  $\angle AEB$  is called an isosceles triangle
8. The triangle  $\angle DCB$  is called a Right angled triangle
9.  $\angle CAE$  and  $\angle CBE =$  30°
10.  $\angle CEB$  and  $\angle CEA =$  270°

Reason:  $AEB = 90^\circ$

Angles around a point sum to 360°

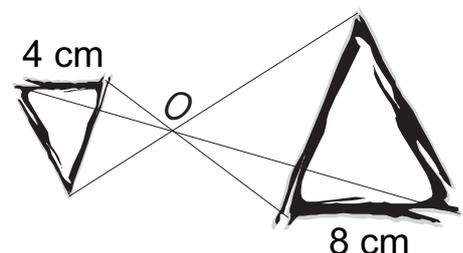


## REMEMBER ENLARGEMENTS

The large triangle shown below is enlarged to form the small triangle.

1. Give the scale factor of the enlargement.

scale factor =  $-\frac{1}{2}$



## GRAPH APPLICATIONS

The perimeter of a square is the sum of the lengths of all the sides.

The diagram below gives the perimeter of three figures made from 1 cm squares.

1 square  
Perimeter = 4cm



2 squares  
Perimeter = 6cm

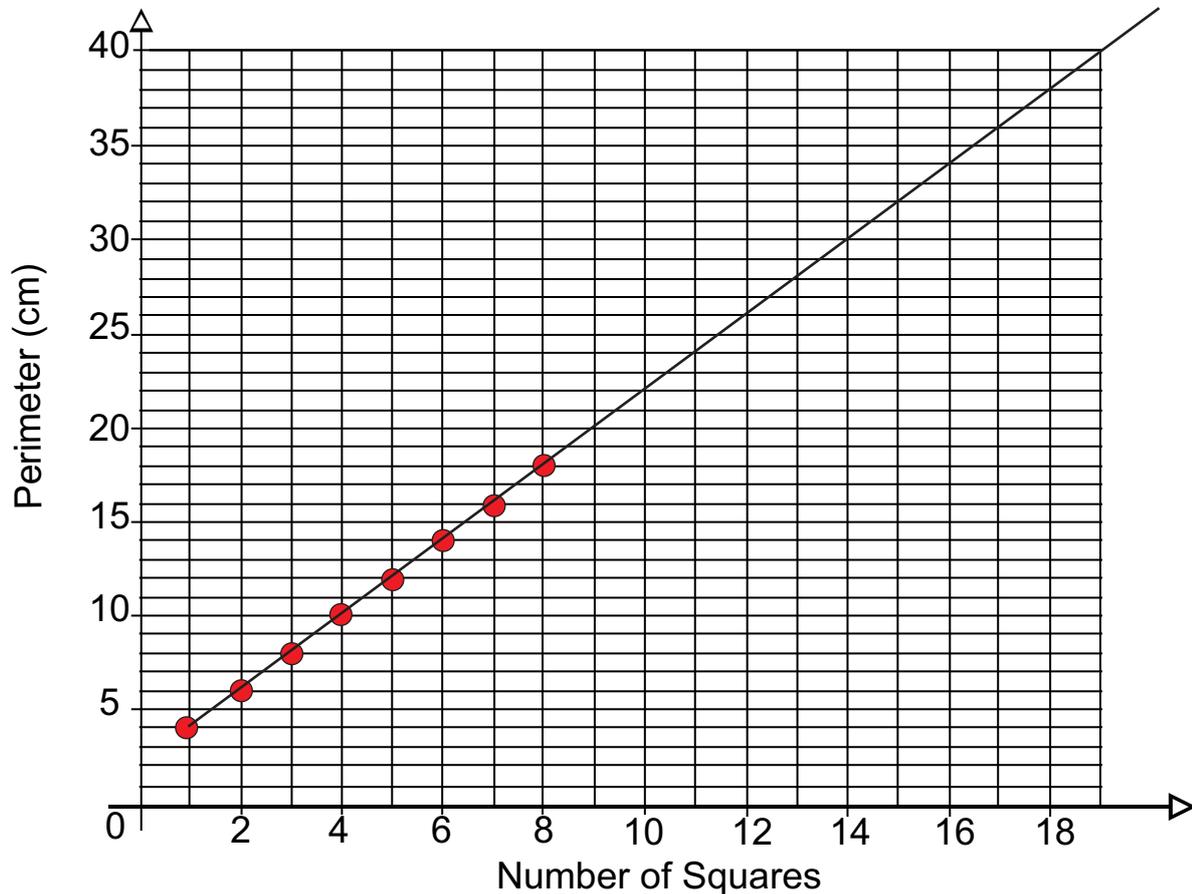


3 squares  
Perimeter = 8cm



Centimeter Squares (x)	1	2	3	4	5	6	7	8
Perimeter (y) cm	4	6	8	10	12	14	16	18

- Using the results of the table, plot the co-ordinates on the graph below, where the x axis co-ordinate is the number of centimeter squares, and the y axis co-ordinate is the resultant perimeter.



- What is the perimeter of the rectangle formed by 18 centimeter squares?

*38 cm*

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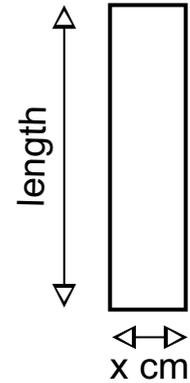
- How many squares form a rectangle with perimeter of 26 cm?

*12 squares*

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## GRAPH APPLICATIONS

The rectangle shown on the right has a width of  $x$  centimeters. The length of the rectangle is 4 cm more than the width.



1. Write an expression for the length of the rectangle.

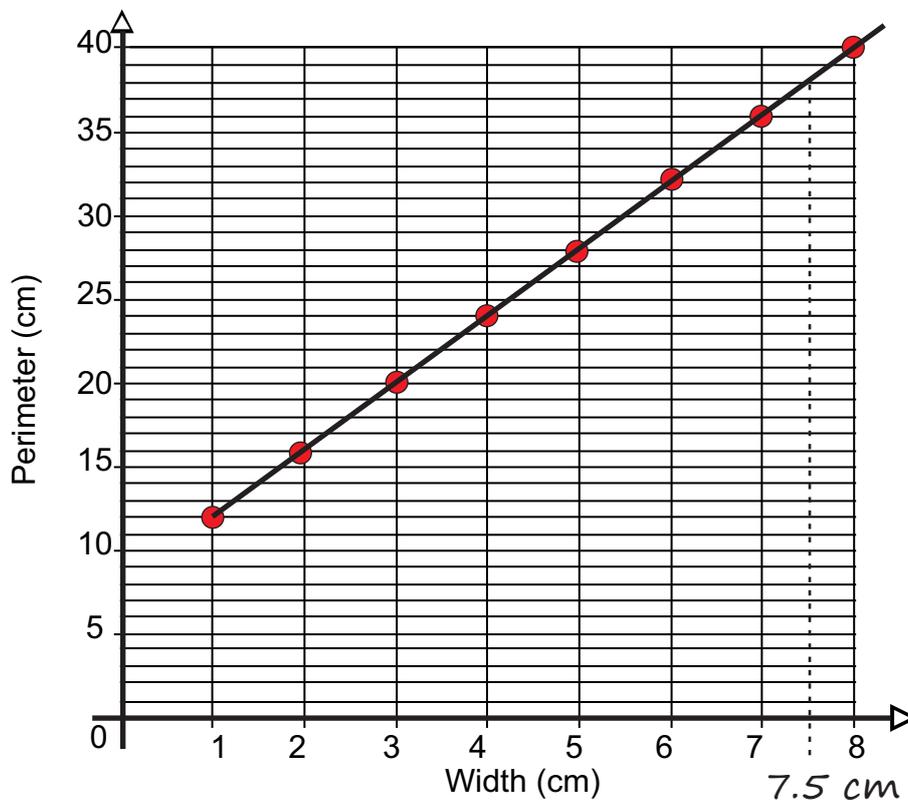
$$\underline{\text{Length} = L, \text{Width} = W, L = W + 4}$$

2. Use your expression from 1. to write a formula for the perimeter,  $P$ , of the rectangle.

$$\underline{P = 2W + 2 \times (W + 4), \text{Therefore } P = 4W + 8 \text{ (cm)}}$$

3. The table below gives different values for  $x$ , the rectangle's width, as well as corresponding values for the length and perimeter. Complete the table then plot the points on the graph.

Width	1	2	3	4	5	6	7	8
Length	5	6	7	8	9	10	11	12
Perimeter	12	16	20	24	28	32	36	40



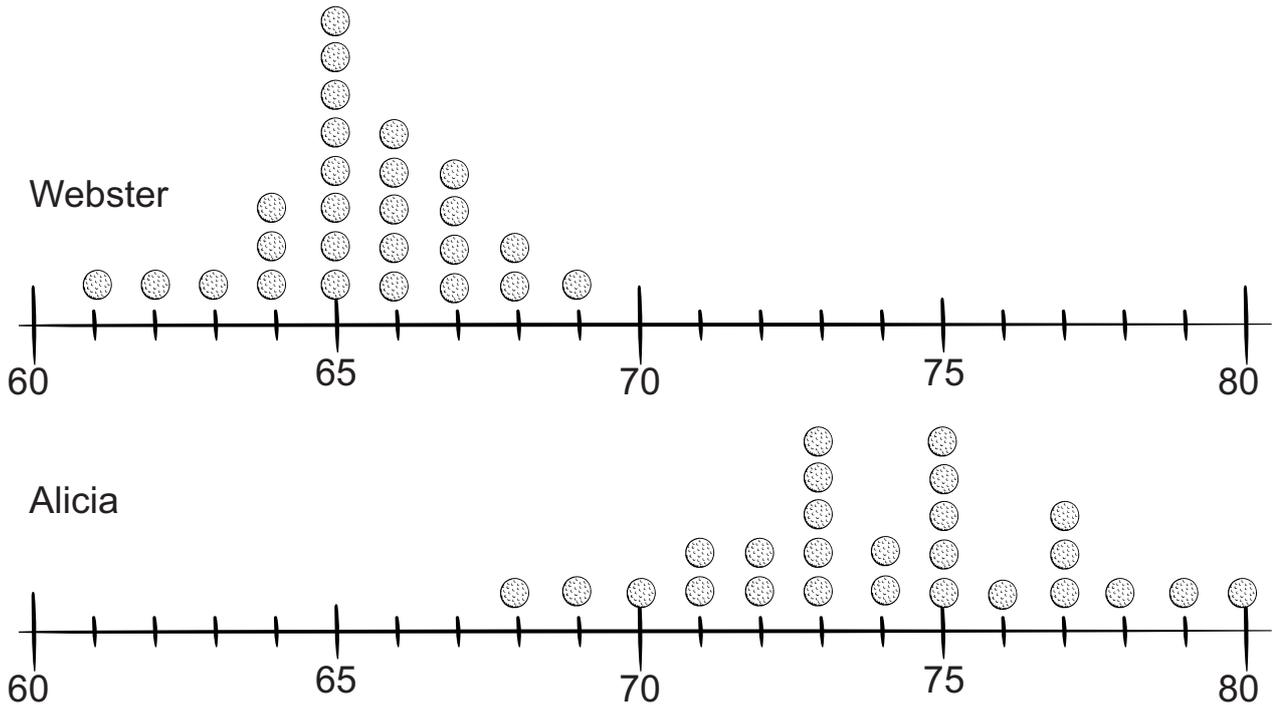
4. What will be the width of the rectangle if the perimeter is 38 cm?

7.5 cm

# BLUE - Worksheet 31

## GOLFING STATISTICS

Every Sunday morning Webster and Alicia visit the Ngunguru Golf Course in Northland to play a round of golf. Ngunguru has a par of 62 for men and 64 for women. The last 26 weeks of scores are graphed below.



1. Calculate the following statistics:

	Webster	Alicia
Mean	<u>65.4</u>	<u>74.0</u>
Median	<u>65</u>	<u>74</u>
Mode	<u>65</u>	<u>73, 75</u>
Range	<u>8</u>	<u>12</u>

3. What are the graphs above called? (Circle the correct answer.)

Box and Whisker Graph

Bar Graph

Pictogram

Stem and Leaf

Line Plot

2. Write a statement that compares both golfers.

Webster has a lower mean therefore is the better player

He also has a lower range of scores showing he is more consistent.

We asked Webster for his cooperation in a data gathering exercise. We got him to hit 30 balls in succession with his driver club. We then measured how far each ball travelled. The data (measured in metres) is as follows:

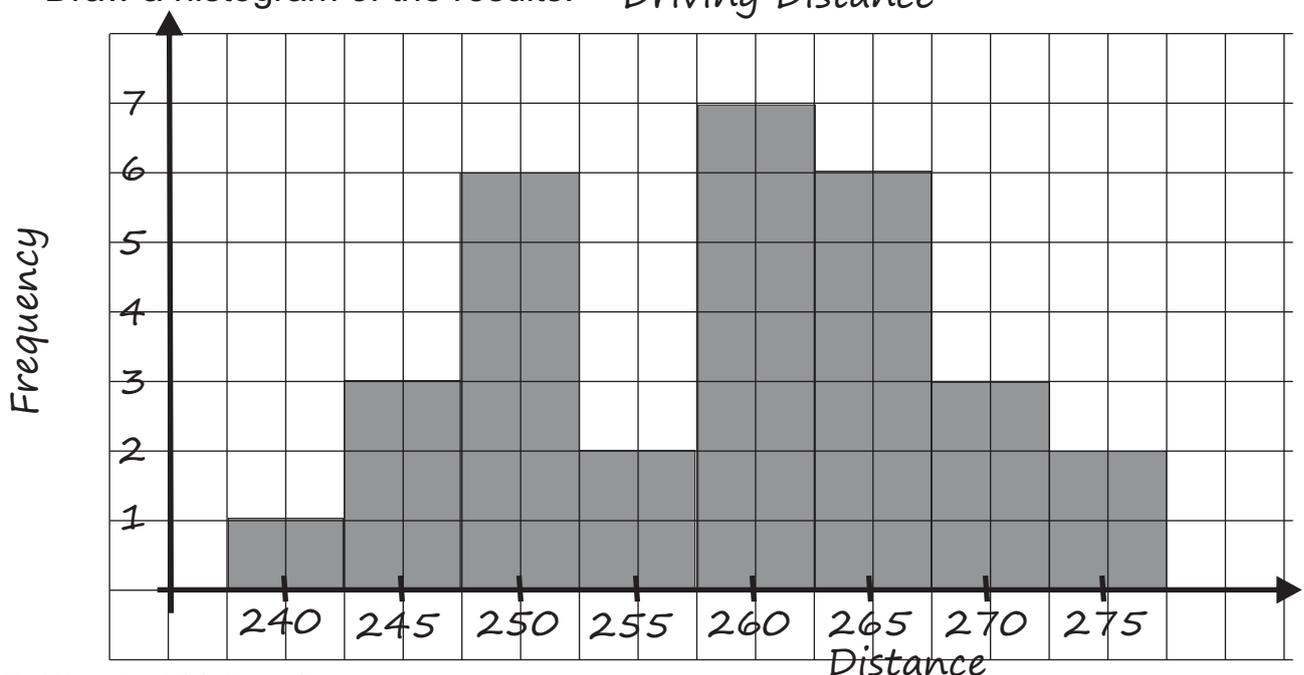
244.8	245.2	247.0	248.9	250.0
252.2	251.5	252.7	254.5	254.6
257.9	258.0	262.8	261.5	261.8
261.1	262.2	264.2	263.8	265.0
265.8	265.9	267.7	268.3	268.9
270.8	274.1	271.9	276.1	278.4

3. Complete the frequency table for the results.

Distance	Tally	Frequency
240 -		
245 -		
250 -	<del>   </del>	
255 -		
260 -	<del>   </del>	
265 -	<del>   </del>	
270 -		
275 -		

4. Complete this statement: "The group '240 - ' includes data values equal to or greater than 240 but less than 245."

5. Draw a histogram of the results. *Driving Distance*



## STATISTICAL TABLES

Insurance Companies use statistics collected on life expectancy and death rates in order to work out the premium to charge people who insure with them for life insurance.

The table on the right shows the current age of a person, the number expected to survive and the remaining life expectancy.

Life Insurance Table					
MALE			FEMALE		
Age	Number Surviving	Remaining Life Expectancy	Age	Number Surviving	Remaining Life Expectancy
0	100 000	73	0	100 000	79
5	98 809	69	5	99 307	75
10	98 698	64	10	99 125	70
15	98 555	59	15	98 956	65
20	98 052	54	20	98 758	60
25	97 325	50	25	98 516	56
30	96 688	45	30	98 278	51
35	96 080	40	35	98 002	46
40	95 366	36	40	97 615	41
45	94 323	31	45	96 997	36
50	92 709	26	50	95 945	32
55	89 891	22	55	94 285	27
60	85 198	18	60	91 774	23
65	78 123	15	65	87 923	19
70	67 798	12	70	81 924	15
75	53 942	9	75	72 656	11
80	37 532	7	80	58 966	8
85	20 998	5	85	40 842	6
90	8416	4	90	21 404	4
95	2098	3	95	7004	3
100	482	2	100	1953	2

- Calculate the probabilities that a male and a female will live to 100 years old.  
*Male  $482 \div 100,000 = 0.00482$ , Female  $1953 \div 100,000 = 0.01953$* 


---
- Can you use the table to estimate how many years you expect to live?  
*If you consider yourself normal then maybe. There are also factors such as family history, lifestyle etc. The table gives the probability of numbers surviving out of every 100,000 people.*


---
- Calculate the estimated probability that a female baby born today will live to the age of 20.  
 *$98758 \div 100,000 = 0.98758$  (0.99) – a very good chance!*


---
- Calvin is 15 years old and there are 16 males in his class. If his school has a class reunion in 30 years, how many of his classmates would you expect to be alive and able to attend the reunion?  
 *$96688 \div 98555 = 0.981$*   
 *$0.981 \times 16 = 15.6$ . i.e. at least 15 would be expected to be alive*

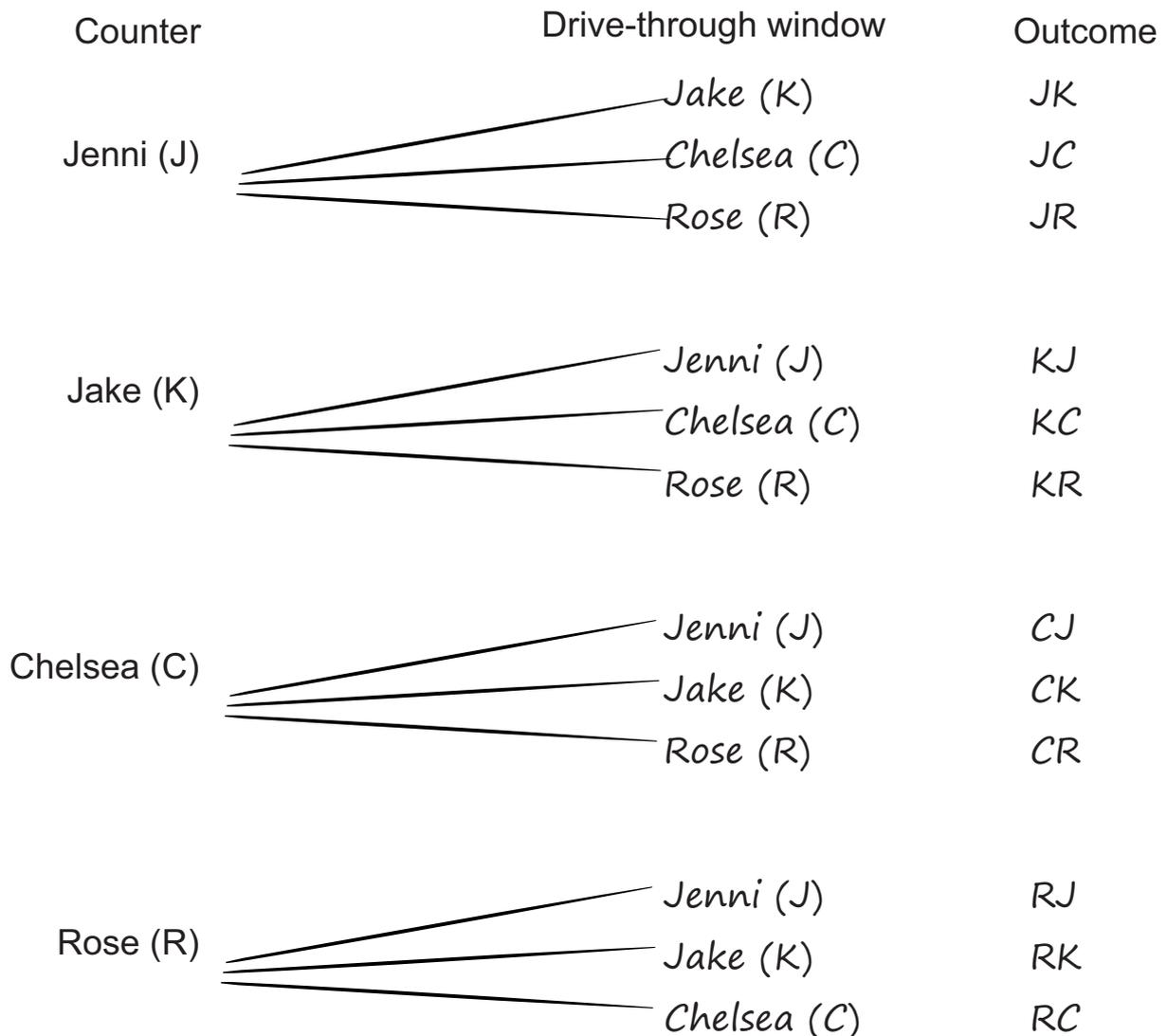

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- Insurance companies sell policies to people to insure them against death. If the person dies during this period the beneficiaries will receive an agreed payout sum of money. Why are life insurance policies cheaper when taken out as a 20 year old rather than a 50 year old?  
*They collect more premiums over a longer period. There is less chance of a younger person dying so less chance of paying out.*


---

## TREE DIAGRAMS

The manager of Fast Fry Chicken needs to hire two employees, one to work at the front counter and one to work at the drive-through window. Jenni, Jake, Chelsea and Rose all apply for a job.

1. How many possible ways are there for the manager to place the applicants? Finish the tree diagram below to show the possible arrangements.



*There are 12 possible arrangements*

2. Jenni tells her parents that altogether 4 people have applied for the jobs and therefore each person has a 25% chance of being chosen. Is this a reasonable statement?

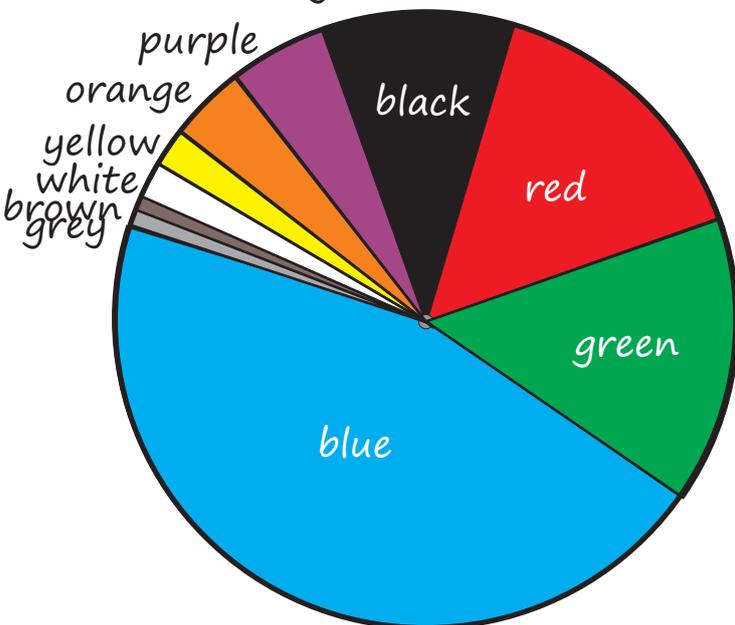
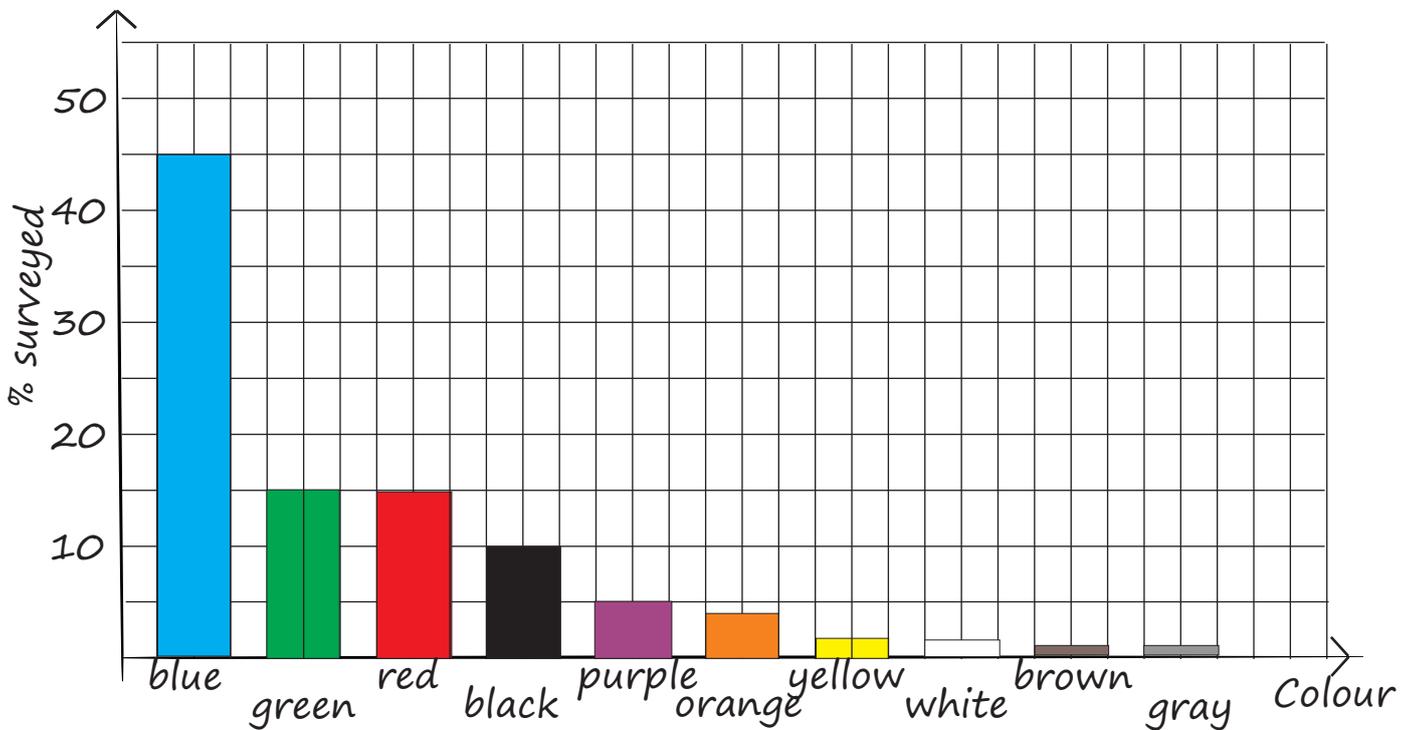
No. Firstly there are 2 positions available therefore using her reasoning she would have a 50% chance. However the choice could be influenced by age or experience.

# BLUE - Worksheet 32

## STATISTICAL GRAPHS

What is your favourite colour? One survey has produced the following responses to that question: Blue 45%, Green 15%, Red 15%, Black 10%, Purple 5%, Orange 4%, Yellow 2%, White 2%, Brown 1%, and Gray 1%.

1. Draw a Bar Graph and a Pie Graph of the results. What are the major features of the graphs and which is the best graph to show these major features?



Major features - blue, green and red take up 75% of popularity.

The Pie Graph is best for percentages but for colours under 10% you should probably group them together as "others". Pie Graphs works best for 4-6 categories. Bar graphs are best for comparing data over time.

## STEM AND LEAF GRAPH

Lata and Calypso played 10 rounds of golf. The number of strokes they took for each round is illustrated below. (Key 7 | 5 means a score of 75)

Lata		Calypso
9, 7	6	
9, 5, 5, 3, 1, 0	7	5, 9
3, 2	8	0, 2, 3, 5, 7
	9	2, 4
	10	1

1. Give the following results:
- |   |                        |           |
|---|------------------------|-----------|
|   | Lata's lowest score    | <u>67</u> |
|   | Lata's modal score     | <u>75</u> |
| <i>101, 94, 92, 87, <u>85, 83</u>, 82, 80, 79, 75</i> | Calypso's median score | <u>84</u> |

2. Write down the range of scores for both Lata and Calypso.

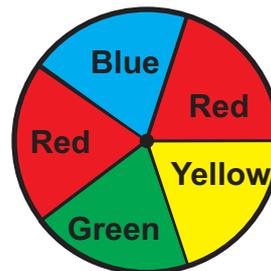
<u>Lata 83 - 67 = 16</u>	<u>Calypso 101 - 75 = 26</u>
--------------------------	------------------------------

3. Compare the playing ability of both golfers.

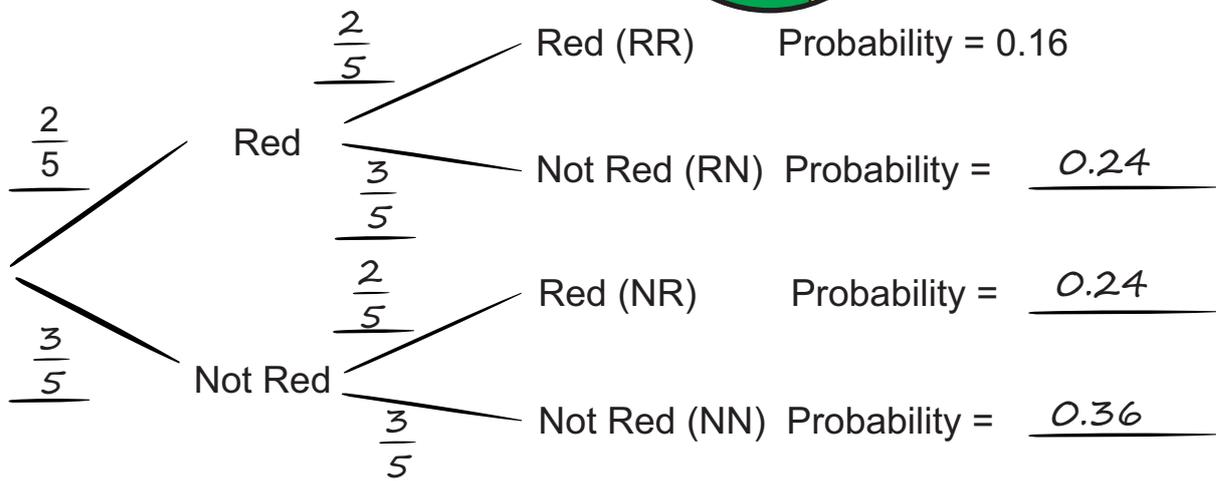
Overall, Lata's scores are lower. Her range of scores is also lower and therefore she is more consistent. Therefore Lata has the better playing ability.

## PROBABILITY TREES

Simone uses this coloured spinner.



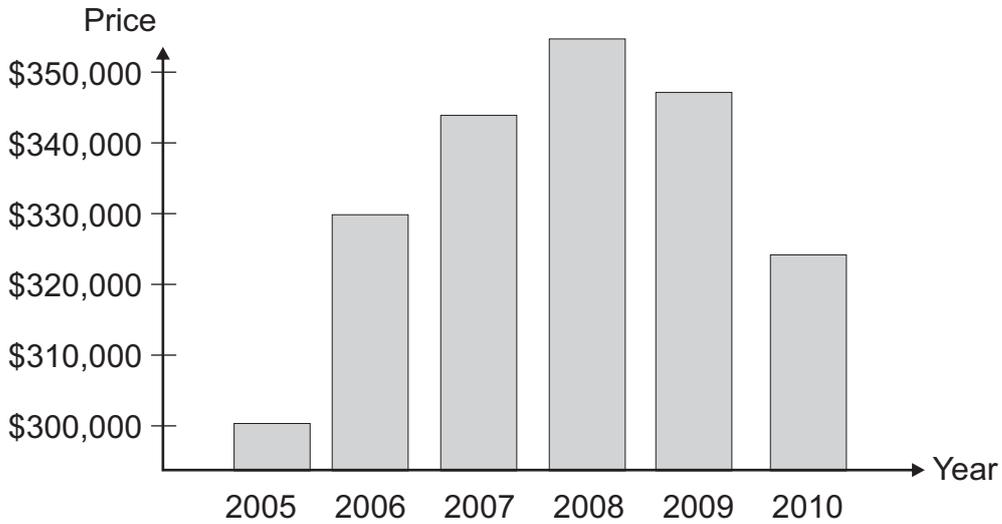
1. Fill in the probability tree for 2 spins.



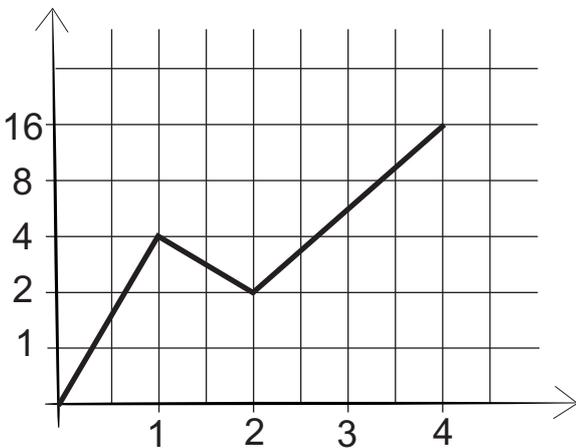
## MISLEADING GRAPHS

Some graphs misinform. Look at the following graphs and say how they are misleading. How should they be drawn?

**Auckland Average House Price**

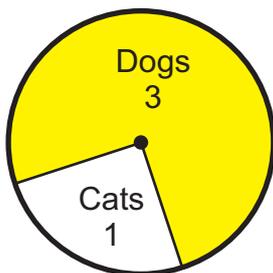


The prices start at \$300,000. Therefore there seems a big jump (at least 3x) between 2005 and 2006. This wouldn't be the case if the graph y axis started at 0.



The grid on the y axis is not spaced evenly. If it was, the graph would look much different.

**Survey of Preferred Pets**



There were only 4 people surveyed. A bigger sample is needed.

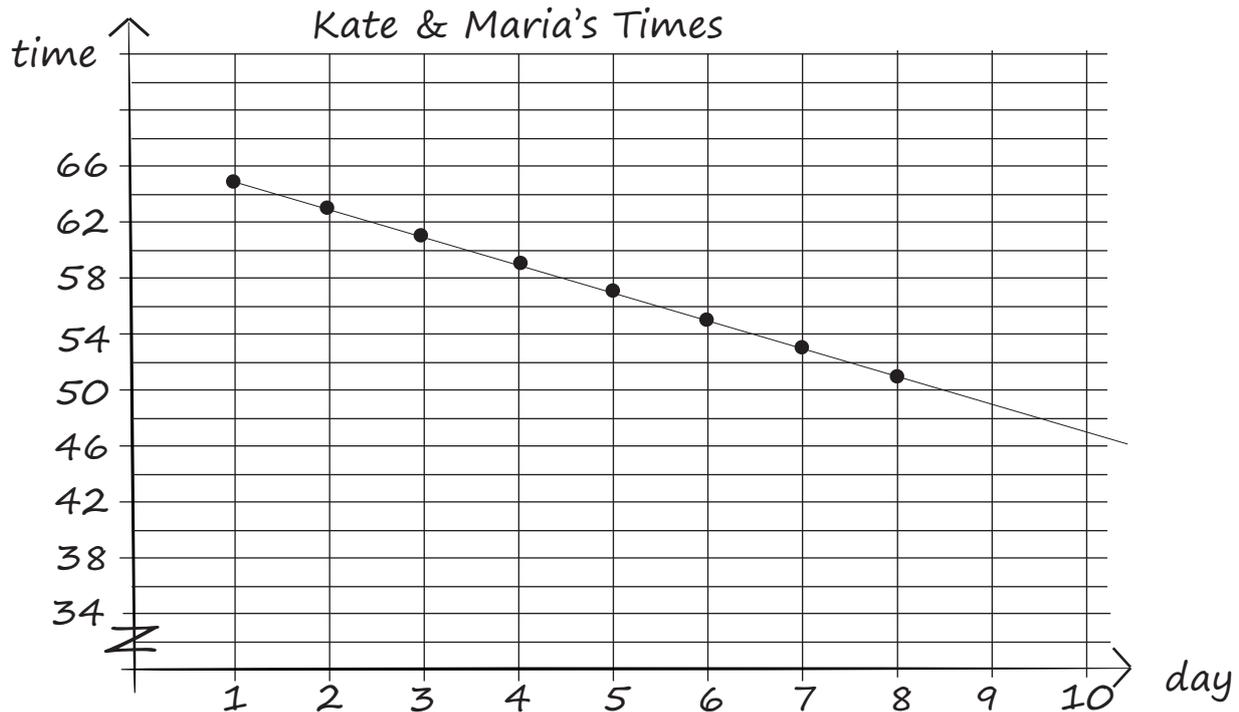
## PLOTTING POINTS ON A GRAPH

Kate and Maria have started a fitness regime. Every morning they meet at 6 am and jog / walk around the block.

Below are the times taken.

Day	1	2	3	4	5	6	7	8
Time (minutes)	65	63	61	59	57	55	53	51

1. Draw a graph on the grid below and plot the data.



2. Extend your graph using the same pattern of times to Day 8.
3. Describe what is happening to the times.  
Estimate the times taken on Days 5 to 10.

*It is unlikely that the pattern will continue. At some stage Kate and Maria will reach a level of fitness when their times will not get any better.*

4. Kate has started a diary of weight loss due to her fitness regime. Find an equation or rule that relates to the week number and the mass of Kate.

End of Week	1	2	3	4	5	6	7	8
Mass (kg)	52	51	50	49	48	47	46	45

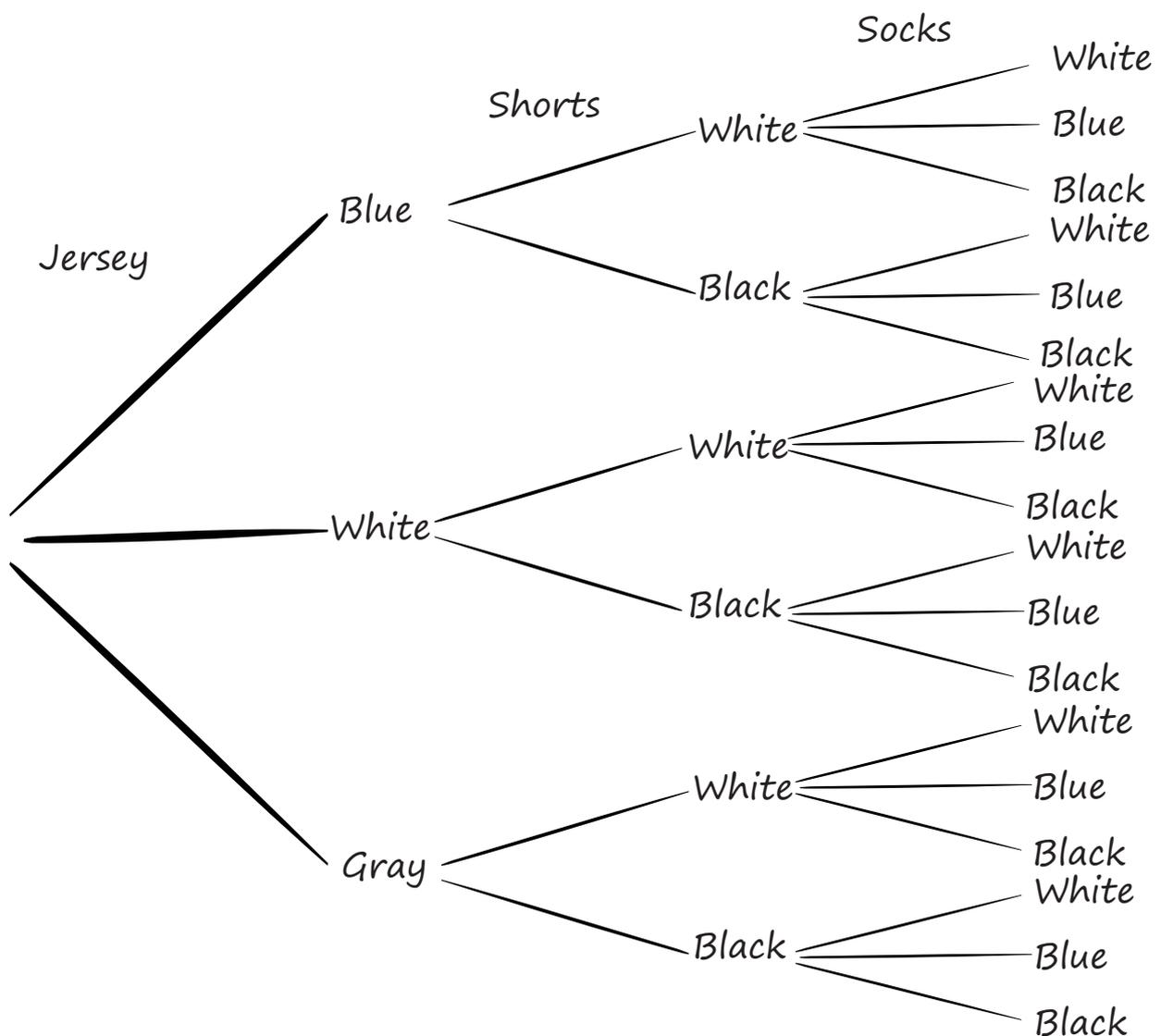
*Mass = 53 - week number. Remember this rule will not continue.  
If it did, on day 53 Kate will weigh 0 kg!*

# BLUE - Worksheet 33

## TREE DIAGRAMS

The Mahobe Rugby team uses blue jerseys for away games, white jerseys for home games, and gray jerseys for practice. The team also uses white or black shorts and white, blue or black socks.

1. Draw a tree diagram to determine the number of possible uniforms.



2. How many different combinations of uniforms are possible?

*18 different combinations*

---

## TABLES OF MONEY

The table below gives monthly repayments when borrowing money.

### Monthly Repayments Schedule

Loan Amount	12 mths	18 mths	24 mths	30 mths	36 mths	48 mths	60 mths
	Rate 22%	22%	22%	22%	22%	22%	22%
\$500	46.80	32.86	25.94	21.82	19.10	15.75	13.81
\$1 000	93.59	65.73	51.88	43.63	38.19	31.51	27.62
\$2 000	187.18	131.46	103.76	87.26	76.38	63.02	55.24
\$3 000	280.77	197.19	155.64	130.89	114.57	94.53	82.86
\$4 000	374.36	262.92	207.52	174.52	152.76	126.04	110.48
\$5 000	467.95	328.65	259.40	218.15	190.95	157.55	138.10
\$6 000	561.54	394.38	311.28	261.78	229.14	189.06	165.72
\$7 000	655.13	460.11	363.16	305.41	267.33	220.57	193.34
\$8 000	748.72	525.84	415.04	349.04	305.52	252.08	220.96
\$9 000	842.31	591.57	466.92	392.67	343.71	283.59	248.58
\$10 000	935.90	657.30	518.80	426.30	381.90	315.10	276.20
\$15 000	1403.90	985.95	778.20	654.45	572.85	472.65	414.30
\$20 000	1871.80	1314.60	1037.60	872.60	763.80	630.20	552.40

1. What is the interest rate given in the table?

*22%*

---

2. What are the monthly repayments on borrowing \$10,000 for 48 months?

*\$315.10*

---

3. What is the total amount in repayments if \$20 000 is borrowed over 36 months?

*$\$763.80 \times 36 = \$27,496.80$*

---

4. Samantha wants to purchase a \$10 000 car. She has a deposit of \$3 000 and intends to borrow the balance over 2 years. What will be the total cost of the car?

*Borrow \$7,000, repayments = \$363.16*

---

*$\$363.16 \times 24 = \$8715.84$ , total paid = \$11,715.84*

---

5. Petra can afford \$200 per month. She wants to buy a car in the \$2 000 to \$5 000 range. What term of loan would you suggest?

*There are a number of options: \$2000 for 12 months, \$3000 for 18 months, \$4000 for 30 months, \$5000 for 36 months*

---

## MEASUREMENT

A conference hall, the plan view of which is below, is about to have its floor carpeted. The carpet comes in rolls 2 metres wide, and costs \$145 per metre. The Newlay Carpet Company quotes a total price of \$6,820 which includes the carpet cost and 8 hours labour.

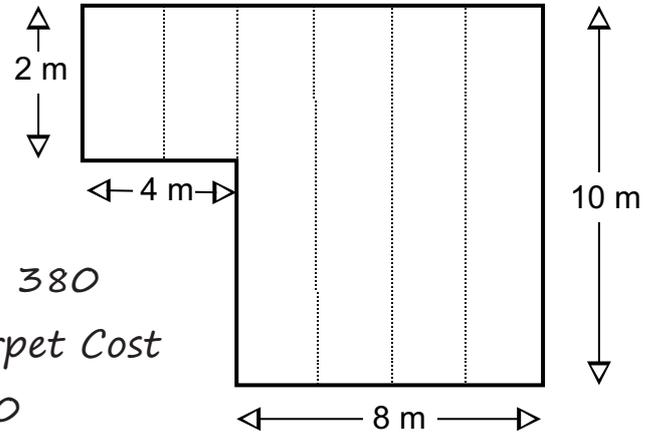
1. How much does the Newlay Carpet Company charge per hour for labour?

$$\begin{aligned} \text{Total length of carpet} & \\ = 4 \text{ strips @ } 10\text{m} + 2 \text{ strips @ } 2\text{m} & \\ = 44 \text{ m} & \end{aligned}$$

$$\text{Price of Carpet } 44\text{m} \times \$145 = \$6\,380$$

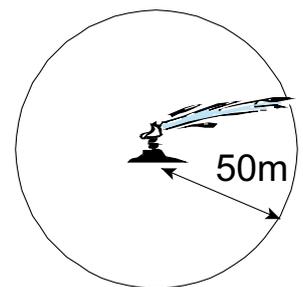
$$\begin{aligned} \text{Labour Cost} &= \text{Total Price} - \text{Carpet Cost} \\ &= \$6\,820 - \$6\,380 \\ &= \$440 \end{aligned}$$

$$\begin{aligned} \text{Hourly Rate} &= \text{Labour Cost} \div 8 \text{ hours} \\ &= 440 \div 8 \\ &= \$55 \text{ per hour} \end{aligned}$$



2. A garden sprinkler rotates in a circular motion watering all the grass within a radius of 50 m. Calculate the area of ground that the water covers.

$$\text{Area is } \pi \times 50^2 = 7854 \text{ m}^2$$



3. A 400 metre athletic track has straights of length 95 m. What is the radius of both the curves on the end of the track?

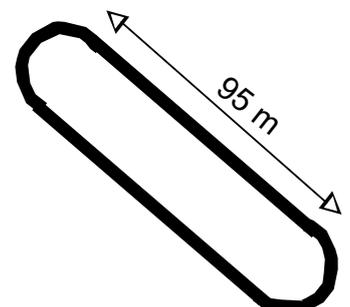
$$400 - 2(95) = 210 \text{ metres of curves}$$

$$C = \pi D \text{ (both curves combined make a circle)}$$

$$210 = 3.142 \times D$$

$$D = 210 \div 3.142, D = 66.836 \text{ m}$$

$$\text{Radius is } \frac{1}{2} \text{ diameter, radius} = 33.42 \text{ m (2 dp)}$$



## MISSION NUTRITION

The NZ Government requires food manufacturers to label their products with an analysis of nutritional content. The sample label below comes from a prepacked Beef Lasagne dinner.

1. How many people is the Beef Lasagne dinner designed to feed?

2 people or 2 dinners

2. The label states that a serving contains 3 grams of saturated fat. This is 15% of the daily value recommended for a 2000-Calorie diet.

How many grams of saturated fat are recommended for a 2000-Calorie diet?

$3 \div 0.15 = 20$  grams

\_\_\_\_\_

\_\_\_\_\_

3. There are 470 milligrams of salt (sodium) in the Beef Lasagne dinner. This is 20% of the recommended daily value. What is the recommended daily value of sodium?

$470 \div 0.2 = 2350$  milligrams

\_\_\_\_\_

4. A healthy diet, should have no more than 30 percent of total calories coming from fat. What percent of the calories in a serving of this Beef Lasagne come from fat?

From the label, there are 250 calories per serving

110 calories come from fat

$\frac{110}{250} = 0.44, 44\%$

\_\_\_\_\_

5. Joseph hasn't eaten all day so eats a whole Beef Lasagne dinner when he gets home in the evening. Is he getting the correct nutritional intake?

Doubling all the % daily values shows he is well short of

good nutrition - e.g. he has no dietary fibre.

\_\_\_\_\_

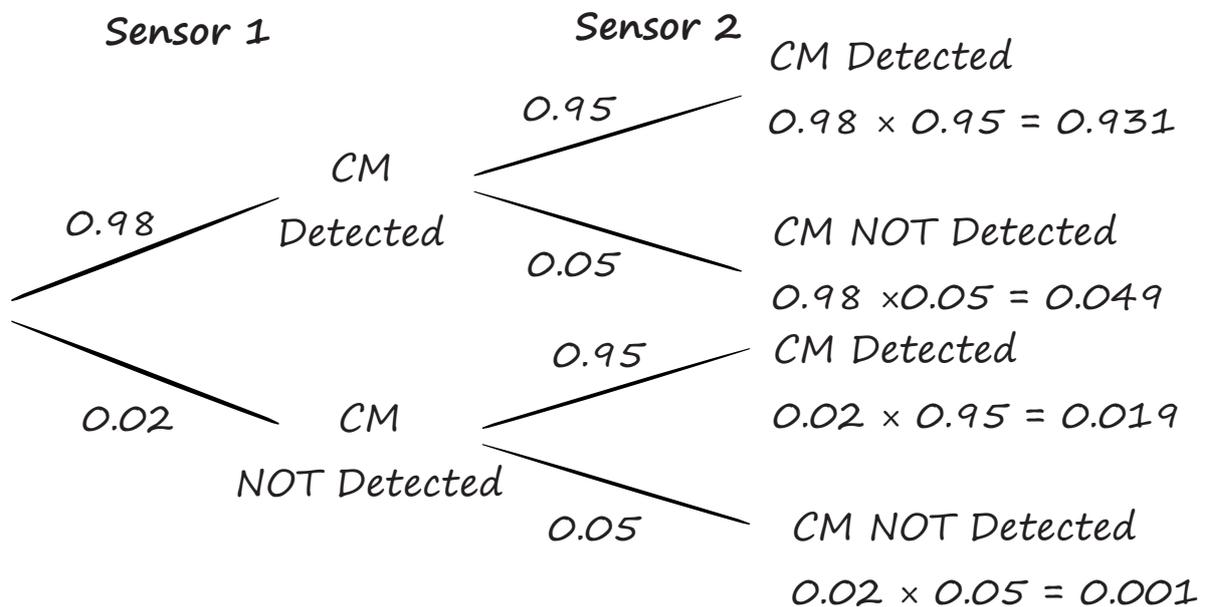
Nutrition Facts	
Serving Size 1 cup (218g). Servings per container 2.	
250 calories per serving. 110 calories from fat.	
	%Daily value
Total Fat 12g	18%
Saturated Fat 3g	15%
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 35g	10%
Dietary Fiber 0g	0%
Sugars 8g	
Protein 10g	
Vitamin A 5%	Vitamin C 3%
Calcium 20%	Iron 5%

# BLUE - Worksheet 34

## POISONING PROBABILITY

A car workshop uses two carbon monoxide detectors to protect its mechanics from any potential poisoning. If carbon monoxide is present, then there is a 98% chance that sensor 1 will detect it and a 95% chance that sensor 2 will detect it.

1. Complete the probability tree below that illustrates this situation.



2. If carbon monoxide is present, there is a probability that it will not be detected. Write a statement backed up by figures that tells the workshop owner the possibility of carbon monoxide poisoning.

Sensor 1 has the best chance of detecting the carbon monoxide

There is a 0.98 chance of it being detected (0.02 undetected).

The chance of both detecting the CM is 95% ( $0.931 + 0.019$ )

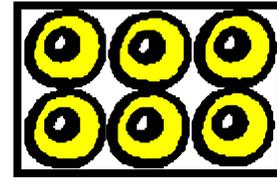
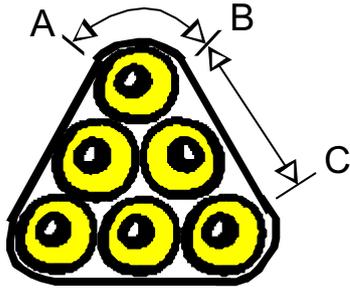
and the chance of both not detecting is 5% ( $0.049 + 0.001$ )

The probability of at least 1 detecting the CM is 99.9%

( $0.931 + 0.049 + 0.019$ )

Therefore the possibility of CM poisoning is very low.

## INVESTIGATION



Box 2

Length = 3 times chocolate diameter

Width = 2 times chocolate diameter

Box 1

$AB = \frac{1}{3}$  the circumference of the chocolate

$BC = 2$  times the chocolate diameter

1. A packaging company has been asked to design packaging for a chocolate company. One particular type of chocolate is round, with a diameter of 4 cm, and is sold in a box of 6. The packaging company designs two particular types of box. These are shown above. By comparing the boxes' perimeters, calculate which box is more economical to make.

$$\text{Box 1: Corners } AB = \frac{1}{3} \pi D \text{ (where } D = 4 \text{ cm)}$$

$$= 4.19 \text{ cm (2 dp)}$$

$$\text{Lengths } BC = 2D = 8 \text{ cm}$$

$$\text{Total} = 3 \text{ (corners)} + 3 \text{ (lengths)}$$

$$= 3(4.19) + 3(8)$$

$$= 36.57 \text{ cm}$$

$$\text{Box 2: Length} = 3D, \text{ Width} = 2D$$

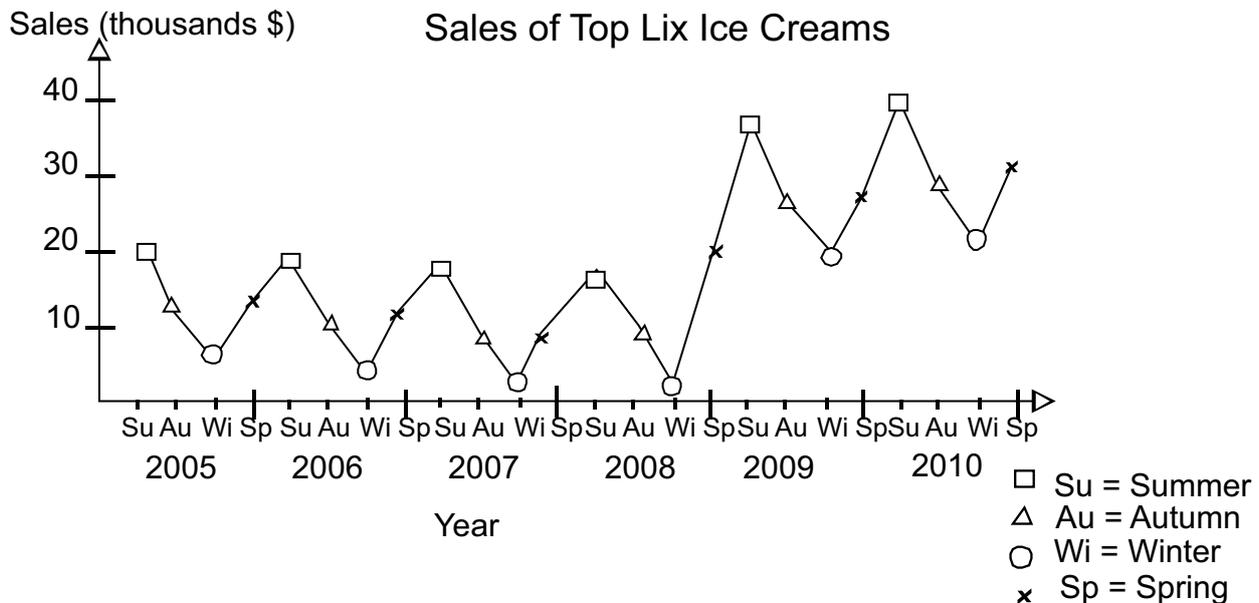
$$= 12 \text{ cm} \quad = 8 \text{ cm}$$

$$P = 2 \text{ (length)} + 2 \text{ (width)}$$

$$= 2(12) + 2(8)$$

$$= 40 \text{ cm}$$

This means that box 1 would be more economical.



### TIME SERIES

Graeme owns an ice-cream van and a business called Top Lix. Graeme keeps a record of his sales over 6 years. During 2009, Graeme increases his sales area and working hours in an effort to get more business. The graph above uses the data from all his sales records.

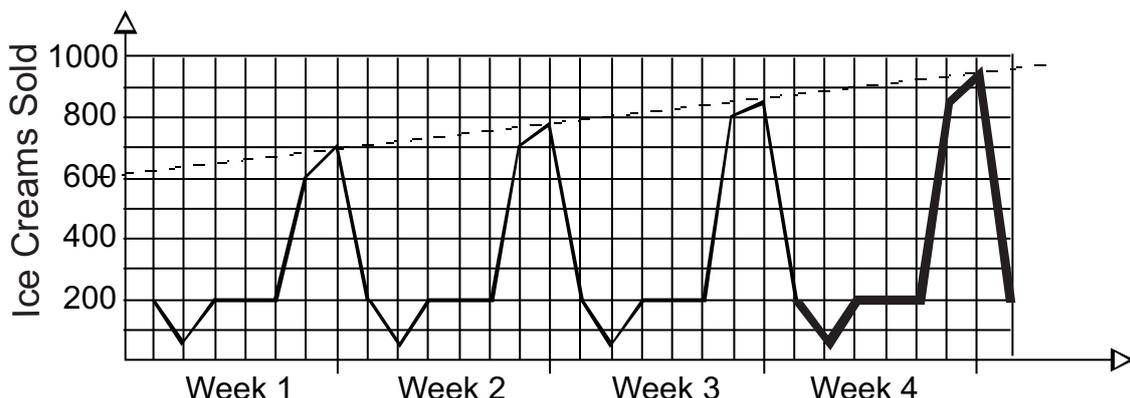
- Use the graph to write about sales at Top Lix. You should be able to identify at least 3 features of the graph.

*Sales show seasonal variation with more in summer and less in winter.*

*From 2005 to 2008 sales were gradually declining.*

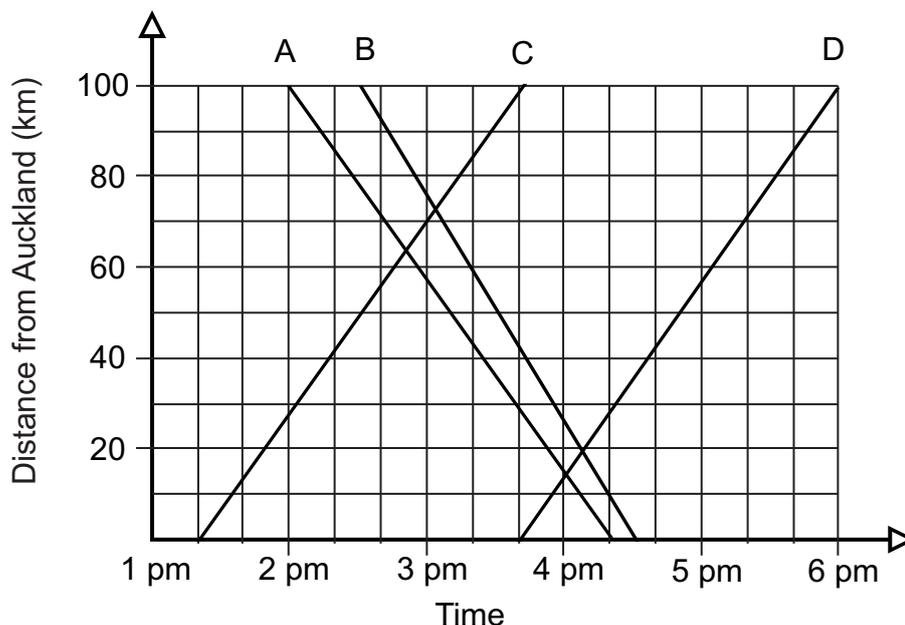
*After the winter of 2008 sales dramatically increase.*

- Graeme decides to buy another ice cream van to service Oceanside Beach. He employs Mrs Barraclough to operate the van and asks her to record the number of ice-creams sold each day. Below is a graph of her sales figures for the first three weeks. Complete the graph for Week 4 so that the trend of the first 3 weeks is continued.



### GRAPHS

The graph below represents the time taken for 4 trains (A, B, C & D) travelling between Auckland and Hamilton.



1. According to the graph, what is the distance between Auckland and Hamilton?

*Distance = 100 km*

---

2. Which of the trains travel at the same speed?

*Trains C & D - both have the same gradient.*

---

3. What is the average speed of Train A?

*100 km in 2hrs 20m =  $100 \div 2.33$*

*= 42.86 km / hr*

---

4. In the graph, some lines representing the trains' travel are drawn "upwards" while the others are drawn "downwards". Explain why they are drawn this way.

*Some trains travel from Auckland to Hamilton (lines C & D) while others travel in the opposite direction from Hamilton to Auckland (lines A & B).*

---

# BLUE - Worksheet 35

## REFLECTION

## REFLECTION

1. The pictures below are two views of a person outside a shop window. Complete the second picture (the sign from inside the shop).



## RATIOS AND AREA

A kite similar to the one in the diagram below is made with 2 sticks. The ratio of the width to height is 2:3.

1. Complete the table:



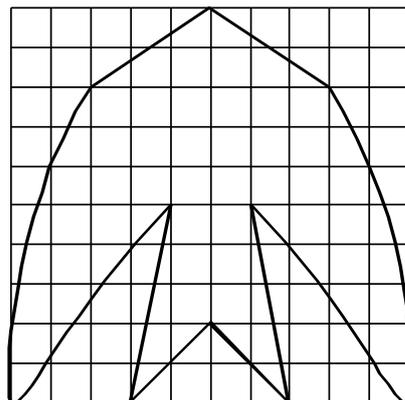
Width	Height
2 m	3 m
200 cm (2 m)	300 cm
1 m	1.5 m
28 cm	42 cm

2. Tony makes a bird shaped kite. The pattern shown is used to design the shape. He uses a 50 cm square piece of nylon material. If the nylon is divided into 100 squares (each with sides of 5 cm), find the approximate area of nylon used in the kite.

Each square has an area of  $25\text{cm}^2$

Approx number of 5 cm squares that the bird takes up = 53

$53 \times 25\text{cm}^2 = 1325\text{cm}^2$



## GRAPHS

Complete the table of values.

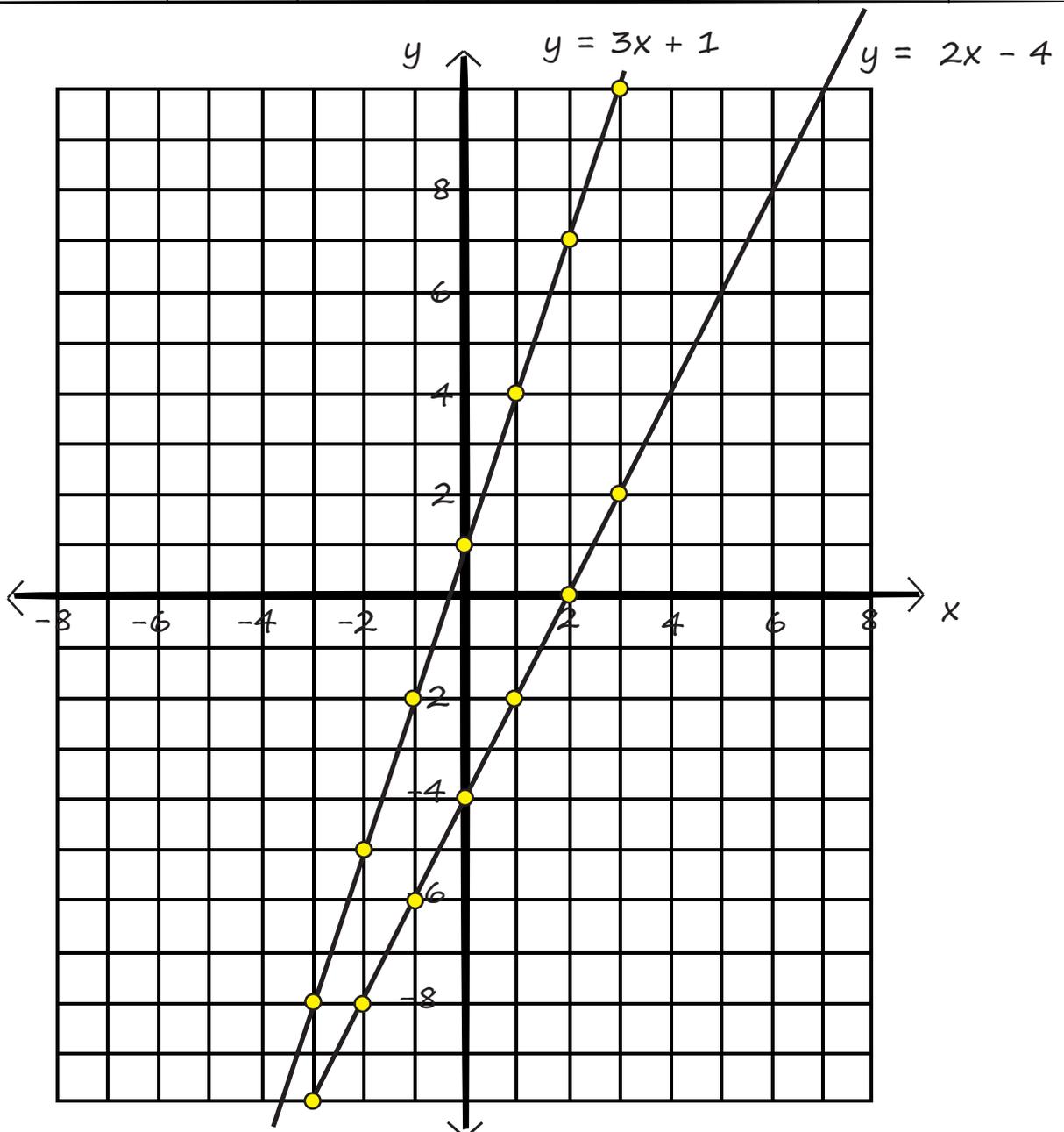
On the grid provided, draw graphs of each line.

1.

x	-3	-2	-1	0	1	2	3
$y = 2x - 4$	-10	-8	-6	-4	-2	0	2

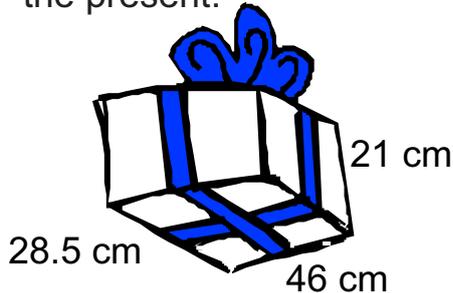
2.

x	-3	-2	-1	0	1	2	3
$y = 3x + 1$	-8	-5	-2	1	4	7	10



## MEASUREMENT

1. A birthday present is tied with a ribbon similar to the diagram below. If the top knot takes 30 cm of ribbon, calculate the total ribbon needed for the present.



$$= (2 \times 28.5) + (2 \times 46) + (4 \times 21) + 30$$

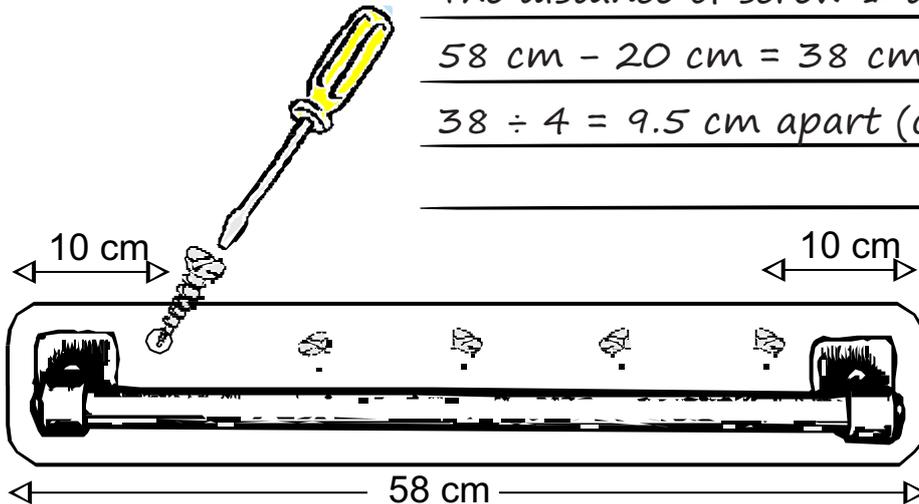
$$\text{Ribbon Length} = 263 \text{ cm}$$

2. A 58 cm long towel rail has five screw holes. The holes are 10 cm from each end and then placed at equally spaced intervals. What is the distance, in millimetres, between each of the screw holes?

The distance of screw 1 to screw 5 is

$$58 \text{ cm} - 20 \text{ cm} = 38 \text{ cm}$$

$$38 \div 4 = 9.5 \text{ cm apart (or 95 mm)}$$

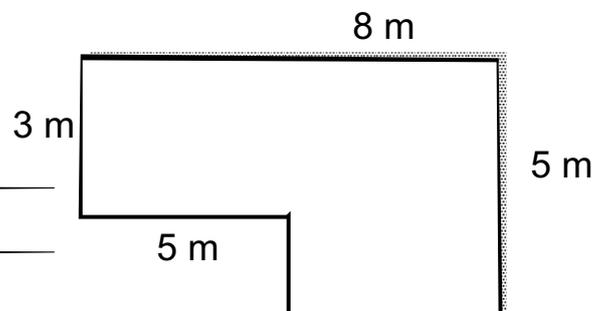


A courtyard similar to the one below is being laid with concrete. Before the concrete is laid, wooden boxing is placed around the perimeter to hold the wet concrete in place until it is dry.

3. How much wooden boxing is required?

Perimeter

$$8 + 5 + 3 + 2 + 5 + 3 = 26 \text{ m}$$



4. If a 15 cm thick layer of concrete is poured into the courtyard, how many  $\text{m}^3$  of concrete will be used?

$$\text{Area of the concrete is } (8 \times 3) + (2 \times 3) = 30 \text{ m}^2$$

All units must be the same:  $15 \text{ cm} = 0.15 \text{ m}$

$$30 \times 0.15 = 4.5 \text{ m}^3 \text{ of concrete.}$$

## EVERYDAY MATHS

1. Food scientists have tested the effects of freezing cheese and tomato puree filling in lasagna. The filling was frozen to a temperature of  $-21^{\circ}\text{C}$  and then raised by  $235^{\circ}\text{C}$ . What was the final temperature of the filling?

$$235 - 21 = 214^{\circ}\text{C}$$

---

2. The table below shows average temperatures at McMurdo Station from April to September. Find the mean of the temperatures.

Month	Apr	May	Jun	Jul	Aug	Sep
Av Temp $^{\circ}\text{C}$	$-18^{\circ}$	$-19^{\circ}$	$-19^{\circ}$	$-20^{\circ}$	$-22^{\circ}$	$-21^{\circ}$

$$-(18+19+19+20+22+21) \div 6 = -19.83^{\circ}\text{C}$$

---

3. You buy a pattern and enough material to make two pillows. The pattern costs \$5. Each pillow requires \$3.95 worth of fabric and a button that costs \$.75. Find the total cost.

$$\$5 + 2 \times \$3.95 + 2 \times 0.75 = \$14.40$$

---

4. You are hiking between two campsites. The distance between the campsites is  $10\frac{1}{5}$  kilometres. You have already hiked  $5\frac{3}{4}$  kilometres. How many more kilometers do you have to hike?

$$\frac{51}{5} - \frac{23}{4} = 4\frac{9}{20} \quad (\text{or } 4.45 \text{ km})$$

---

5. A desert tortoise can live for over a year without drinking water. When it does drink, its body weight can increase by 40%. Suppose a desert tortoise weighs 15 kg after a long period without water. How many kg can the tortoise gain when it drinks?

$$15 \times 1.4 = 21, \text{ a } 6 \text{ kg gain}$$

---

6. In the 2010 World Cup, 5 of the 32 soccer teams that will compete are from South America. What percent of the teams will be from South America?

$$\frac{5}{32} = 0.156, 15.6\%$$

---

7. The International Balloon Fiesta takes place every year in Albuquerque, New Mexico. In 2009, 903 balloons participated. In 2010, 1019 balloons participated. By about what percent did the number of balloons increase from 2009 to 2010?

$$\text{increase of } 116 \quad \frac{116}{903} = 0.128, 12.8\%$$

---

# BLUE - Worksheet 36

## AREA

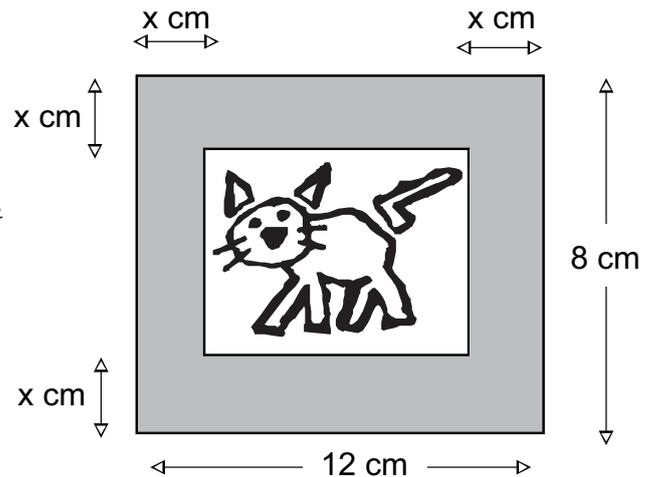
1. Look at the photo below. If  $x = 15$  mm, find the area of the shaded border.

$$15 \text{ mm} = 1.5 \text{ cm}$$

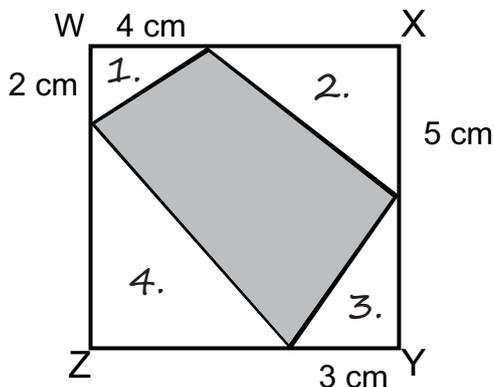
$$\text{Total Area is } 12 \times 8 = 96 \text{ cm}^2$$

$$\text{Photo Area is } 9 \times 5 = 45 \text{ cm}^2$$

$$\text{Shaded Area is } 96 - 45 = 51 \text{ cm}^2$$



2. WXYZ is a square with sides 10 cm. Find the area of the shaded shape inside the square.



$$\text{Area WXYZ} = 100 \text{ cm}^2$$

Subtract from this all the triangle areas

$$1. \frac{1}{2} \times 4 \times 2 = 4 \text{ cm}^2$$

$$2. \frac{1}{2} \times 6 \times 5 = 15 \text{ cm}^2$$

$$3. \frac{1}{2} \times 5 \times 3 = 7.5 \text{ cm}^2$$

$$4. \frac{1}{2} \times 7 \times 8 = 28 \text{ cm}^2$$

$$\text{Shaded Area} = 100 - (4 + 15 + 7.5 + 28) = 45.5 \text{ cm}^2$$

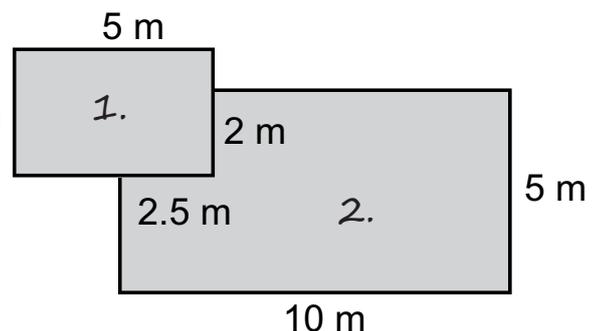
3. The two rectangles shown below overlap. Find the total shaded area.

$$\text{Rectangle 1 Area } 5 \times 3 = 15 \text{ m}^2$$

$$\text{Rectangle 2 Area } 10 \times 5 = 50 \text{ m}^2$$

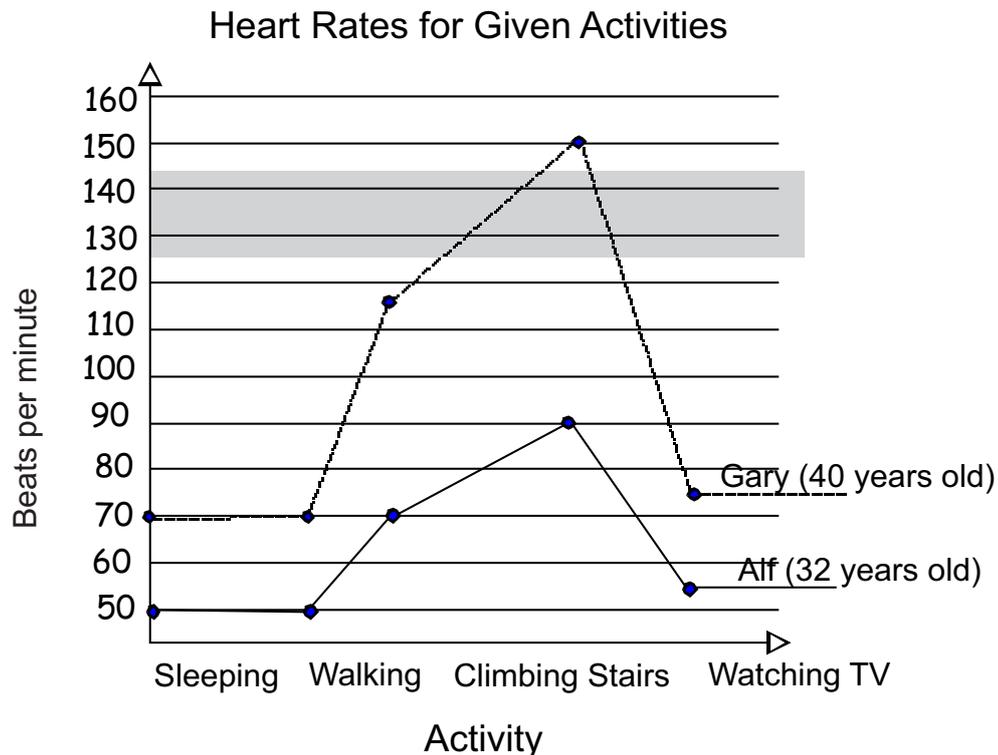
$$\text{Overlap Area } 2.5 \times 2 = 5 \text{ m}^2$$

$$\text{Total Area } 15 + 50 - 5 = 60 \text{ m}^2$$



## INTERPRETING GRAPHS

Alf and Gary both work for the Olympic Engineering Company. They agree to take a fitness assessment which involves taking their pulse rates after various activities.



1. Complete the table below by filling in the pulse rates for different activities.

	Sleeping	Walking	Climbing Stairs	TV Watching
Alf	50	70	90	55
Gary	70	115	150	75

2. After the initial assessment, Gary is advised to start a training programme. He reads the following information in a fitness magazine: "Your ITZ (Ideal Training Zone) is between 70% and 80% of your MHR (Maximum Heart Rate). To calculate your MHR, take your age away from 220." On the graph above shade in the area for Gary's Ideal Training Zone.

$$220 - 40 = 180,$$

$$80\% \text{ of } 180 = 144, \quad 70\% \text{ of } 180 = 126$$

*Gary's ITZ is between 126 and 144.*

3. True / False:

The average person's heart beats approximately 32 million beats per year. (Assume that the average heart rate is 60 beats per minute.)

Beats per hr:  $60 \times 60 \text{ mins} = 3600$ , Per day:  $3600 \times 24 = 86400$

Per year is  $86\,400 \times 365 = 31\,536\,000$

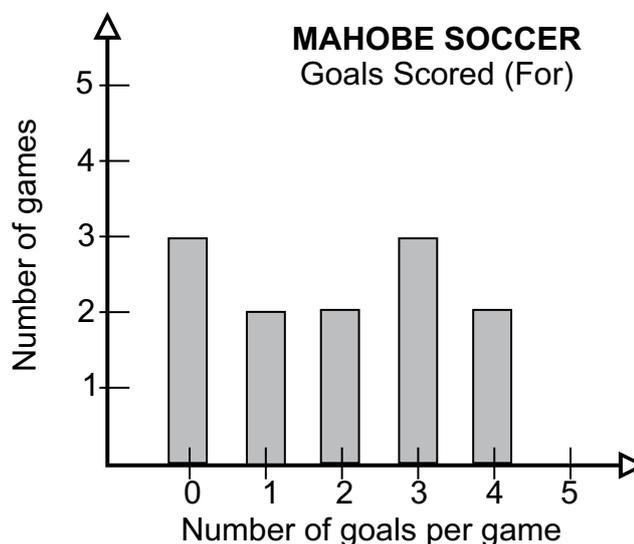
The question says "approximately 32 million" - TRUE.

## STATISTICS

The Mahobe football team played 12 games last season. Here are the results.

Game	1	2	3	4	5	6	7	8	9	10	11	12
Result For - Against	2-1	3-2	2-0	3-1	4-1	0-5	4-3	1-0	0-0	0-2	1-1	3-1

1. Organise the data and complete the bar graph for goals scored by the Mahobe soccer team.



2. The table below gives the number of spectators at each of the football games. Find the mean, median and mode of the figures.

Game	1	2	3	4	5	6	7	8	9	10	11	12
Attendance	20	19	24	22	20	20	20	23	28	24	26	24

$$\text{Mean: } 270 \div 12 = 22.5 \text{ people (23 people)}$$

$$\text{Median: } 19, 20, 20, 20, 20, \underline{22}, \underline{23}, 24, 24, 24, 26, 28$$

$$\text{Median} = 22.5 \text{ people (23 people), Mode} = 20 \text{ people}$$

3. The Mahobe Football Club has the following membership: 20 women, 12 men, 27 under 20's (male), 31 under 20's (female). Draw a pie chart illustrating the data.

Pie Angle

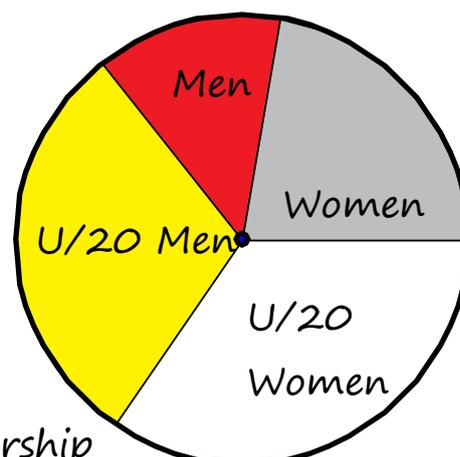
$$\text{Women: } \frac{20}{90} \times 360 = 80^\circ$$

$$\text{Men: } \frac{12}{90} \times 360 = 48^\circ$$

$$\text{U/20 Male: } \frac{27}{90} \times 360 = 108^\circ$$

$$\text{U/20 Female } \frac{31}{90} \times 360 = 124^\circ$$

Football Club Membership



## REMEMBER PERCENTAGES

1. 15 is what percent of 150?

$$\frac{15}{150} = 0.1, 10\%$$

2. 16 is what percent of 40?

$$\frac{16}{40} = 0.4, 40\%$$

3. 25 is 20% of what number?

$$25 \div 0.2 = 125$$

4. 50% of what number is 75?

$$75 \div 0.5 = 150$$

5. What percent of 48 is 30?

$$\frac{30}{48} = 0.625, 62.5\%$$

6. What is 150% of 50?

$$1.5 \times 50 = 75$$

7. 5% of what number is 10.2?

$$10.2 \div 0.05 = 204$$

8. 1 is what percent of 500?

$$\frac{1}{500} = 0.002, 0.2\%$$

9. Find 0.5% of 300

$$0.005 \times 300 = 1.5$$

10. 15 is what percent of 10?

$$\frac{15}{10} = 1.5, 150\%$$

## QUICK QUESTIONS

1.  $5 \times (9 + 3) = 5 \times 12$

$$= 60$$

2.  $12 + 6 \times 3^2 = 12 + 6 \times 9$

$$= 66$$

$a = 2, b = 5, c = 3, d = 1.$

3.  $a^2b + c$

$$23$$

4.  $(cd)^3$

$$27$$

5.  $c(a + d)$

$$9$$

6. Solve  $y = (4.5 + 1.8) - 3.2$

$$3.1$$

7. Solve  $y = 4^2 + 3 \times (4 + 2)$

$$34$$

8. Simplify  $2m + 3m$

$$5m$$

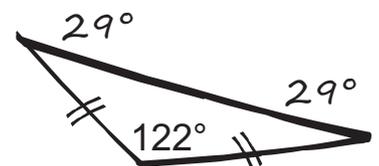
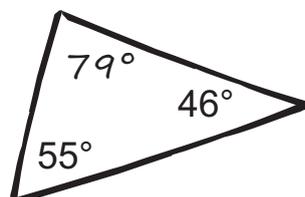
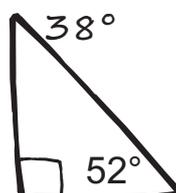
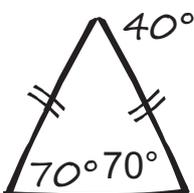
9. Simplify  $8x + 5y + 2x - y$

$$10x + 4y$$

10. Simplify  $3(2a + b)$

$$6a + 3b$$

Calculate each of the missing angles.  
Note: Triangles are not drawn to scale!



# BLUE - Worksheet 37

## Monthly Repayment (per \$1000 borrowed)

Interest Rate % pa	Term			
	2 years	5 years	10 years	20 years
12.0	47.07	22.24	14.35	11.01
12.5	47.31	22.50	14.64	11.36
13.0	47.54	22.75	14.93	11.72
13.5	47.78	23.01	15.23	12.44
14.0	48.01	23.27	15.83	12.80
14.5	48.25	23.53	16.13	13.17
15.0	48.49	23.79	16.44	13.57

Arthur and Zoe need to borrow some money. The bank sends the Repayment Schedule shown above. It gives the monthly repayment amounts for each \$1000 borrowed.

- Arthur and Zoe are told that the repayments for any amount borrowed cannot exceed 25% of their total income. Arthur earns \$32 000 per year while Zoe earns \$27 000. What is the maximum monthly repayment that they can afford (rounded to the nearest dollar).

$$32\ 000 + 27\ 000 = 59\ 000, 25\% \text{ of } 59\ 000 = 14\ 750$$

$$\underline{\$14\ 750 \div 12 \text{ months} = \$1229 \text{ per month}}$$

- Current interest rates for loans are 12.5%. They will need to borrow the money over 20 years. How much are Arthur and Zoe able to borrow? (Round your answer to the nearest \$1 000.)

$$12.5\% \text{ for } 20 \text{ years} = 11.36 \text{ per } \$1000$$

$$\underline{1229 \div 11.36 = 108.19 \text{ (thousand)} = \$108\ 000 \text{ (rounded)}}$$

- After borrowing the money, interest rates increase by 1.5%. How much extra per year will Arthur and Zoe need to pay for their loan?

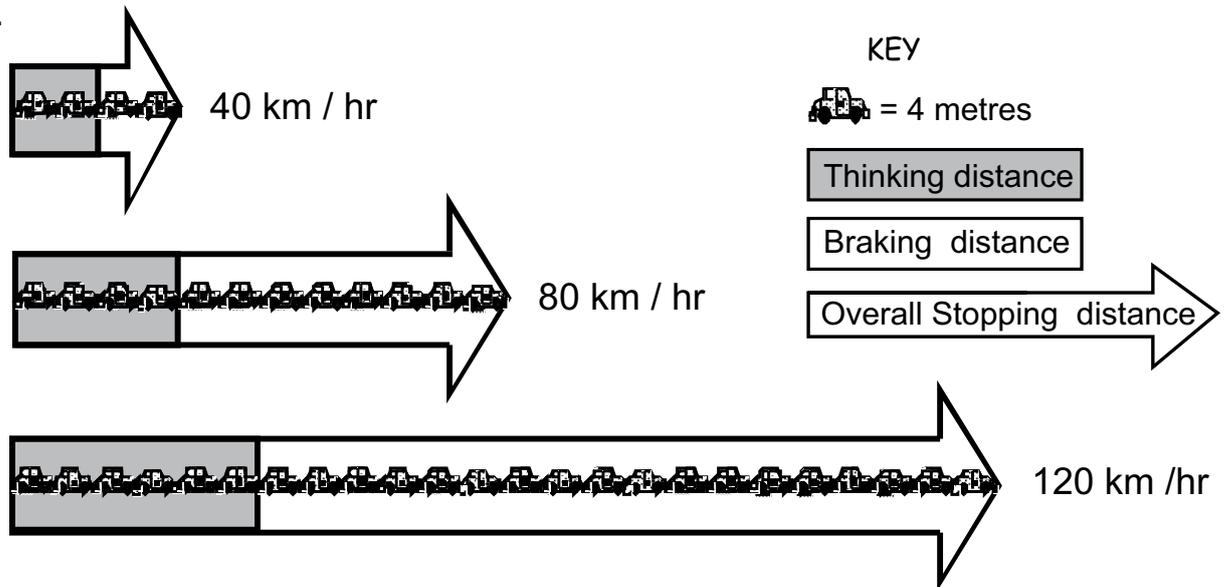
$$\text{From the table, } \$12.80 - \$11.36 = \$1.44$$

$$\underline{\$1.44 \text{ per } \$1000, \text{ each month (12 months in a year)}}$$

$$\underline{\$1.44 \times 108 \times 12 = \$1\ 866.24 \text{ extra per year}}$$

## INTERPRETING GRAPHS

The diagram below gives the stopping distance for cars travelling at different speeds.



1. What is the braking distance at 40 km/hr?  
*Braking Dist= 8m*
2. What is the thinking distance at 80 km/hr?  
*Thinking Dist= 16m*
3. How much longer is the overall stopping distance at 80 km/hr compared to 40 km/hr?  
*32m further.*
4. Why does the thinking distance become greater as the speed increases?  
*Although it takes the same time to think about braking, more distance is covered in the same time when the car is travelling at a higher speed.*
5. What do you estimate the thinking distance, braking distance and overall stopping distance would be for a car speeding at 160 km/hr?  
*The thinking distance would increase to 32 metres*  
*The braking distance is harder to calculate from this graph.*  
*We estimate it would be at least an extra 200 - 250 metres*

# EVERYDAY MATHEMATICS

## Mahobe Insurance Plan (Monthly Charge)

Coverage	Medical	Dental	Vision
Employee	\$88	\$35	\$17
Family (additional coverage)	\$55	\$15	\$8

1. Fabian works for Mahobe, is single and decides to get all three types of insurance. How much will it cost for 12 months?

$$(88 + 35 + 17) \times 12 = \$1680$$


---

2. If Fabian was to marry Helen, who has 5 year old son, how much would Fabian expect to pay for family medical and dental coverage per year?

$$(88 + 35) \times 12 = \$1476 \quad (55 + 15) \times 12 = \$840$$


---

$$\$1476 + \$840 = \$2316$$


---

3. In American baseball, a player's average is calculated by dividing the number of times a player is up to bat by the number of hits.

This season, Devereux has 20 hits from 30 bats. His average is 0.667. Burgess has 2 hits from 3 bats. His average is also 0.667.

Both Devereux and Burgess play the next two games. In Game 1 they both have 2 bats for 1 hit each. In Game 2 they both have 3 bats with Devereux getting 1 hit and Burgess getting 2 hits.

Who is the better player?

$$\text{Devereux, Game 1: } \frac{21}{32} = 0.656 \quad \text{Game 2: } \frac{22}{35} = 0.629$$


---

$$\text{Burgess, Game 1: } \frac{3}{5} = 0.6 \quad \text{Game 2: } \frac{5}{8} = 0.625$$


---

$$\text{Devereux, 2 game average } \frac{2}{5} = 0.4$$


---

$$\text{Burgess, 2 game average } \frac{3}{5} = 0.6$$


---

In the last 2 games, Burgess has the better average, however over the season, Devereux has better average. Seasonal figures are usually taken as the indicator as to who is the best player.

4. The "bit depth" of a computer's colour monitor is the number of colours that it can display. Bit depth is expressed as a power of 2. This means that a 32 bit monitor can display  $2^{32}$  colours. Use this information to calculate the number of colours an 8 bit monitor can display.

$$2^8 = 256 \text{ colours}$$


---

## INVESTIGATIONS

If you double the radius of a circle, what happens to the circle's circumference and what happens to its area?

1. Calculate this for a few circles using a different radius for each circle.

*Doubling the radius, doubles the circumference and quadruples the area (quadruple is 4x).*

*Doubling the diameter also doubles the circumference and quadruples the area.*

The "Rule of 72" is a compounding interest rule that states money invested will double in value in  $\frac{72}{r}$  years if invested at an annual compounded interest rate of  $r\%$ . For example if you invest \$1000 at 6% compounded interest then your investment will be worth \$2000 in  $\frac{72}{6}$  (12) years.

2. What is meant by compounding interest?

*The interest is added to the original amount. This new amount also receives interest.*

3. By using 2 or 3 different interest rates, show that the "Rule of 72" is valid.

*You will probably do this with a table and adding of consecutive years and interest rates.*

*You should find that the "Rule of 72" is valid.*

# BLUE - Worksheet 38

## MEASUREMENT

1. An electrician completes three jobs on a particular working day. On the first he works from 8.35 am to 11.15 am, on the second he works from 11.40 am to 2.30 pm and on the third he works from 3.10 pm to 5.55 pm. What was the average time taken for the three jobs?

$$8:35 \text{ am} - 11:15 \text{ am} = 2 \text{ hr } 40 \text{ min}$$

---

$$11:40 \text{ am} - 2:30 \text{ pm} = 2 \text{ hr } 50 \text{ min}$$

---

$$3:10 \text{ pm} - 5:55 \text{ pm} = 2 \text{ hr } 45 \text{ min}$$

---

$$\text{Total Time} = 6 \text{ hrs } 135 \text{ min} (8 \text{ hrs } 15 \text{ min})$$

---

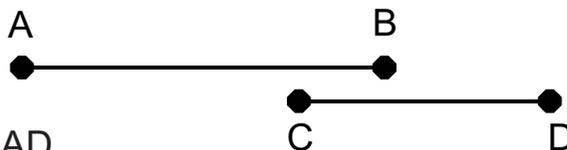
$$495 \text{ minutes} \div 3 = 165 \text{ minutes average}$$

---

$$= 2 \text{ hrs } 45 \text{ minutes}$$

---

2. Look at the two lines below.  
AB = 54 mm, CD = 29 mm and CB (the overlap) = 13 mm.



Find the length of AD.

$$\text{Length is } 54 + (29 - 13) = 70 \text{ mm}$$

---

A hectare is a piece of land which has the same area as a square with sides  $100 \text{ m} \times 100 \text{ m}$ .

3. How many hectares are in a farm with an area of  $55\,000 \text{ m}^2$ ?

$$100 \times 100 = 10\,000 \text{ m}^2 (1 \text{ ha})$$

---

$$55\,000 \text{ m}^2 = 5.5 \text{ ha}$$

---

4. If 15 bags of fertiliser are needed for 20 hectares, how many bags are needed for  $55\,000 \text{ m}^2$ ?

$$15 \div 20 = 0.75 \text{ (bags per hectare)}$$

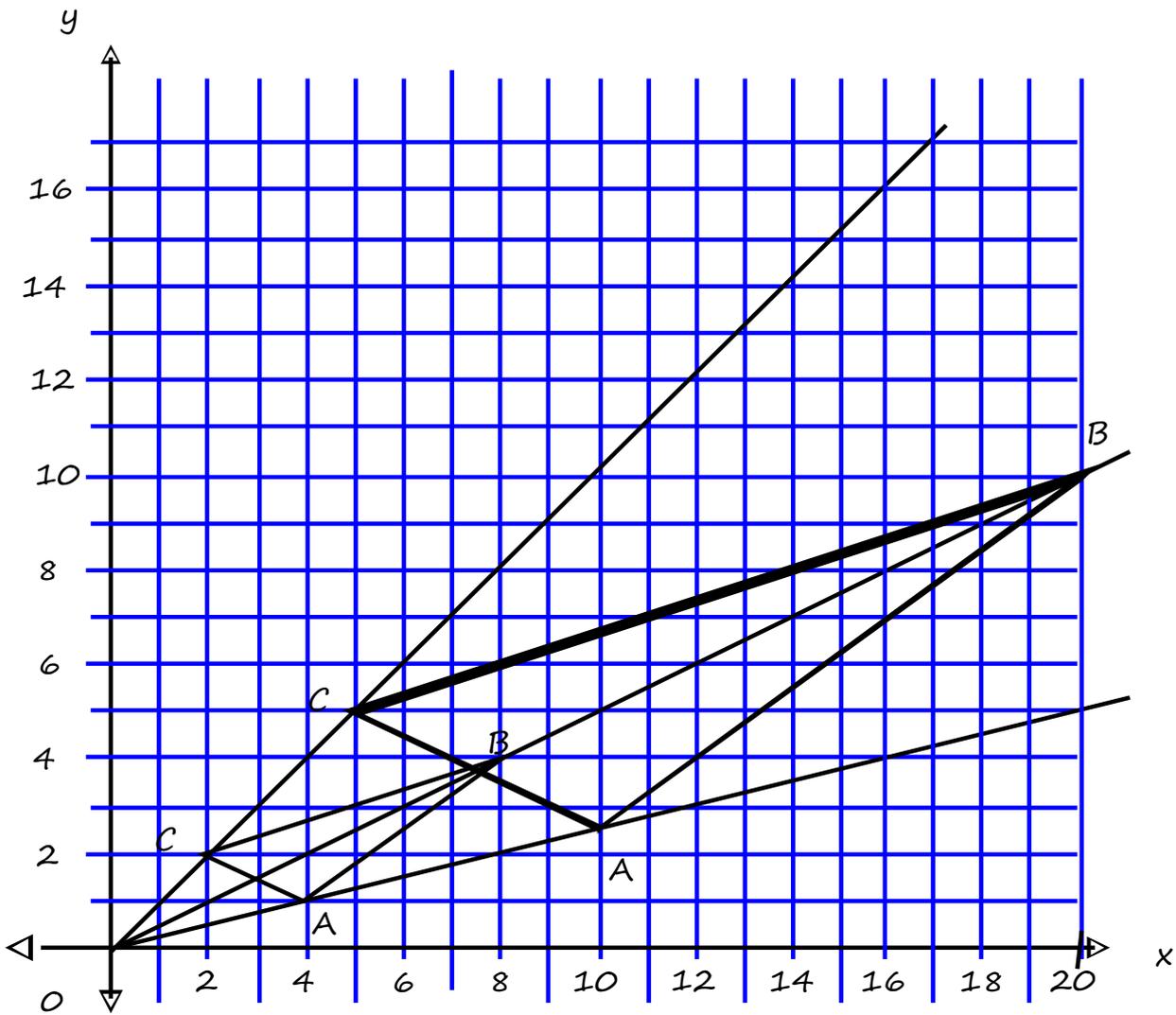
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$$0.75 \times 5.5 \text{ ha} = 4.125 \text{ (i.e 5 bags of fert.)}$$

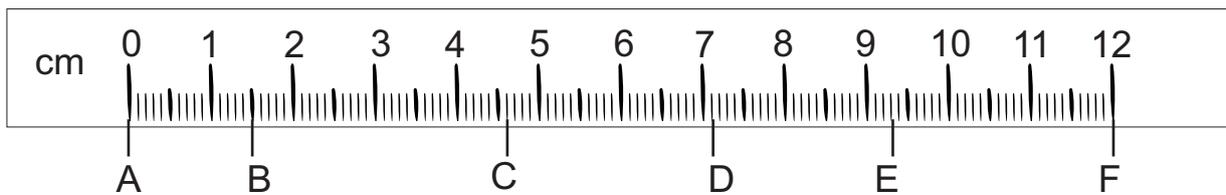
---

A triangle has co-ordinates A(4,1), B (8,4) and C(2,2).

3. Use the grid below to draw some X and Y axes. Then draw the triangle ABC.
4. Enlarge the figure ABC by a scale factor of 2.5 through the centre point O (0,0). Call the new figure A'B'C'.



### MEASUREMENT



Write the length of:  $BC = \underline{31\text{mm}}$   $CD = \underline{25\text{mm}}$   $BE = \underline{78\text{mm}}$   $DF = \underline{49\text{mm}}$

## INVESTIGATIONS

Stage 1: You send a text to 4 friends.

Stage 2: Each friend sends the text on to 4 more friends.

Stage 3: Each of these friends sends to 4 more friends.

1. The scenario is illustrated below. Find the number of texts sent at Stage 9.

Stage 1	4 texts
Stage 2	16 texts
Stage 3	64 texts

*Note how the numbers are increasing by  $4^1$ ,  $4^2$ ,  $4^3$ ,  $4^4$  etc*

*Therefore at stage 9 there will be  $4^9$  texts*

*= 262,144*

2. At what Stage will there be more than 1 million texts sent?

*Using the same pattern,  $4^{10} = 1,048,576$*

*Therefore 1 million texts will be sent at Stage 10.*

Digital cameras capture images in a matrix (rows and columns) of pixels. A pixel is a small rectangular dot. The more pixels in the image, the greater the detail.

3. A megapixel is 1,000,000 pixels. Jason's camera produces an image that has 1280 pixels in a row and 1024 pixels in a column. What are the total number of megapixels pixels in each image?

*$1280 \times 1024 = 1,310,720$  pixels*

*= 1.3 megapixels*

4. Many digital centres measure photos in inches.  
Let  $l$  and  $w$  be the length and width of a photo in inches.

Let  $M$  be the number of megapixels in the image.

A printed photo is considered acceptable if the value of the expression  $\frac{M}{lw}$  is greater than 0.017

Can Jason produce an 8 inch by 10 inch print of the image in his camera?

*$\frac{1.3}{10 \times 8} = 0.01625$*

*This is less than 0.017 so the picture would not be clear.*

*Jason would need a camera with more megapixels to produce such a photo.*

## EVERYDAY MATHEMATICS

The number of calories in a serving of food is the sum of the calories from carbohydrate, protein, and fat. The table below shows the number of calories in 1 gram of carbohydrate, protein and fat.

	<i>Calories in 1 gram</i>
<i>Carbohydrate</i>	4
<i>Protein</i>	4
<i>Fat</i>	9

1. A cup of milk has 11 g of carbohydrate, 8 g of protein, and 8 g of fat. How many calories are there in a cup of whole milk?

$$(11 \times 4) + (8 \times 4) + (8 \times 9) = 148 \text{ calories}$$

---

---

Doctors measure cholesterol in blood to see if there is any risk of heart disease. The formula below gives total cholesterol level in terms of LDL (Low-density lipoprotein or “bad”) cholesterol, HDL (High-density lipoprotein) or “good” cholesterol, and your triglycerides.

$$\text{Total cholesterol} = \text{LDL} + \text{HDL} + \frac{\text{Triglycerides}}{5}$$

All the values are measured in milligrams per deciliter (mg/dL) of blood.

2. Raymond has his cholesterol levels is checked by a doctor. The lab results are show below.

$$\begin{aligned} \text{Total} &= 210 \text{ mg/dL} \\ \text{LDL} &= ? \\ \text{HDL} &= 45 \text{ mg/dL} \\ \text{Triglycerides} &= 125 \text{ mg/dL} \end{aligned}$$

Find Raymonds LDL level.

$$210 = \text{LDL} + 45 + (125 \div 5)$$

---

$$210 = \text{LDL} + 70$$

---

$$\text{LDL} = 140$$

---

---

3. For teenagers, LDL levels below 110 mg/dL are considered acceptable. Levels from 110 mg/dL to 129 mg/dL are borderline, and levels of 130 mg/dL or greater are considered too high. Given that Raymond is a teenager, classify his LDL level as acceptable, borderline, or too high.

*140 is too high*

---

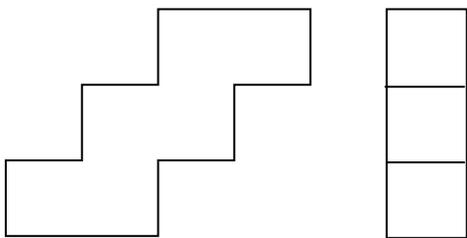
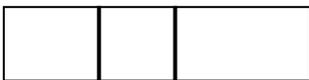
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# BLUE - Worksheet 39

## SHAPE AND SPACE

On the grid below, draw isometric views of each shape pictured.

Top View

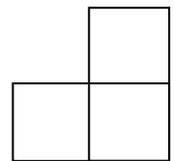
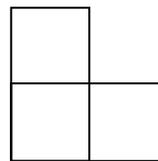
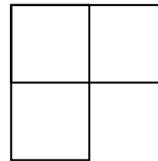


Side View

End View

Shape ONE

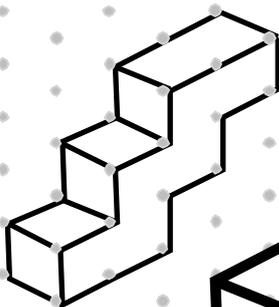
Top View



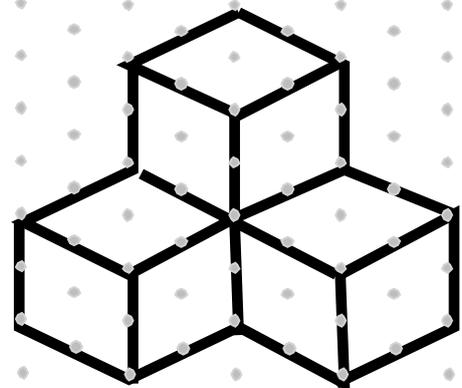
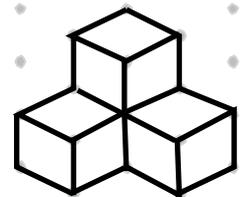
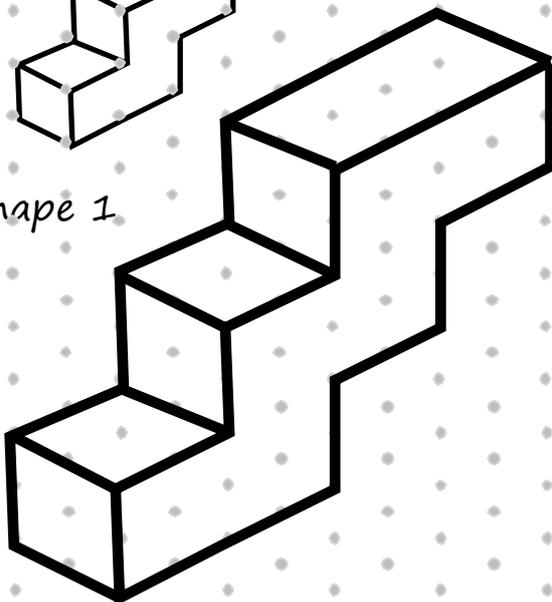
Side View

End View

Shape TWO



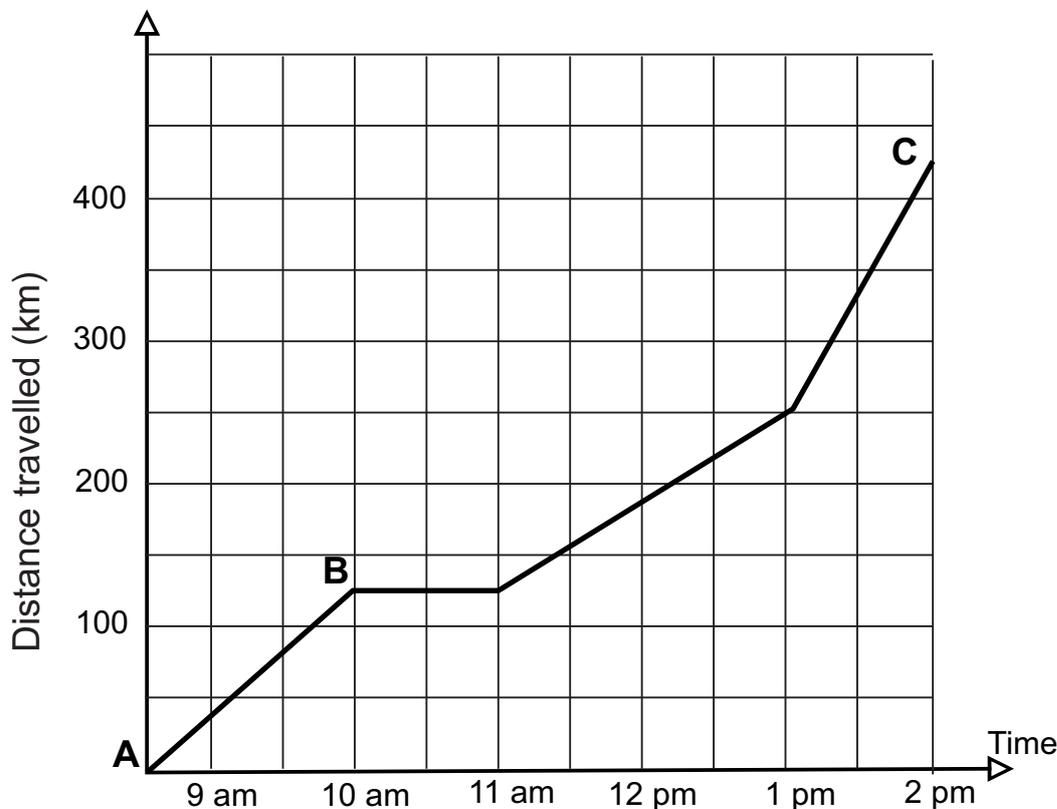
Shape 1



Shape 2

## GRAPHS

Helen is a saleswoman for Mahobe Resources. She travels the country selling books to retail outlets. The graph below, shows her car journey, on one trip last week, driving from Manukau (A), through Hamilton (B), where she visits some booksellers, then on to Hastings (C).



1. At what time did Helen reach Hamilton?

*Helen reached Hamilton at 10 am.*

---

2. How long did Helen stay at Hamilton?

*Helen was in Hamilton for 1 hour.*

---

3. Between Hamilton and Hastings, the graph line changes. What could have happened?

*After 1 pm, the car was travelling faster.*

---

*This could have been because of better roads, no road works, good driving conditions or less cars on the route.*

---

4. What was Helen's average speed for the whole journey?

*total distance = 425 km, total time for journey = 5.5 hrs*

---

*$425 \div 5.5 = 77 \text{ km / hour (2 sf)}$*

---

## EVERYDAY MATHS

In 1694, the English ship Sussex sank in the Mediterranean Sea while on a journey to Spain. In 2002, the ship was discovered under the sea and both the salvage company, Odyssey, and the government of England agreed to share any money that resulted from the sale of gold and silver coins recovered from the wreckage.

1. It was agreed that Odyssey would get 80% of the first \$45 million of the sales. What is 80% of \$45 million?

$$0.8 \times \$45m = \$36 \text{ million}$$

---

---

2. The salvage company would then get 50% of any sales between \$45 million and \$500 million. If sales totaled \$500 million, how much money would Odyssey get?

$$\$455m \times 0.5 = \$227.5 \text{ million}$$

---

$$\$227.5m + \$36m = \$263.5 \text{ million}$$

---

3. Odyssey will receive 40% of sales over \$500 million. In all, they found over 17 tons of gold and silver coins. It is probably the biggest ever treasure hoard found and there is still a dispute over who really owns it. Therefore the sale of all the treasure has still not taken place. If sales of the treasure total \$1 billion how much money will the Odyssey get?

$$\$1 \text{ billion is } 1000 \text{ million.}$$

---

$$40\% \text{ of } \$500 \text{ million} = \$200 \text{ million}$$

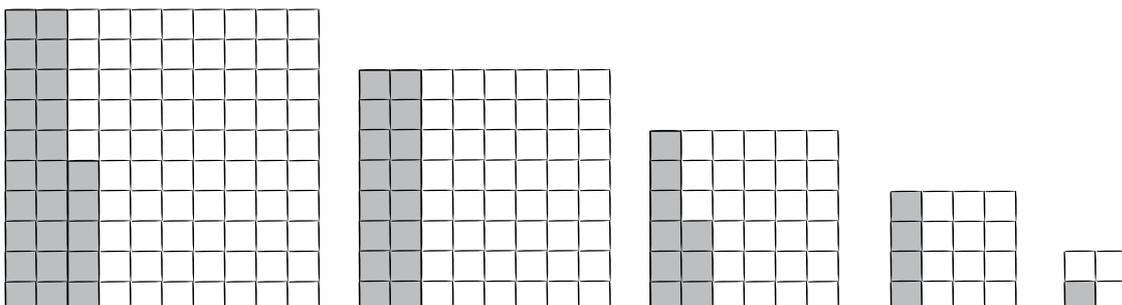
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$$\text{Add to that the figure from (2) } \$200 + \$263.5 = \$463.5 \text{ million}$$

---

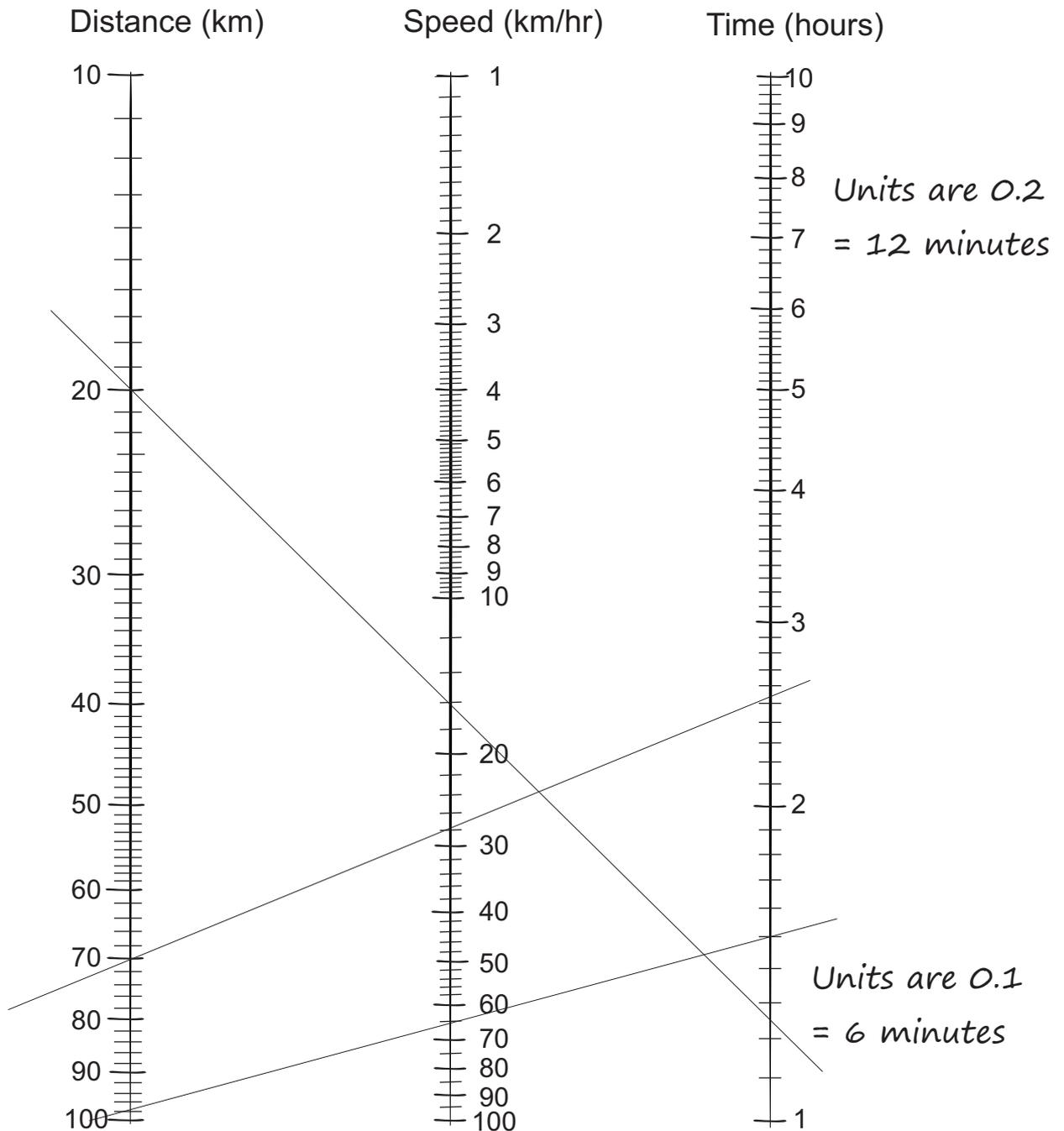
## PERCENTAGE INVESTIGATION

4. Draw the grid that represents the fifth figure.



## SPEED NOMOGRAM

The nomogram below can be helpful for working out distance, time and average speed. Use it to answer the questions below.



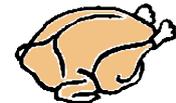
1. A cyclist travels 70 km in 2½ hours.  
What is his average speed? 28 km/hr
  
2. A train travels for 1½ hours at an average speed of 65 km./hr.  
What distance does it travel? 98 km
  
3. What is the time taken by an athlete running in a 20 km race at an average speed of 16 km/hr?  
1 hour 15 minutes

# BLUE - Worksheet 40

## Better Price Supermarkets



Butter \$4.95

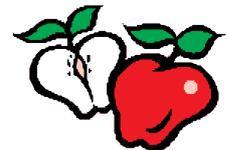
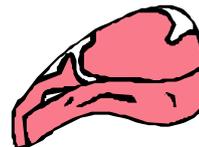


### NUMBER

Graeme sees the Supermarket advertisement above and buys the items on the shopping list below.

- Fill out the price of each item on the shopping list, then find the total cost of the shopping.

1 loaf of bread	<u>\$4.50</u>
1 pack of butter	<u>\$4.95</u>
½ kilo of prime steak	<u>\$13.25</u>
2 bags of apples	<u>\$7.98</u>
9 oranges $\frac{3}{4}$ of \$8 =	<u>\$6.00</u>
Total	<u>\$36.68</u>



- The supermarket always rounds its prices down to the nearest 5 or 10 cents. What will Graeme pay for his goods? \$36.70

- Graeme pays for his purchases with a \$50 note. How much change will he receive? \$13.30

- A 2 litre carton of ice cream costs \$5 and a 3 litre carton costs \$8. Which is the best value for money?

$$\$5 = \$2.50 \text{ per litre}$$

$$\$8 = \$2.67 \text{ per litre}$$

2 litre carton

## INTERPRETING GRAPHS

One weekend, 5 people made phone calls to various parts of the country. They recorded both the costs of their calls and also the times they were on the phone. A graph of their data is shown below.



1. Who is most likely to be calling long distance? Explain your reason.

*John - not a very long phone call but the most expensive.*

---

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2. Who is the most likely to be making a local call? Explain your reason.

*Michael - the longest phone call but the least expensive.*

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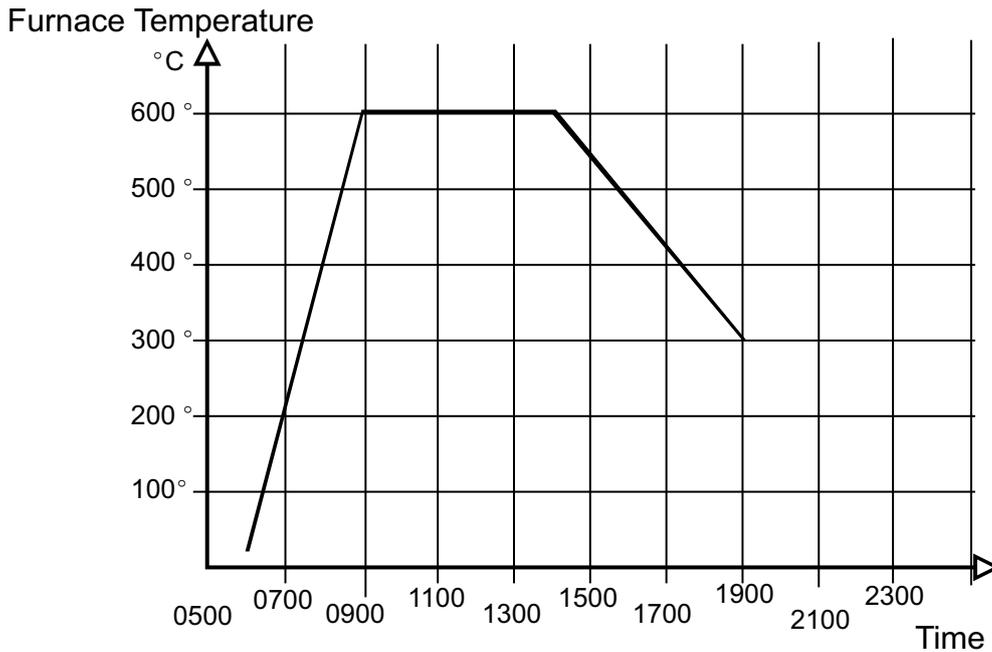
3. Which people were dialling (approximately) the same distance?  
Explain your answer.

*Philip, Edith and Jane - a line (cost v duration) could be drawn through these three points.*

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## INTERPRETING GRAPHS



1. Give 3 pieces of information about the furnace that can be gained from this graph.

i. *The furnace starts off at room temperature at 6 am and takes 3 hours to heat to a temperature of 600° C.*

ii. *In the hours between 9 am and 2 pm, the furnace stays at the same temperature (600°C).*

iii. *At 2 pm the furnace is turned off and starts to cool at a constant rate.*

2. Does the furnace heat up or cool down quicker? Explain your answer.

*The graph's gradient during the heating phase is steeper.*

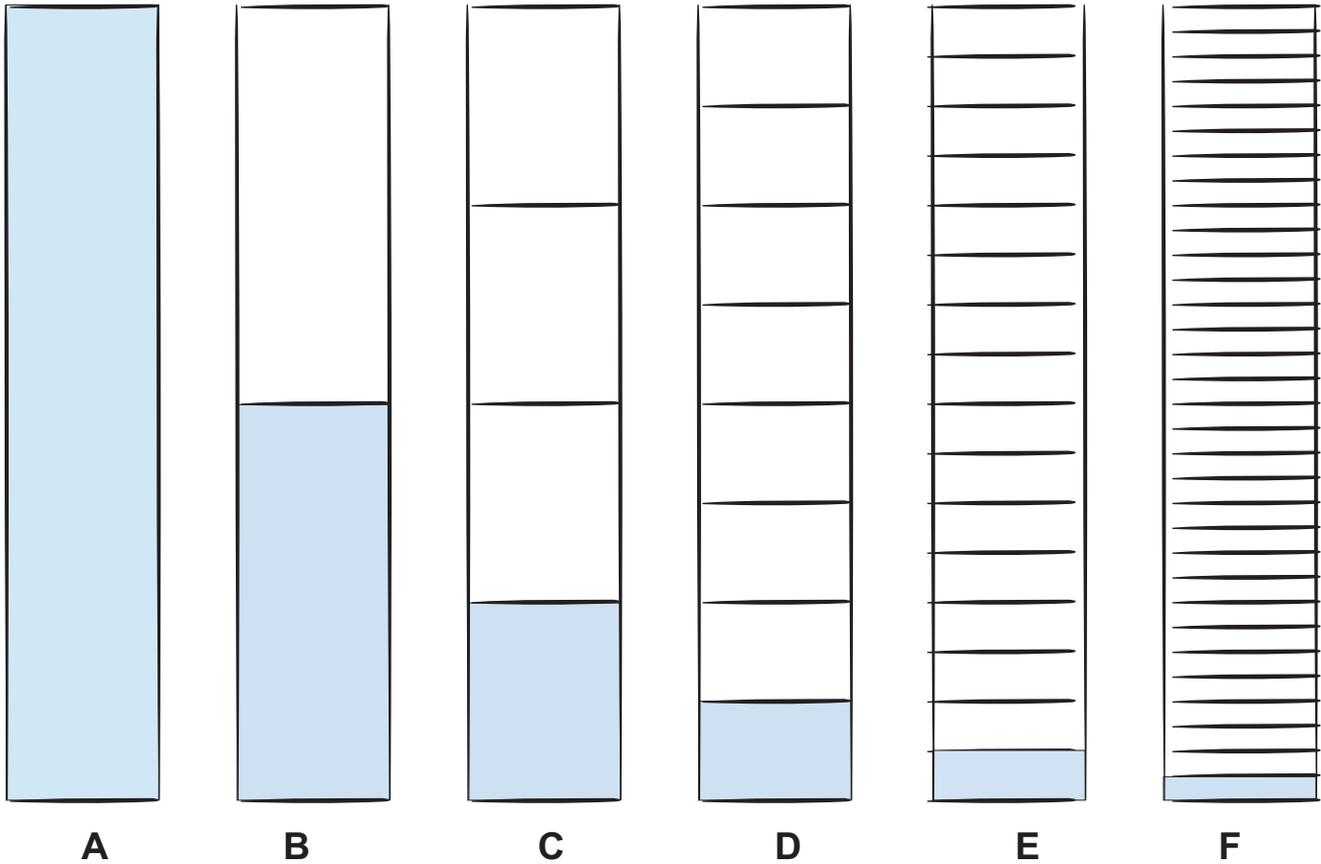
*This means that the furnace heats faster than it cools.*

3. The school's caretaker has to perform maintenance work on part of the furnace. Calculate, the time when it will cool down below 20°C. Assume that it continues to cool at the same rate.

*Extend the cooling line. It reaches room temperature*

*(approximately 20° - 30°) at around 11.30 pm.*

# FRACTIONS



Look at the rectangles above. Parts of each are shaded.

1. Write down each fraction that is shaded.

$\frac{1}{1}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$
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2. What fraction is:

C of B?	D of B?	E of B?	F of B?	E of C?	F of D?
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{4}$	$\frac{1}{4}$

3. Write the fraction illustrated by D in 3 different ways.

$$\frac{1}{8} \quad \frac{2}{16} \quad \frac{4}{32}$$


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4. If you added all the shaded blocks together, what would be the value of the resultant block?

$$1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} = 1\frac{31}{32}$$


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