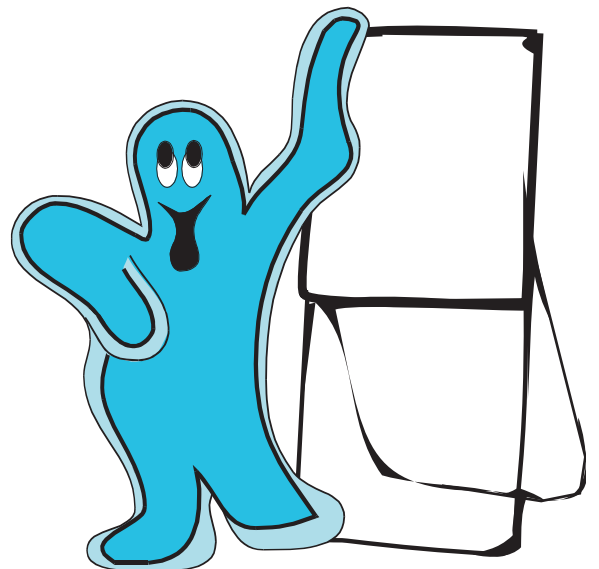# Mathematics Homework Book

Level 3/4

Robert Lakeland & Carl Nugent

# Contents

Year 9 Number Achievement Standard	
Assessment Criteria	**Explanatory Notes**
ACHIEVEMENT • Solve problems involving whole numbers, decimals and fractions. • Convert between fractions, decimals and percentages.	**Assessment will be based on a selection from:** • Calculation of square roots and powers of whole numbers • Application of order of operations to number problems • Word problems involving whole numbers and decimals • Ordering decimals in practical contexts • Finding equivalent fractions • Finding a fraction of a quantity.
MERIT • Solve number problems.	**Assessment will be based on a selection from:** • Word problems involving integers • Finding a percentage of a quantity • Expressing one quantity as a percentage of another • Rounding numbers to any number of decimal places • Conversion of large numbers into standard form.
EXCELLENCE • Solve number problems in context involving several steps.	**Students will be expected to:** • Set out work logically • Round their answers sensibly. © NZAMT (New Zealand Association of Mathematics Teachers) www.nzamt.org.nz.
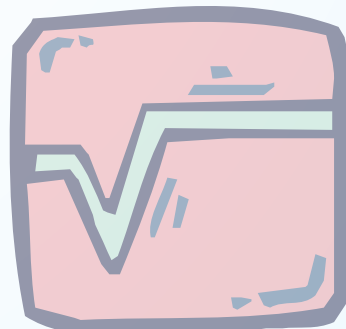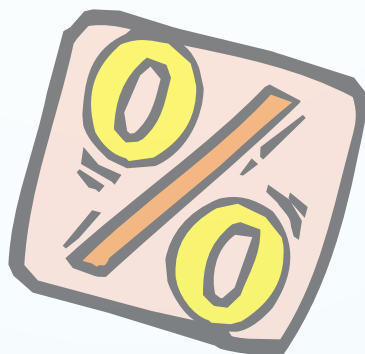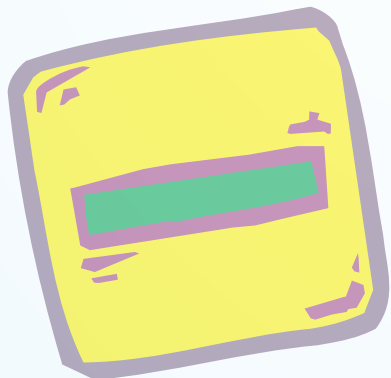
Order of Operations (Brackets) – Applications of order of operations to number problems

Example

Evaluate 2 x (2 + 3)

If we are doing the problem without a calculator we must calculate the brackets first.

2 x (2 + 3) becomes 2 x 5 = 10

On a calculator we enter the problem as it is written down (including the brackets).
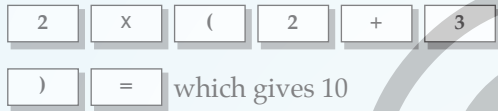
| 2 | x | (| 2 | + | 3 |

|) | = | which gives 10

Evaluate the following (using your calculator if you wish).

1. 5 x (3 + 2) = _____

    = _____

2. 6 x (5 – 2) = _____

    = _____

3. (2 + 3) – (3 + 1) = _____

    = _____

4. 12 – (5 + 3) = _____

    = _____

5. 2(12 – 12) = _____

    = _____

6. (1 + 2) x (3 + 2) = _____

    = _____

7. (2 x 12) – (5 x 4) = _____

    = _____

Application Problems

Use your calculator to answer the following.

8. In a fruit hamper there were 7 oranges, a banana, 5 apples and 50 grapes. 9 hampers are sold. How many pieces of fruit are there altogether?

    Expression: _____

    Answer: _____

9. A container holds 35 pallets. On each pallet there are 36 reams of paper and in each ream there are 500 sheets. Calculate the number of sheets of paper in 3 containers.

    Expression: _____

    Answer: _____

10. At a basketball tournament there are 24 teams. In each team there are 10 players, 2 officials and a coach. How many team members are there in total?

    Expression: _____

    Answer: _____

11. A taxi firm hires mini-buses. Each mini-bus holds 12 people, (11 passengers and 1 driver). If 6 mini-buses are required at the airport, what is the maximum number of people they can pick up?

    Expression: _____

    Answer: _____

12. A meat raffle contains 1 chicken, 15 sausages, 5 steaks and 10 meat patties. In one evening 4 of these meat packs are raffled. How many pieces of meat were there altogether?

    Expression: _____

    Answer: _____

I found this work	Proportion completed	
Easy OK Difficult	None Few Half Most All	Date: _____

Integer Review – Solve problems involving integers
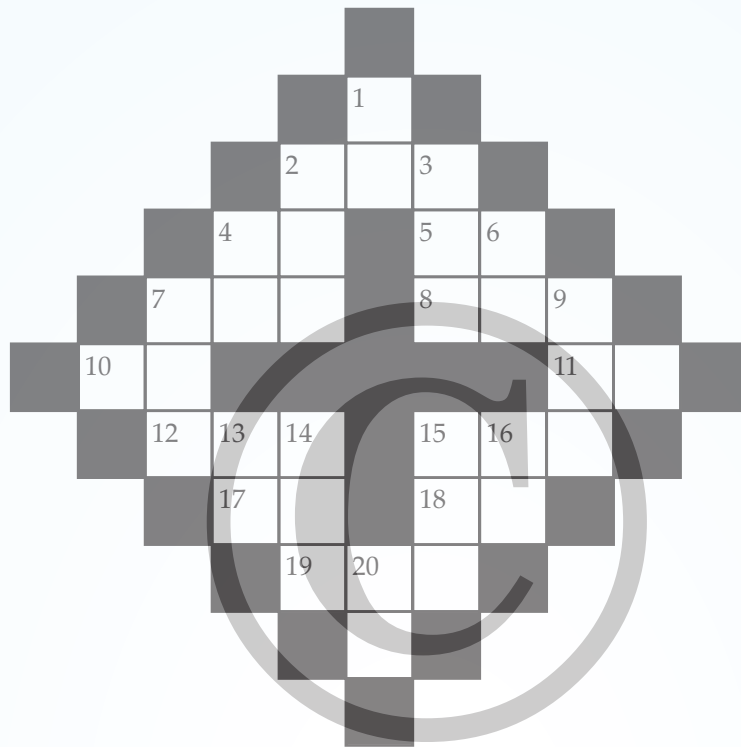
A negative sign occupies a single square.

ACROSS

2. $76 + {}^-117 =$ _____

4. $53 \div {}^-53 =$ _____

5. $3 \times 9 =$ _____

7. $408 \div {}^-8 =$ _____

8. ${}^-11 \times {}^-11 =$ _____

10. ${}^-93 \div {}^-3 =$ _____

11. ${}^-63 + 75 =$ _____

12. $12 - {}^-199 =$ _____

15. ${}^-68 - 12 =$ _____

17. $\dfrac{300}{5} =$ _____

18. $4 - {}^-6 =$ _____

19. $76 - {}^-117 =$ _____
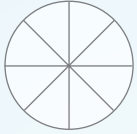
DOWN
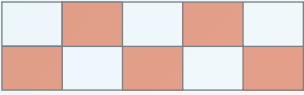
1. $6 \times 9 =$ _____

2. $99 \div {}^-9 =$ _____

3. $100 - {}^-21 =$ _____

4. ${}^-60 \div 12 =$ _____

6. $100 + {}^-28 =$ _____

7. $84 \div {}^-7 =$ _____

9. $17 - {}^-93 =$ _____

13. $4 \times 4 =$ _____

14. $90 - {}^-11 =$ _____

15. $65 \div {}^-5 =$ _____

16. ${}^-170 - {}^-250 =$ _____

20. $8 \times 12 =$ _____
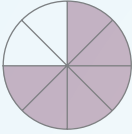
I found this work

Easy   OK   Difficult

Proportion completed

None   Few   Half   Most   All

Date: _____

Fractions – Solving problems involving fractions

Examples

a) Shade $\frac{3}{4}$ of the circle.

b) What fraction of the rectangle is shaded?

a) In this circle it means for every 4 parts we shade 3, so we end up shading 6 out of the 8.

b) 5 out of the 10 parts are shaded so the answer is $\frac{5}{10}$ which simplifies to $\frac{1}{2}$.
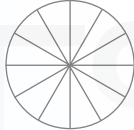
Shade the fraction of each shape.

1.   Shade $\frac{1}{2}$ of the circle.

2.   Shade $\frac{1}{4}$ of the square.

3.   Shade $\frac{5}{6}$ of the rectangle.

4.   Shade $\frac{2}{3}$ of the circle.

5.   Shade $\frac{2}{3}$ of the triangle.

What fraction is shaded? Write the fraction in its simplest form.

6.

7.

8.   _____

9.   _____

10. _____

Application Problems

Complete the diagram so three eighths ($\frac{3}{8}$) is shaded and the rest is unshaded.

Complete the diagram so seven sixteenths ($\frac{7}{16}$) is shaded and the rest is unshaded.
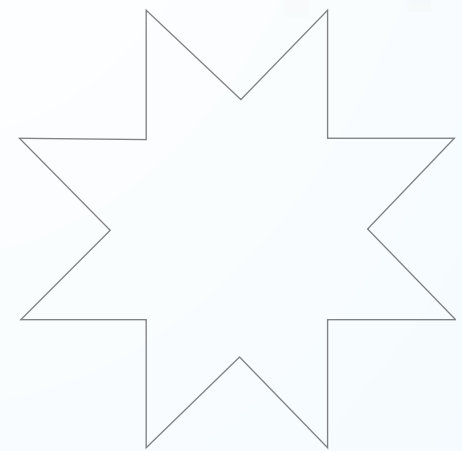
I found this work			Proportion completed					
Easy	OK	Difficult	None	Few	Half	Most	All	Date: _____

Percentages – Word problems involving percentages

Problems **Calculate the following percentage problems and find the answer in the code at the bottom of the page. Each time the answer appears write the letter of the problem to decode the answer to the riddle.**

A A power bill went up $30 from its normal level of $200. What is this increase as a percentage? _____

C A shop is having a sale with 25% off all whiteware. Find the sale price in dollars of a drier marked at $280. _____

D The population of a town increased from 6460 by 5%. What was the increase in population? _____

E 24 of the 32 students in a class passed a mathematics test. What percentage of the students passed the test? _____

F Jeans normally sell at $125 a pair. The shop increases the price by 4%. What is the increase in price? _____

H A teacher has calculated that the probability that a student will be absent from school is 0.1. What percentage of students are absent from school? _____

I In a mathematics competition, 15% of competitors get a merit certificate. If there are 140 competitors at a school, how many would you expect to get a merit certificate? _____

M A soccer ball was advertised at $30 minus 20% discount. What is the sale price of the ball? _____

N From the free throw line a student scores 14 times in every 20 throws. What percentage is this? _____

R There are 18 boys and 12 girls in a class. What percentage of the class are boys? _____

S In the question above there are 18 boys and 12 girls in a class. What percentage of the class are girls? _____

T If a house doubled in price, what would the increase be as a percentage? _____

U During a flu epidemic, 40% of our class of 30 were away ill. How many of the students were away ill? _____

W In hockey a team converted 9 out of 20 penalty corners into goals. What percentage were converted? _____

In the history of mankind, who is the fastest runner?

| 15 | 323 | 15 | 24 | ' | | 10 | 75 | | 45 | 15 | 40 | | 5 | 21 | 60 | 40 | 100 |

| 21 | 70 | | 100 | 10 | 75 | | 10 | 12 | 24 | 15 | 70 | | 60 | 15 | 210 | 75 |

| **I found this work** | **Proportion completed** | |
| Easy   OK   Difficult | None   Few   Half   Most   All | Date: _____ |

Metric Units (Volume, Capacity and Mass) – Conversion of units and application problems

Notes

Abbreviations

Volume		Mass	
cm^3	= centimetre cubed	mg	= milligram
m^3	= metre cubed	g	= gram
		kg	= kilogram

Capacity

mL = millilitre　　　　L = litre

Volume	$1\ 000\ 000\ cm^3 = 1\ m^3$
Capacity	$1\ mL = 1\ cm^3$
	$1000\ mL = 1$ litre
Mass	$1000\ mg = 1\ g$
	$1000\ g = 1\ kg$
	$1000\ kg = 1$ tonne

Problems

Convert to the unit indicated.

1. 2000 mL = _____ (L)

2. 30 000 mL = _____ (L)

3. 700 cm^3 = _____ (mL)

4. 3 L = _____ (mL)

5. 7000 mg = _____ (g)

6. 12 000 g = _____ (kg)

7. 2 kg = _____ (g)

8. 9000 kg = _____ (tonne)

9. 3 tonnes = _____ (kg)

10. 1 tonne = _____ (g)

For each item below circle the best estimate of its measure from the list given.

11. The mass (weight) of a new pencil.

　　3 g　　　　30 g　　　　300 g　　　　3 kg

12. The volume of a classroom.
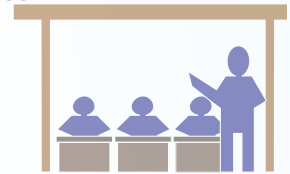
　　120 m^3　　　40 m^3

　　10 m^3　　　2 m^3

13. The mass (weight) of a litre of water.

　　1000 mg　　　1 g

　　1 kg　　　1 tonne

14. The capacity of a can of cola.

　　2 L　　　　750 mL

　　340 mL　　　80 mL

15. The mass (weight) of a new baby.

　　8 g　　　750 g　　　3 kg　　　11 kg

Application Problem

Find the total mass (weight) in kilograms of the ingredients of this wedding cake prior to cooking.

Butter	500 g	_____
Brown Sugar	700 g	_____
Spices	25 g	_____
Flour	500 g	_____
Dried fruit	3 kg	_____
Eggs	600 g	_____
Liquid	50 g	_____
TOTAL		_____

I found this work　　　Easy　　OK　　Difficult

Proportion completed　　None　Few　Half　Most　All

Date: _____

Measurement Crossnumber
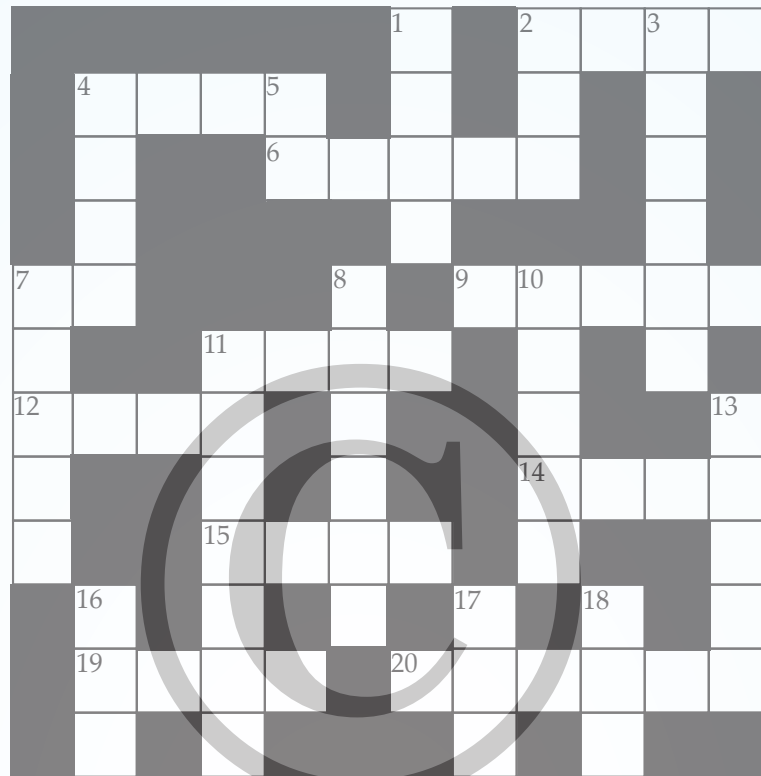
All measurements have units and are written in CAPITALS.

ACROSS

2. 7:35 pm in 24 hour time.

4. Add 3 hours to 1045 hours in 24 hour time.

6. If 5 students shared a 1 L bottle of cordial, how many millilitres will they get each?

7. How many seconds in a minute?

9. Convert 4500 mm to centimetres.

11. The time in seconds to run 1 km if you run at an average speed of 100 m in 27 seconds.

12. Find (in 24 hour time) the finishing time of a film that starts at 2030 and lasts 2 hours and 25 minutes

14. Change 1:30 am to 24 hour time.

15. A triangle has sides of 30 mm, 45 mm and 55 mm. Find its perimeter in centimetres.

19. A sheet of plywood is 0.2 cm thick. How many centimetres thick will 300 sheets be?

20. A bottle of drink contains 2 L. How many millilitres is that?

DOWN

1. If there are 10 sausages in a kilogram, how much in grams would each sausage weigh?

2. How many litres are needed for 50 drinks of 200 mL each?

3. A netball court is 30 m long. How many centimetres is that?

4. Midday in 24 hour time.

5. The number of weeks in a year.

7. Find the circumference of a circle with a diameter of 2 m to 2 dp.

8. Convert 10.25 m to centimetres.

10. Convert 5 kg to grams.

11. Find the circumference of a circle with a radius of 4 cm to 2 dp.

13. A bottle contains 1.5 L. If you pour it into 15 glasses, how many millilitres is there in each glass?

16. The number of days in a year.

17. Convert 8000 cm to metres.

18. How many 5 mL teaspoons are there in a litre?

I found this work

Easy   OK   Difficult

Proportion completed

None   Few   Half   Most   All

Date: _____

Solve Linear Equations (Two steps) – Solving simple linear equations involving 2 or more steps

Example

Solve $4x + 3 = 15$

We use subtraction to remove the 3 and then divide by 4 to leave x on one side.

$$4x + 3 - 3 = 15 - 3$$
$$4x = 12$$
$$\frac{4x}{4} = \frac{12}{4}$$
$$x = 3$$

Problems

Solve each of the following equations.

For questions 1 – 5, use trial and error OR ask yourself '2 x what + 3 = 7?' etc.

1. $2 \times \boxed{} + 3 = 7$ $\boxed{} =$ _____

2. $4 \times \boxed{} + 1 = 17$ $\boxed{} =$ _____

3. $6 \times \boxed{} - 2 = 4$ $\boxed{} =$ _____

4. $8 \times \boxed{} - 4 = 20$ $\boxed{} =$ _____

5. $2 \times \boxed{} + 2 = 8$ $\boxed{} =$ _____

6. $3x + 4 = 13$

7. $2x - 5 = 9$

8. $5x + 1 = 36$

9. $6x - 3 = 45$
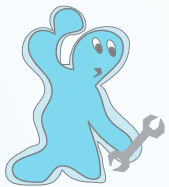
Application Problem

A goldfish costs $x and a packet of fish food $5.

Jason buys two goldfish and one packet of fish food and it costs him $13 in total.
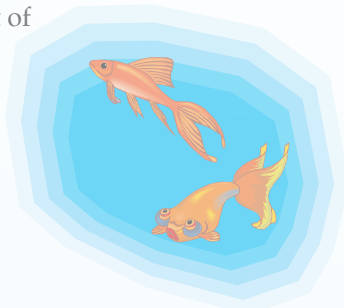
Write an equation for this information and solve it to find the cost of a single goldfish.

I found this work

Easy   OK   Difficult

Proportion completed

None   Few   Half   Most   All

Date: _____

Graphing Points – Plotting co-ordinate pairs on a full Cartesian graph

Example

Plot and label the following points on the grid provided.

A(3, 0)   B(6, 2)   C(0, 7)   D(1, 5)

Note: we always look along the x axis first and then the y axis when plotting points.

One way of remembering this is that *x comes before y in the alphabet* OR *a plane goes along the runway before going up in the air.*

Problems
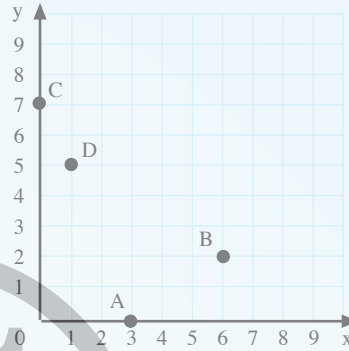
1. Find the letter at each coordinate to work out the answer to the riddle.

What's worse than finding a maggot in your apple?

___ ___ ___ ___ ___ ___ ___
(5, 4) (14, 13) (1, 8) (12, 9)(14, 13) (1, 8) (7, 14)

___ ___ ___ ___   ___
(7, 7) (1, 14) (8, 3) (5, 4)   (1, 14)

___ ___ ___ ___ ___ ___
(9, 13) (1, 14)(7, 14) (7, 14)(4, 10) (14, 6)

2. Plot the following points on the grid below and join them up to complete the coordinate diagram.

(2, 0) to (3, 3) to (6, 3) to (6, 0) to (9, 0) to (8, 1) to (8, 3) to (9, 4) to (8, 4) to (6, 6) to (5, 5) to (5, 8) to (7, 8) to (7, 10) to (5, 10) to (5, 8) to (4, 7) to (3, 6) to (3, 3) to (1, 7).

Its a breeze!!

I found this work

Easy   OK   Difficult

Proportion completed

None   Few   Half   Most   All

Date: _____

Year 9 Geometry Achievement Standard	
Assessment Criteria	**Explanatory Notes**
ACHIEVEMENT • Perform simple transformations. • Solve simple angle problems. • Produce a drawing representing a three-dimensional shape.	**Assessment will be based on a selection from:** • Reflecting objects in horizontal and vertical lines • Identifying the axes of symmetry of a shape • Rotating objects by a half or quarter turn • Identifying the order of rotational symmetry of a shape • Translating objects given instructions • Drawing tessellations • Using a protractor to find the size of unknown angles • Finding unknown angles at a point, on a line, in a triangle, in a rectangle and on parallel lines • Drawing top, front and side views of a model made from cubes • Drawing a net and making a model given the plan and the measurements.
MERIT • Perform and describe transformations. • Solve simple angle problems and give reasons. • Produce a representation of a simple three-dimensional shape. • Carry out simple instructions.	**Assessment will be based on a selection from:** • Reflecting objects in any mirror line, including 2-way reflections • Finding the centre of rotation when the angle of rotation is 90° or 180° • Describing reflection, rotation and translation • Identifying invariant properties from a list • Using a protractor to solve bearing problems • Solving one-step angle problems with reasons • Making a model using cubes given front, top and side views • Isometric drawings of a simple shape made of cubes • Drawing a net and making a model given the measurements • Constructing any triangle, angle bisector or perpendicular bisector.
EXCELLENCE • Demonstrate an understanding of drawing techniques associated with geometry. • Calculate angles giving reasons.	**Students will be expected to:** • Identify the invariant properties of the isometries • Draw more complicated isometric drawings • Use constructions to draw a net and make a model • Solve 2-step angle problems • Explain why a shape tessellates. © NZAMT (New Zealand Association of Mathematics Teachers) www.nzamt.org.nz.

Translation – Translating objects given instructions

Example

Translate the train below 3 units to the right and 2 units down.

Each point of the train has been moved 3 units to the right and 2 units down.

Original

Image →

Problems Translate each of the letters below in the described direction. When completed they should form the answer to the riddle:

What do you call a camel with no hump?

6 units to the left
and 8 units down

H

7 units to the right
and 7 units down

R

2 units to the left
and 4 units down

U

8 units to the left
and 4 units down

P

4 units to the right
and 2 units down

M

3 units to the left
and 2 units down

H

10 units to the right
and 2 units up

Y

4 units to the left
and 2 units up

E

Statistical Investigation – Collecting data to investigate a given question

Question   To explore the relationship between the length from a person's elbow to their wrist and whether it can be used as an estimate of the length of the person's foot.

Data Collection   Select a sample of 10 people. Measure the length (to the nearest cm) from the person's elbow to their wrist and record it in the table below (use their right arm). Measure the length (rounded to the nearest cm) of the person's foot, from the heel to the toe and record it in the table below (use their right foot). Remember there should be an arm and foot measurement for each person. Do NOT mix them up.

Organise Data

Person	1	2	3	4	5
Elbow to wrist (cm)					
Length of foot (cm)					
Person	6	7	8	9	10
Elbow to wrist (cm)					
Length of foot (cm)					

Graphing Data   One way we can find out whether there is a relationship between the length of a person's arm (elbow to wrist) and the length of their foot is to graph the results on a scatter graph.

For each pair of points you have collected plot them on the graph below. A sample pair of points (28, 26) have been plotted to help you.

Scatter Graph - Foot / Elbow-wrist
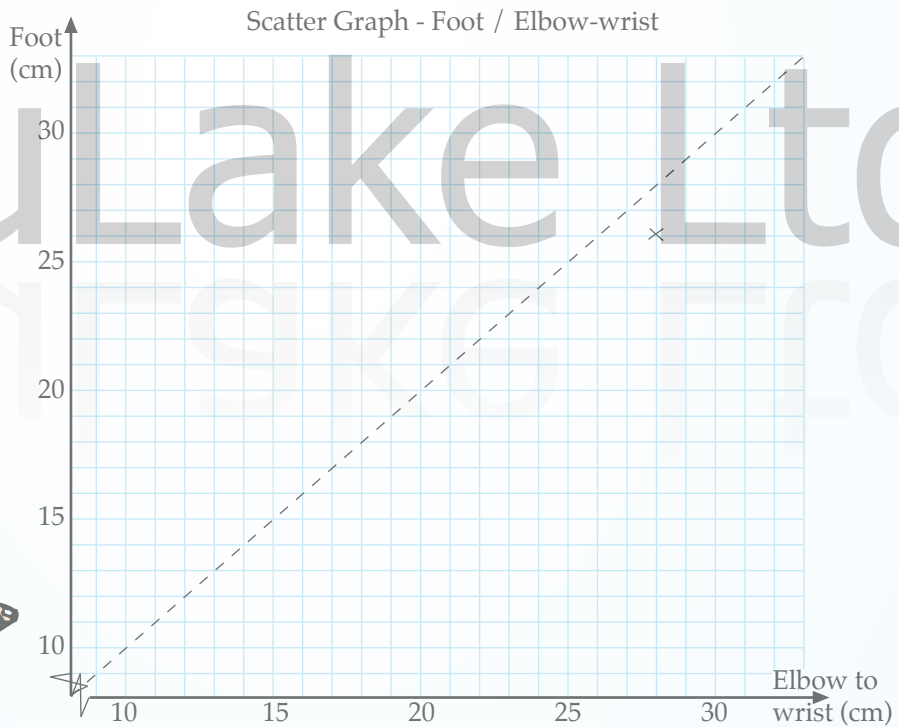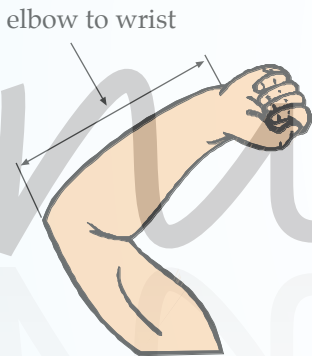
Conclusion   If the crosses 'hug' the straight line drawn on the graph there is a good relationship, if not there is a poor relationship. What are your conclusions? Compare your results with the rest of the class.

I found this work   **Proportion completed**

Easy   OK   Difficult   None   Few   Half   Most   All   Date:

Pie Graphs – Displaying data appropriately and answering questions relevant to graphs

Example

A block of land is planted in native trees. The following number and type of trees were planted.

Rimu 120   Totara 140

Kauri 100   Tawa 200

Pohutakawa 160

Draw a pie graph to represent the native trees planted on the block of land.

Note. We calculate the required angle of each sector by using the formula $\dfrac{item}{total}$ x 360° = angle

Native trees

$\dfrac{120}{720}$ x 360° = 60°
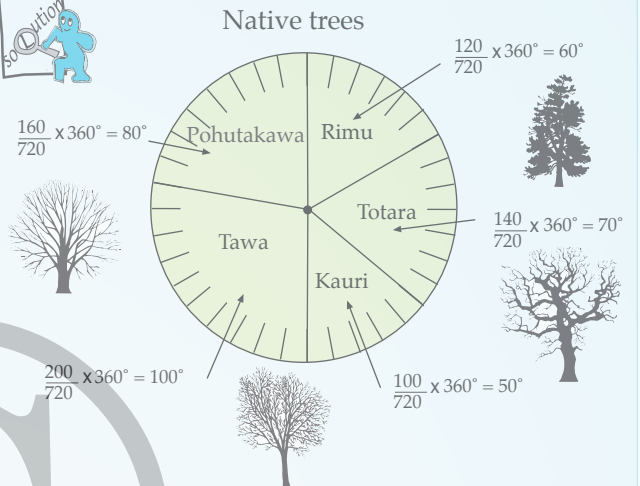
$\dfrac{160}{720}$ x 360° = 80°

$\dfrac{140}{720}$ x 360° = 70°

$\dfrac{200}{720}$ x 360° = 100°

$\dfrac{100}{720}$ x 360° = 50°

Jane earns $90 a week working at the supermarket after school and at the weekends. She spends her money as follows:

$20 Clothing $10 Entertainment

$30 Food $10 Savings

$20 Music

1. Calculate the following.

Clothing $\dfrac{20}{90}$ x 360° = 80°

Entertainment $\dfrac{10}{90}$ x 360° = _____

Food $\dfrac{30}{90}$ x 360° = _____

Savings $\dfrac{10}{90}$ x 360° = _____

Music $\dfrac{20}{90}$ x 360° = _____

2. Complete the pie graph below of how Jane spends her money.

Jane's spending

Clothing

180 Year 8 students were asked what musical instrument they play best. The results are shown in the pie graph below.

Studying music

None   Piano   Violin   Drums   Guitar
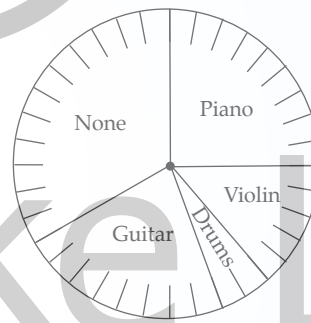
3. What fraction of students do not play a musical instrument?

_____

4. How many of the 180 Year 8 students do not play a musical instrument?

_____

5. How many students play the drums best?

_____

6. What fraction of students play a stringed instrument (violin or guitar) best?

_____

7. How many students play the piano best?

_____

I found this work   **Proportion completed**

Easy   OK   Difficult   None   Few   Half   Most   All   Date: _____

Whole Number – Applications

Calculate <u>without a calculator</u> and find the answer in the code at the end of the problems. Each time the answer appears write the letter of the problem to decode the answer to the riddle.

A There are 29 students in each form class and the school has 31 form classes. Find the total number of students.

B One family has to sell 72 raffle tickets between them. There are 4 members of the family, so how many tickets do they each need to sell?

E How many email letters did I get last week if I got 6 on Monday and Thursday, 4 on Tuesday, 8 on each day of the weekend and 7 on each of the other two days?

H Jim needs a $1000 towards buying a new car. He has saved the following amounts over the last six months. $121, $64, $89, $135, $105, $78. How many more dollars must he save?

I If you have $81 in the bank and each week you take out $27, how many dollars do you have left after two weeks?

L A match box typically has 50 matches. How many matches would you expect in a carton of 12 boxes?

N A high school has 81 students in year 9, 77 in year 10, 101 in year 11 and 75 in year 12. The total number at the school is 412. How many students are in year 13?

O If I save $11 a week for the 52 weeks of the year, how many dollars will I have saved?

P 144 lollies are shared evenly among 6 friends. How many sweets do they get each?

R There are 24 hours every day and 365 days in a year. How many hours are there in a year?

S The bequest of Grandma Jean left $1500 to be split evenly between her 2 daughters and 4 grandchildren. How many dollars will each get?

T How many seconds are there in an hour?

U I work 8 hours a day for 5 days a week. How many hours will I work in a 49 week year?

X What do all the numbers from 1 to 10 add to?

What happened to the man who tried to blow up his car?

| 408 | 46 | | 18 | 1960 | 8760 | 78 | 3600 | | 408 | 27 | 250 | | 600 | 27 | 24 | 250 |

| 572 | 78 | | 3600 | 408 | 46 | | 46 | 55 | 408 | 899 | 1960 | 250 | 3600 | | 24 | 27 | 24 | 46 |

I found this work   Proportion completed

Easy   OK   Difficult   None   Few   Half   Most   All   Date: _____

Page 24 Percentages of Amounts

1. 45 litres
2. $1.10
3. $18
4. $102
5. $2.80
6. $256
7. 6630
8. 352 girls
9. $70 000
10. 9 calls
11. $9
12. 16.5 hours
13. 288 students

Page 25 Quantity as a Percentage

1. 90%
2. 47.5%
3. 65%
4. 16%
5. 35%
6. 76%
7. 37.5%
8. 70%
9. 60%
10. 80%
11. 90%
12. 62.5%
13. 60%
14. 37.5%

Page 26 Percentages

A 15%
C $210
D 323
E 75%
F $5
H 10%
I 21
M $24
N 70%
R 60%
S 40%
T 100%
U 12
W 45%

ADAM, HE WAS FIRST IN THE HUMAN RACE

Page 27 Standard Form

1. 1.23×10^5
2. 3.0×10^{11}
3. 4.05×10^4
4. 9.87×10^1
5. 4.2×10^0
6. 1.26×10^7
7. 4.6×10^6
8. 1.92×10^6
9. 6.57×10^5
10. 3.942×10^9

Fun Spot

Soul music.

Page 28 Number Crossnumber

Page 29 Number Review

1. a) 2.233
   b) 3.93
   c) 30.16
   d) 0.84
2. $415.24
3. 67, 71, 89, 2 and 47
4. a) 19   b) 6

5. a) 8   b) 8
6. a) 14.46   b) 0.035
7. a) 0.8   b) 1.25
8.

	Fraction	Decimal	Percent
a)	$\frac{3}{4}$	0.75	75%
b)	$\frac{9}{10}$	0.9	90%
c)	$\frac{1}{5}$	0.2	20%
d)	$\frac{1}{2}$	0.5	50%

9. a) $\frac{1}{4}$ b) $\frac{4}{5}$
10. Completed $\frac{7}{10}$. To go $\frac{3}{10}$
11. a) 75%   b) 70%
12. a) $6   b) 120 km
13. 4.5×10^8
14. 1.24×10^7

Page 98 Time Series Graphs

1. 60°C

2. 100° C

3. 4 minutes.

4. 80° C

5. Height (mm) — Plant growth
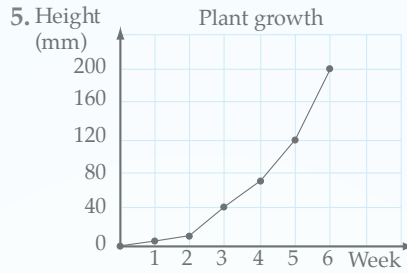
6. 70 mm

7. 50 mm

8. 160 mm

9. 6th week, 80 mm.

Page 99 Statistics Crossword
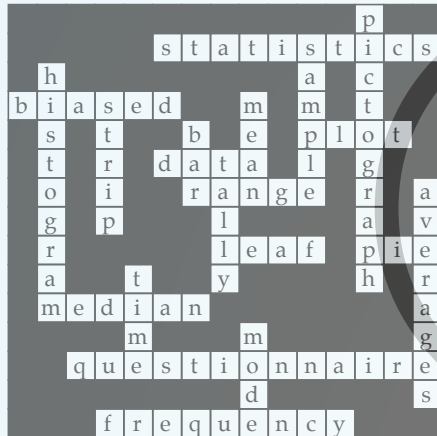
Page 100 Statistics Review

1. 40 mm

   20 mm

   50 mm

   35 mm

   25 mm

   65 mm

   45 mm

   a) 20, 25, 35, 40, 45, 50, 65

   b) mean = 40 mm
   median = 40 mm
   range = 45 mm

2.

Fast food sold/hour	Tally	Frequency
chicken	‖‖	5
burger	‖‖ ‖	7
fish	‖‖ ‖‖ ‖	11
chips	‖‖ ‖‖ ‖‖	15
hotdog	‖‖ ‖	4
fritter	‖ ‖	2
TOTAL	44	44

   b) chips

   c) $\dfrac{4}{44}$ or $\dfrac{1}{11}$

3. a) 38 000 books

   b) 1 000 books

   c) $\dfrac{29000}{38000}$ or $\dfrac{29}{38}$

4.

   Matt's revising