NCEA

Q&A

LEVEL 1
MATHEMATICS

Part 3 - AS90151
Number Problems in Context

QUESTIONS & ANSWERS

MAHOBE

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NCEA Level 1 Mathematics, Questions & Answers
Part 3 - AS90151 Solve Number Problems
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This edition is Part 3 of a 6 Part eBook series designed to help you study towards NCEA.

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Contents

About this Book 5

Percentages 8

Goods and Services Tax (GST) 9

Standard Form 10

Ratios and Accuracy 11

Achievement Examples 12

Merit Examples 17

Excellence Examples 22

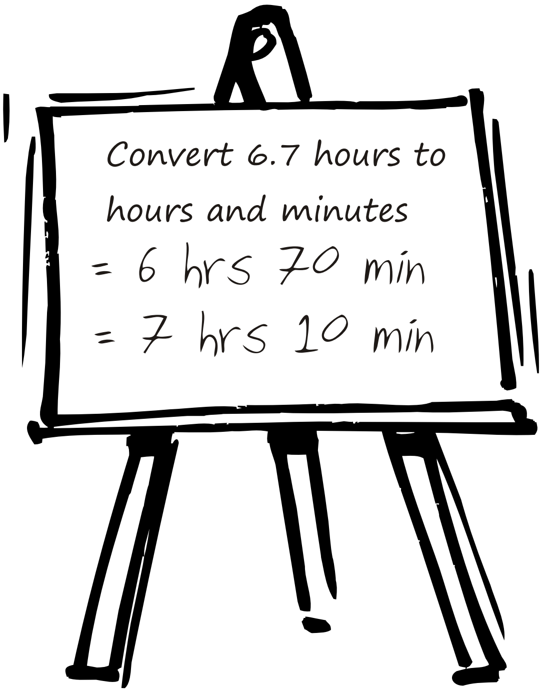
Past Exam 26

Answers 32

About This Book

Q&A eResources are recognised as the leading study guides for NCEA. Each freely available title has been compiled by a team of experienced educators to meet the study and revision needs of NCEA students. They are proving to be valuable resources in the hands of students who want to work ahead of their regular class programme. They also serve as effective revision programmes in the run up to the final examinations.

This book carefully explains the mathematical concepts that will be tested in NCEA then illustrates them with Achievement, Merit and Excellence examplars. It allows students to practise on NCEA-type questions and provides detailed solutions. After working through this programme, all students will be well prepared for their final assessments.


Convert 6.7 hours to hours and minutes
= 6 hrs 70 min
= 7 hrs 10 min

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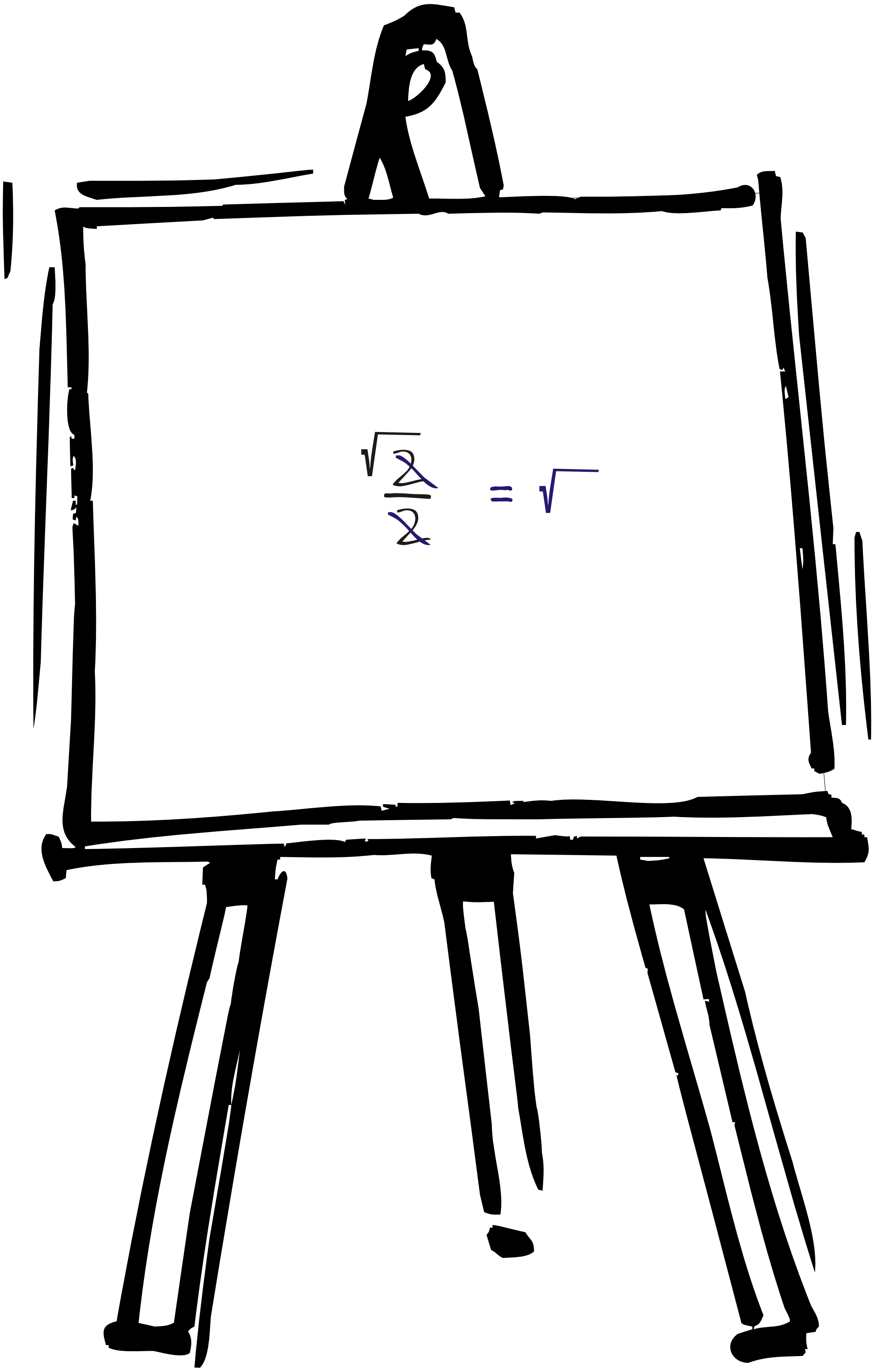
MATHEMATICS 1.7 - AS90151

Solve straightforward number problems in context

Always understand what the examiner wants! A past examination answer is shown below. The student who wrote this answer on a recent assessment paper did not use a Q&A Level 1 Mathematics eResource.



$$\sqrt{\frac{\cancel{2}}{\cancel{2}}} = \sqrt{}$$

Percentages

Instead of writing a number over 100 we write the number as a percentage (%). $16\% = \frac{16}{100} = 0.16$. Here are the usual type of percentage questions:

1. Find x% of y.

e.g. Find 22% of 150 $0.22 \times 150 = 33$

22% means $\frac{22}{100}$ or 0.22

2. Add x% to y.

e.g. The sale price of a graphics calculator is \$90 + GST of 12.5%. What is the price of the calculator?

(The price is the original value (\$90) + 12.5% of \$90)

$\$90 \times 1.125 = \$101.25$

3. Express x as a percentage of y.

e.g. Give 87 as a percentage of 580 $= (87 \div 580)$ or $\frac{87}{580} \times 100$

$= 0.15$ $= 15\%$

4. Find the original value.

e.g. A house increases in value by 20% to \$372,000. What was the original value?

An increase of 20% means the new value represents 120% (or 1.2) of the original value.

Therefore $372{,}000 \div 1.20 = \$310{,}000$ (the original value)

5. Percentage increase or decrease

Use the formula: $\text{Percentage change} = \frac{\text{amount of profit or loss}}{\text{original value}} \times 100$

e.g. Emile buys a phone for \$300 and sells it a year later for \$60. What is her percentage loss?

Loss = \$240, Percentage change $= \frac{240}{300} \times 100$

$= 80\%$ loss

e.g. Elton purchases some earrings for \$5000. He later sells them at an auction for \$7000. What was his percentage profit?

Profit = \$2000, Percentage change $= \frac{2000}{5000} \times 100$

$= 40\%$ profit

Goods and Services Tax (GST)

In New Zealand GST (Goods and Services Tax) is 12.5%.
As a decimal this is written 0.125.
To add GST to an item multiply by 1.125.

e.g. Add GST to these prices:

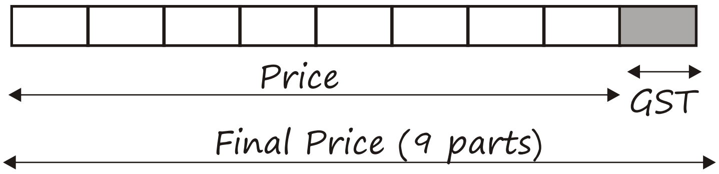
1 pair of shoes = $90 + GST
= $90 × 1.125
= $101.25

1 iFone = $150 + GST
= $150 × 1.125
= $168.75

To find the GST component in a price divide by 9. The reason why we divide by 9 is illustrated in the diagram below.

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

This means one eighth is added to the price giving $\frac{9}{8}$ altogether



Dividing by 9 will give the GST component of the final price.

e.g. A new computer costs $1299.
How much GST is included in this price?
$1299 ÷ 9 = $144.33

e.g. A new camera costs $450.
What is the price without GST?
$450 ÷ 9 = $50
$450 − $50 = $400

Standard Form

Standard form is used to write very small or very large numbers.
A number written in standard form must always be written in the form:

(n) The number of places the decimal has moved.

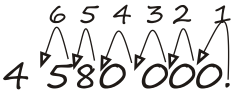
$$A \times 10^n$$

(A) This number is always between 1 and 10

e.g. Write 4,580,000 in standard form.

$= 4.58 \times 10^6$

The decimal point is moved 6 places

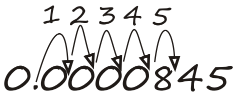


4,580,000 is a big number so the 6 is positive.

e.g. Write 0.0000845 in standard form.

$= 8.45 \times 10^{-5}$

The decimal point 1s moved 5 places



0.0000845 is smaller than 1 so the 5 is negative.

Scientific calculators can make working in standard form easy. Your scientific calculator should have an **EXP** key. Use this when keying in numbers given in standard form.

e.g. $5.63 \times 10^4 \div 2.0 \times 10^3$

Key in 5 . 6 3 **EXP** 4 ÷ 2 . 0 **EXP** 3

The **EXP** key is the same as writing “times 10 to the power”.

Remember 10^5 means 1×10^5 or 1 **EXP** 5

On your calculator display, standard form will often look like: 3.5 E 2

This means 3.5×10^2 or 3500

Final Example: Write 69.5 million in standard form.

69.5 million $= 69\ 500\ 000$

$= 6.95 \times 10^7$

Ratios and Accuracy

A ratios is a comparison of quantities that are measured in the same units. Treat a ratio like a fraction. This means that the RATIO 3:4 could be treated the same as the fraction $\frac{3}{4}$ which is 0.75.

e.g. Mortar is made from sand and cement in the ratio of 7:2
If 28 buckets of sand were used, how much cement was used?

The ratio means that $\frac{7}{9}$ is sand and $\frac{2}{9}$ is cement.

Ratio 7 sand : 2 cement
× 4 × 4
= 28 buckets of sand = 8 buckets of cement.

e.g. \$120 is divided amongst 4 students in the proportions 5:2:2:1
How much does each student get?

Add all the proportions together 5 + 2 + 2 + 1 = 10

Student 1 gets $\frac{5}{10}$ $0.5 \times \$120 = \$60$
Students 2 and 3 get $\frac{2}{10}$ $0.2 \times \$120 = \$24$
Student 4 gets $\frac{1}{10}$ $0.1 \times \$120 = \$12$

All the fractions were converted to decimals

Rounding
1. Identify the position of the "last digit".
2. Look at the next digit to the right.
3. If this digit is 5 or more then add 1 to the "last digit".
   If this digit is 4 or less then leave the "last digit" as is.

e.g. Calculate 7.81 × 4.6 to 1 decimal place and 2 significant figures.

For 1 decimal place $= 35.9\underline{2}6$

the 2nd decimal place is a 2 – leave the "last digit" as is.

$= 35.9$ *(1 dp)*

For 2 significant figures $= 35.\underline{9}26$

the 3rd significant digit is a 9 – add 1 to the "last digit"

$= 36$ *(2 sf)*

Number Problems - Achievement Examples

Miranda is given a weekly allowance of $25. From this she has to pay for all her clothes and entertainment. Miranda wishes to buy a skirt that costs $58.50 and a shirt that costs $45.90.

a. What will be the total cost of the skirt and the shirt if Miranda gets a 15% discount for paying cash? (15% discount is 85% of the total price.)

Total cost = ($58.50 + $45.90) × 0.85

= $88.74

b. Miranda saves all her allowance money to buy the skirt and shirt.
For how many weeks will she need to save?

$88.74 ÷ $25 = 3.54 weeks (round this figure up)

= 4 weeks

c. Miranda now decides that she will bank 30% of her $25 weekly allowance.
How much will Miranda bank each week?

30% of $25 = 0.30 × 25

= $7.50

30% means $\frac{30}{100}$ or 0.30

d. Miranda's mother decides that for every $2 Miranda banks, she will put another $3 in her bank account. This can be written as:

Miranda's banking : Mother's banking = 2 : 3

The banking from Miranda and her mother comes to a total of $112.50.
Calculate how much each person must have banked.

(Total banked = 5 parts) $112.50 ÷ 5 = $22.50 (1 part)

Miranda banks 2 × $22.50 = $45

Mother banks 3 × $22.50 = $67.50

e. 'Hollywood Galaxy' has reduced its prices by 40%.
Miranda sees a baseball cap with a price of $32.50.
What was the original price of the cap?

The reduced price is 60% of the original value.

$32.50 ÷ 0.6 = $54.17

Exercises

1. A breakdown of new car costs is as follows:

Dealer’s Profit	$ 4750
Assembly, Labour, Parts	$ 7500
Overseas Manufacturer	$ 9250
Advertising	$ 2000
Total	$23500

a. Local components (parts) fitted to the car cost $2650. What is this as a percentage of the total Assembly, Labour and Parts cost?

. . . .

b. A car salesperson gets $\frac{2}{5}$ of the Dealer’s Profit.
How much does the car salesperson get?

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c. A car dealer has 3 cars in his yard. He has to pay insurance of 0.5% of the value of the cars. How much insurance will he have to pay?

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d. Another car in the yard is reduced in price from $12,800 to $12,400. What is the percentage reduction?

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e. Usually a car depreciates at a rate of 20% per year. A customer purchases one of the advertised cars (for $23,500). How much will it be worth at the end of 5 years?

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2. Below is a table showing student numbers at Mahobe High School.

Year Level	Year 9	Year 10	Year 11	Year 12	Year 13	Totals
Boys	120	115	135	80		
Girls	130	125	155	75		
Totals	250	240	290	155	108	1043

a. In year 13, the ratio of boys : girls is 4 : 5.
Calculate the number of boys and girls at Mahobe High School.

. . . .

b. In year 11, $\frac{1}{5}$ of the students walk to school, $\frac{1}{4}$ catch the bus
$\frac{1}{3}$ cycle and the rest get driven.
How many Year 11 students get driven to school?

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c. One day 82 students were absent from school.
What percentage of students were absent that day?

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d. Next year the total roll at Mahobe High School is expected to increase by 6%. Calculate the expected number of students next year.

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e. Next year the Year 9 intake is expected to increase from 250 students to 270 students. What is the percentage increase?

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3. **a.** Mahobe is selling iFones for $369. During one week in February they have a Back to School, 55% off sale.
What will be the price of the iFone?

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b. Yesterday petrol cost $1.98 per litre. Today the cost has risen by 4 cents per litre. What percentage increase is this?

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c. Suri buys a box of apples. On closer inspection she finds that $\frac{1}{3}$ of the apples are rotten and have to be thrown away. She gives her parents $\frac{1}{4}$ of the (original) box of apples.
What fraction of the box of apples does Suri have left?

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d. A recipe for a Christmas cake requires all of the ingredients below. Katie gathers the ingredients together but discovers that she only has 5 eggs. She has completed some of the calculations for a modified recipe. In the spaces provided calculate the two ingredient measures necessary for Katie to make the modified recipe.

	Normal recipe	Modified Recipe
Butter	400g	250g
Brown Sugar	200g	125g
All Spice	4 teaspoons	2.5 teaspoons
Eggs	8	5
Mixed Fruit	2.5kg	. . . .
Flour	5 cups	. . . .

4. **a.** Winston and Tariana travel to Fiji on holiday. The total cost of plane tickets and accommodation is $3666. The two plane tickets cost $1525. What percentage of the cost was the accommodation?

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b. During December one quarter of the travel agency’s customers were making their 2nd travel booking for the year. One third of the customers had already booked travel at least twice that year. The rest of the bookings at the travel agency were first-time customers.
What fraction were first time customers?

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c. In December the travel agency also arranged 1860 flights to Australian cities. The flights went to Sydney, Brisbane, Melbourne and Perth in the ratio 5 : 4 : 2 : 1.
Calculate the number of flights that went to Brisbane.

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d. Flights to Melbourne normally cost $420. During January Winston buys a ticket and receives a 15% discount.
How much does Winston pay?

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e. Tariana tries to purchase tickets to Melbourne. However she is told that the $420 deal has now increased in price by 9%.
How much will Tariana have to pay for her ticket to Melbourne?

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Number - Achievement and Merit Examples

a. While out shopping Miranda finds a pair of jeans reduced to \$66.75. A sign said this included a 25% discount. How much were the jeans before the discount was taken off? (Achievement Question)

\$66.75 ÷ 0.75 = \$89

b. At the same time, Miranda sees a belt that would be ideal with her jeans. The belt has been discounted from \$24 to \$15.60.

Calculate the percentage discount. (Achievement Question)

Discount amount is \$24 – \$15.60 = \$8.40

$$\frac{8.4}{24} \times 100 = 35\%$$

c. Miranda starts work in a clothing store. She has to put price tags onto the clothes. The store manager gives her the cost price and tells her that she is to add on 50% for profit and then 12.5% for GST. To get the selling price she multiplies the original cost price by 1.6875. Explain, in mathematical terms, how Miranda knows that this is the correct number by which to multiply the cost price. Include any necessary calculations. (Merit Question)

$$\text{Cost} \times 1.5 \times 1.125 = \text{Cost} \times 1.6875$$

d. Miranda works for two and a half hours after school on Fridays and six hours on Saturdays. She is paid \$7.20 an hour at the end of each week. Miranda wishes to buy a dress normally costing \$230, shoes usually priced at \$90, and a pair of earrings marked down to \$34 on special. Her boss says he will only charge her cost price for the dress and shoes. However, she will have to pay \$34 for the earrings as they are already on special. Remember: selling price is the cost price, plus 50% profit plus 12.5% GST.

How many full weeks will it take Miranda to pay for the outfit?

Cost of Dress: \$230 ÷ 1.6875 = \$136.30
Cost of Shoes: \$90 ÷ 1.6875 = \$53.33
Cost of earrings: = \$34.00
Total Cost = \$223.63

Wages paid: 8.5 × \$7.20 = \$61.20

Total Cost ÷ Wages: 223.63 ÷ 61.20 = 3.65

Time needed to work and save money = 4 weeks.

5. **a.** The population of India is 1.130×10^9.
The number of males between 0 - 15 years is 1.882×10^8.
The number of females between 0 - 15 years is 1.714×10^8.
What percentage of the population of India is aged between 0 and 15 years?

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b. Visitors who plan to attend the 2010 Commonwealth Games in Delhi, India, have booked 25, 450 rooms. This means that 75% of the rooms in Delhi are already booked.
How many hotel rooms are still available in Delhi?

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c. In Delhi markets, vendors are already selling replica sets of Commonwealth Games medals. They buy these for 1100 rupees then put a mark up of 85% on each set of medals. In India they also have VAT (value added tax) of 12.5% added to all costs. One vendor reduces his prices by one quarter over one particular weekend.
How much would a customer have to pay for a reduced price set of replica medals?

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6. Last year at Mahobe High School there were 290 students in Year 11. This was a 15% increase over the previous year.

a. How many students were in Year 11 at Mahobe High School in the previous year?

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b. Each year over 44,500 students sit NCEA examinations.
They will use 5.8×10^6 sheets of paper.
On average how many sheets of paper per student does this represent?

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Below is a table showing student numbers at Mahobe High School.

Year Level	Year 9	Year 10	Year 11	Year 12	Year 13	Totals
Boys	120	115	135	80		
Girls	130	125	155	75		
Totals	250	240	290	155	108	1043

Next year the Year 10 and Year 12 roll is expected to increase by $\frac{1}{4}$.
The Year 13 roll is expected to drop 12%.
20 more students are expected at Year 9.

c. Calculate the percentage change in the total roll at Mahobe College next year.

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7. **a.** Hamilton purchases a car that costs $87, 500 including GST. His mother offers to pay the GST (which is 12.5%).
How much will Hamilton have to pay?

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b. Dixon brought a car last year. After one year it is calculated that the car has depreciated by 31.5% and it is now worth $58,500.
Calculate the price that Dixon paid last year for his car.

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c. Last year Goldstein's company had an annual turnover of $\$9.31\times10^6$.
This year Goldstein's company had an annual turnover of $\$1.126\times10^7$.
What percentage increase is this for Goldstein's company?

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d. The Sun is about 0.000016 light years away from the Earth.
A light year is calculated as 9.46×10^{15}m. This is the distance traveled by light in one year.
Calculate the distance of the Sun from the Earth in metres.
(Give your answer in standard form.)

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8. **a.** Winston purchases a ticket to Fiji. The ticket is discounted by 22.5%.
Winston pays \$335 for the ticket.
What was the usual cost of a ticket to Fiji?

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b. Sharples pays \$5280 (including GST) for a ticket to Iran.
Calculate the GST content of the ticket price (GST is 12.5%).

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c. The Caspian Sea in Iran in covers an area of 3.72×10^{11} m^2.
The Aral Sea in Kazakhstan covers 4.0×10^{10} m^2.

i. What is the total area covered by the two seas?

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ii. What is the ratio of the area of the Caspian Sea to the area of the Aral Sea?

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d. Last year the AirWays Travel Company arranged a total of 1.82×10^4 flights for its customers. These flights represented a flying distance of 3.85×10^8 kilometres.
What was the mean distance of a flight for a customer of the AirWays Travel Company?

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Number Problems - Excellence Example

Goldstein has $100,000 to invest for 3 years. His savings bank offers two different schemes to choose from.

Scheme 1: Deposit the money and receive 9.5% interest at the end of each year.

Scheme 2: Deposit the money and receive 4.55% at the end of each 6 months.

Investigate each scheme. Recommend to Goldstein what he should do.

There are two ways in which this type of question can be approached.

1. Draw up a table of calculations.

   With this question there are a lot of calculations. Therefore take care as a wrong key press can mean the end result is incorrect.

   Scheme 1

   Year 1 $100,000 × 1.095 = $109,500
   Year 2 $109,500 × 1.095 = $119,903
   Year 3 $119,903 × 1.095 = $131,294

   Scheme 2

   6 months $100,000 × 1.0455 = $104,550
   12 months $104,550 × 1.0455 = $109,307
   18 months $109,307 × 1.0455 = $114,280
   24 months $114,280 × 1.0455 = $119,480
   30 months $119,480 × 1.0455 = $124,916
   36 months $124,916 × 1.0455 = $130,600

   Over 3 years, Scheme 1 gives the best return.

2. Use the compound growth formula:

   $$N = N_o\left(1 + \frac{r}{100}\right)^n$$

   $\text{Amount} = \text{initial value} \times (1+ \text{percentage change})^{\text{Number of days, hours or years}}$

   Using this formula

   Scheme 1: $100,000 × 1.095^3 = $131,293.24
   Scheme 2: $100,000 × 1.0455^6 = $130,600.31

9. A travel agent's price for a flight to Los Angeles has increased each year since 2005. In December 2000 the price was $1289.
During each of the next three years the price increased by 2.5% on the previous year.
In December 2004 the price increased by 2.1% on the previous year.
In December 2005, the price increased by 3.3% on the previous year.
In December 2006 there was no change in the price.
In December 2007 there was a 5.55% change in the previous year's price.
Since December 2007 there have been no price rises.

The AirWays Travel Company want to advertise a flight to Los Angeles at "less than December 2000 prices". Calculate the minimum percentage discount that they would have to offer for their advertising claim to be true.

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10. 5 years ago Mahobe High School invested $550,000 at a yearly interest rate of 9.55% paid at the end of each year.

The money and interest were re-invested each year.
The money is for extensions to the Mathematics Department Computer Suite. A quote from a building company gives the cost of the extensions at $1.5 million. This price includes GST.

The Ministry of Education agrees to subsidise the building extensions.
The Ministry will give $2 for every $3 raised.
The building company involved offers to pay all the GST.

Will the schools investment, plus subsidy and no GST to pay be enough to pay for the cost of the extension?

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Level 1 Mathematics - Sample Exam

AS90151 Solve Number Problems

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You are advised to spend 30 minutes answering the questions in this section.

QUESTION ONE

A salad contains lettuce, tomato, cucumber and sprouts in the ratio 4 : 3 : 2 : 1 by weight. How many grams of lettuce are in a 270 gram salad?

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QUESTION TWO

A bean salad contains beans, onions, peppers and some other vegetables. In one particular bean salad $\frac{3}{5}$ of the salad is made from beans and $\frac{3}{4}$ of the beans used are green beans. Calculate the fraction of the salad that is made of green beans.

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QUESTION THREE

At the food market Claudia normally pays $7.50 for a bag of stir-fry mixed vegetables. Today she only pays $5.00. What is the percentage discount on the bag of stir-fry mixed vegetables?

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QUESTION FOUR

Steve sells boxes of kumara to the supermarket. He receives \$22.18 + GST per box (GST is 12.5%). Calculate the price the supermarket pays Steve, inclusive of GST, if they purchase 5 boxes of kumara.

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QUESTION FIVE

Kate sells boxes of home-made muesli to the supermarket. Yesterday she sold a 150 boxes and received a direct credit payment into her bank for \$349.50.

How much GST was included in the payment? (GST is 12.5%)

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QUESTION SIX

A factory produced a total of 1.9×10^8 cans of food (i.e. canned fruit and canned vegetables) last year. Within this total, 7.6×10^6 of the cans were full of peaches. What percentage of the total output of food produced by the factory were cans of peaches?

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QUESTION SEVEN

The price of a 440 gram can of peaches is now priced at \$1.70.
This price has increased 6.5% in the last year.
What was the price of a 440 gram can of peaches a year ago?

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QUESTION EIGHT

A 350 gram can of Blue Seas Tuna in Oil costs \$6.55.
Two 190 gram cans of Sea King Tuna in Oil costs \$7.65.
Calculate which brand of Tuna is cheaper.

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QUESTION NINE

There are 190 Year 11 students at Mahobe High School. This year they are organising an end-of-exams party and they expect 300 people to attend.

They need to purchase food and drink - sausages, bread, tomato sauce and cola.

The school's Board of Trustees agrees to pay 25% of the food and drink cost.

The parents' association will pay $\frac{1}{3}$ of the food and drink cost.

The students decide to charge entry so that the rest of the costs are covered.

One kilogram of sausages will feed 6 people. Sausages cost $8.70 per kilogram, however the butcher agrees to give the students a 15% discount.

One loaf of bread will feed 10 people. Bread costs $2.30 per loaf.

One bottle of tomato sauce will be enough for 25 people and costs $5 per bottle.

Cola costs $2.98 for a 2.25 litre bottle and each bottle is enough for 10 drinks.

Calculate how much should be charged to cover the cost of the food and drink.

Explain at each step how you are calculating your answer.

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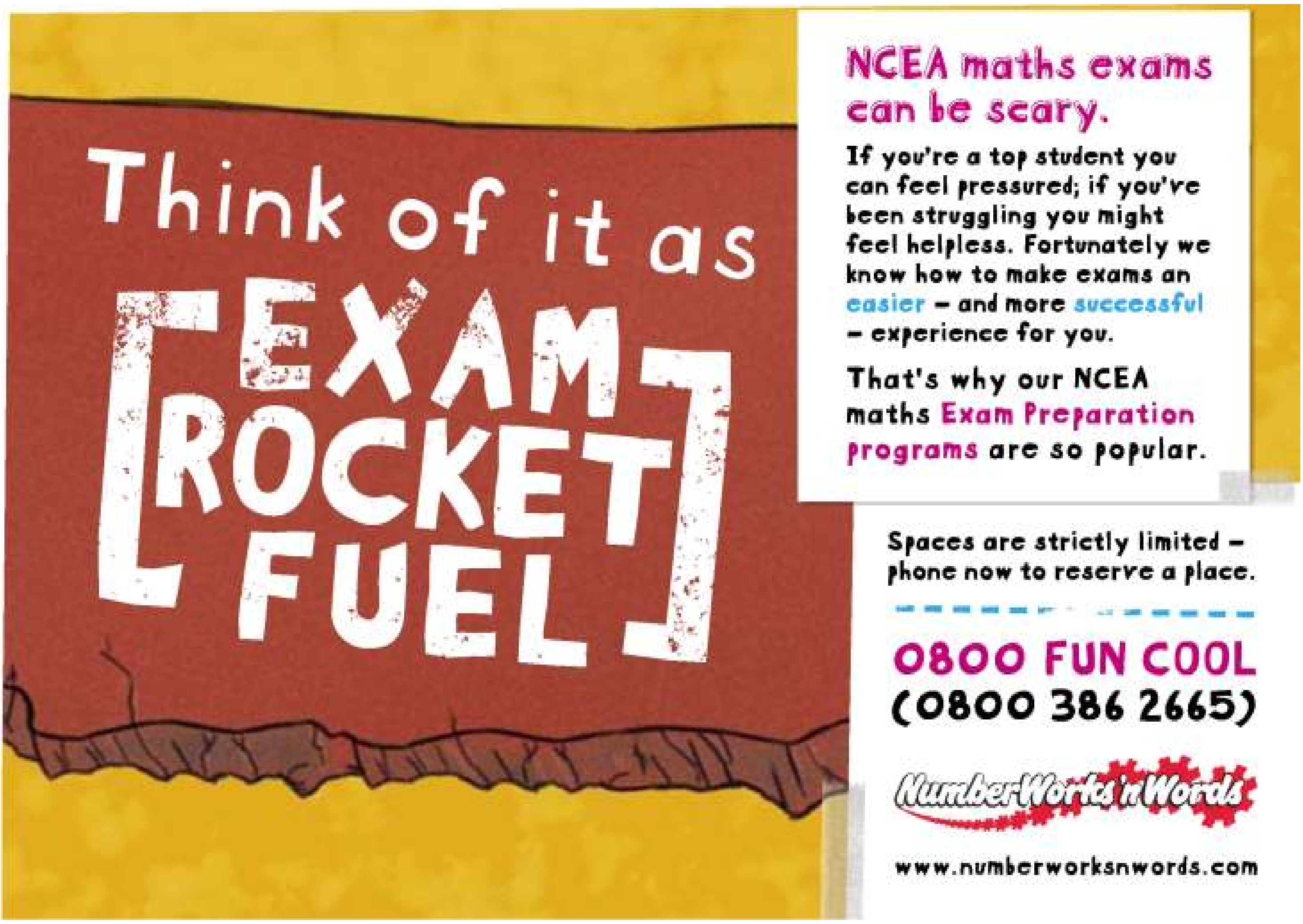
The Answers



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The Answers

Page 13

1. a. $(2650 \div 7500) \times 100 = 35.33\%$

b. $4750 \times 0.4 = \$1900$

c. $3 \times \$23500 = \$70500$

$0.005 \times \$70\,500 = \$352.50$

d. $(12800 - 12400) = 400$

$400 \div 12800 \times 100$

$= 3.125\%$ decrease

e. $\$23500 \times (0.8)^5 = \$7700$

Page 14

2. a. $108 \div 9 = 12$

$4 \times 12 = 48$ boys

$5 \times 12 = 60$ girls

b. $\frac{1}{5} + \frac{1}{4} + \frac{1}{3} = \frac{47}{60}$

This means $\frac{13}{60}$ get driven

$\frac{13}{60} \times 290 = 62$ students

c. $82 \div 1043 \times 100 = 7.86\%$

d. $1043 \times 1.06 = 1106$

e. $20 \div 250 \times 100 = 8\%$

Page 15

3. a. $\$369 \times 0.45 = \$166.05$

b. $4 \div 198 \times 100 = 2.02\%$

c. $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$ i.e. $\frac{5}{12}$ for Suri

d. Modified recipe is 37.5% decrease

Mixed fruit = 1.56kg

Flour = 3.13 cups

Page 16

4. a. $\$3666 - \$1525 = \$2141$

$2141 \div 3666 = 0.584$

$= 58.4\%$

b. $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$

i.e. $\frac{5}{12}$ First time customers

c. There are 12 parts to the ratio

$1860 \div 12 = 155$

$155 \times 4 = 620$ flights to Brisbane

d. $\$420 \times 0.85 = \$357$

e. $\$420 \times 1.09 = \$457.80$

Page 18

5. a. When using a calculator type in:

1.882 EXP 8 + 1.714 EXP 8

$1.882 \times 10^8 + 1.714 \times 10^8$

$= (1.882 + 1.714) \times 10^8$

$= 3.596 \text{ x } 10^8$

$(3.596 \text{ x } 10^8) \div 1.130 \times 10^9$

$= 0.318$ (31.8%)

b. $25450 \div 0.75 = 33933$ total rooms

$33933 - 25450 = 8483$ rooms left

c. $1100 \times 1.85 \times 1.125 = 2289.38$

$2289.38 \times 0.75 = 1717.04$ rupees

Page 19

6. a. $290 \div 1.15 = 252$

b. $(5.8 \times 10^6) \div 44500 = 130.337$

$= 130$ sheets

c. Year 10: $240 \times 1.25 = 300$

Year 12: $155 \times 1.25 = 194$

Year 13: $108 \times 0.88 = 95$

$270 + 300 + 290 + 194 + 95$

$= 1149$ (Expected roll next year)

An increase of 106 students

$106 \div 1043 = 0.1016$

$= 10.16\%$ increase

Page 20

7. a. $\$87500 \div 1.125 = \$77{,}777.78$

b. Depreciate by 31.5% means it is worth 68.5% of its previous value.

$\$58500 \div 0.685 = \$85{,}401.46$

$= \$85{,}400$

c. $1.126 \times 10^7 - 9.31 \times 10^6$

$(11.26 - 9.31) \times 10^6 = 1.95 \times 10^6$

$1.95 \times 10^6 \div 9.31 \times 10^6$

$1.95 \div 9.31 = 0.209$ (20.9%)

If using a calculator type

1.95 EXP 6 ÷ 9.31 EXP 6

d. $0.000016 = 1.6 \times 10^{-5}$ light years

$1.6 \times 10^{-5} \times 9.46 \times 10^{15}$

$= 15.136 \times 10^{10}$

$= 1.51 \times 10^{11}$ m

Page 21

8. **a.** $\$335 \div 0.775 = \$432.26$

b. Price without GST

$5280 \div 1.125 = 4693.33$

$\$5280 - \$4693.33 = \$586.67$ GST

Or GST of 12.5% $= \frac{1}{8}$

When added to a whole price you have $1 + \frac{1}{8}$. i.e. The new price can be divided into 9 parts.

$\$5280 \div 9 = \$586.67$ GST

c. i. $(4.0 + 37.2) \times 10^{10}$

$= 41.2 \times 10^{10}$

$= 4.12 \times 10^{11}\ \text{m}^2$

ii. $3.72 \times 10^{11} \div 4.0 \times 10^{10}$

$= 37.2 \times 10^{10} \div 4.0 \times 10^{10}$

$= 37.2 \div 4.0$

$= 9.0$ (1 sf)

= ratio 9:1

(The Caspian Sea is bigger.)

d. $(3.85 \times 10^{8}) \div (1.82 \times 10^{4})$

$= (38500 \times 10^{4}) \div (1.82 \times 10^{4})$

$= 38500 \div 1.82$

$= 21153.85$

$= 2.12 \times 10^{4}$ km

Page 23

9. Current price is:

$1289 \times 1.025^{3} \times 1.021 \times 1.033 \times 1.0555 =$ $\$1545.29$

Discount needed is

$\$1545.29 - 1289 = 256.29$

Percentage decrease

= discount needed ÷ original price × 100

This means $256.29 \div 1545.29 \times 100$

$= 16.58\%$

The price would need to be discounted by 16.6% for the advertising claim to be satisfied.

Page 24

10. Investment after 5 years interest

$= \$550{,}000 \times 1.0955^{5}$

$= \$867{,}810$

Total with subsidy

$= \$867{,}810 \times \frac{5}{3}$

$= \$1{,}446{,}350$

Cost without GST

$= \$1{,}500{,}000 \div 1.125$

$= \$1{,}333{,}333$

Therefore there is enough money.

Page 28

Question One

Total of ratio = 10 parts

$\frac{4}{10} \times 270 = 108$ grams

Question Two

$\frac{3}{5} \times \frac{3}{4} = \frac{9}{20}$

Question Three

$\frac{\$7.50 - \$5.00}{\$7.50} = 33.3\%$

Page 29

Question Four

$\$22.18 \times 1.125 = \$24.95$

5 boxes means $\$24.95 \times 5 = \$124.76$

Question Five

$\$349.5 \div 9 = \$38.83$ (GST component)

Question Six

$\frac{7.6 \times 10^{6}}{1.9 \times 10^{8}} \times 100 = 4\%$

Page 30

Question Seven

$1.7 \div 1.065 = \$1.60$

Question Eight

$\$6.55 \div 350 = 0.01871$

$\$7.65 \div 380 = 0.02013$

Blue Seas Tuna is the cheaper

Page 31

Question Nine

1kg of sausages feeds six people. This means for 300 people you need 50 kg of sausages

\$50 × \$8.70 = \$435

15% discount = \$369.75

30 loaves of bread @ \$2.30 = \$69

12 bottles of tomato sauce @\$5 = \$60

30 bottles of cola @\$\$2.98 = \$89.40

Add all the costs together

\$369.75 + \$69 + \$60 + \$89.40 = \$588.15

Board of Trustees pay (25%) \$147.04

Parents Association pay (33.3%) \$196.05

Total to pay \$588.15 – \$147.04 – \$196.05

= \$245.06

Total left ÷ 300 people = \$0.82

Charge at least \$0.82 per person to break even.

The Mahobe RedBack Calculator

The NZ Centre of Mathematics recommends the Mahobe RedBack scientific calculator for NCEA. This calculator has advanced features, such as equation solving, to help take the sweat out of such calculations. Purchase it direct from the Mahobe website www.mahobe.co.nz.

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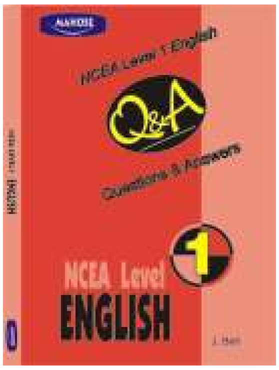

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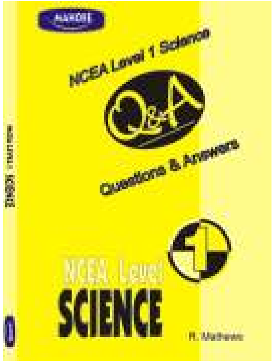There are explanations and practice NCEA assessments of the type that can be expected in the exam. This book allows you to focus on the exam essentials. It will your boost confidence and maintain motivation in the weeks leading up to the exams. Study with this book and you will enter the exam room with more comfort, confidence and enthusiasm. Q&A Science is **$19.95** and can be purchased from Whitcoulls, Paper Plus or from the Mahobe website www.mahobe.co.nz