

# Mathematics

Year 8  
Satisfactory

## WORK SAMPLE PORTFOLIO

Annotated work sample portfolios are provided to support implementation of the Foundation – Year 10 Australian Curriculum.

Each portfolio is an example of evidence of student learning in relation to the achievement standard. Three portfolios are available for each achievement standard, illustrating satisfactory, above satisfactory and below satisfactory student achievement. The set of portfolios assists teachers to make on-balance judgements about the quality of their students' achievement.

Each portfolio comprises a collection of students' work drawn from a range of assessment tasks. There is no pre-determined number of student work samples in a portfolio, nor are they sequenced in any particular order. Each work sample in the portfolio may vary in terms of how much student time was involved in undertaking the task or the degree of support provided by the teacher. The portfolios comprise authentic samples of student work and may contain errors such as spelling mistakes and other inaccuracies. Opinions expressed in student work are those of the student.

The portfolios have been selected, annotated and reviewed by classroom teachers and other curriculum experts. The portfolios will be reviewed over time.

*ACARA acknowledges the contribution of Australian teachers in the development of these work sample portfolios.*

## THIS PORTFOLIO: YEAR 8 MATHEMATICS

This portfolio provides the following student work samples:

- Sample 1 Number and measurement: Food pyramids
- Sample 2 Number: Feed the family
- Sample 3 Statistics: Books, cricket and pets
- Sample 4 Algebra: Linear relationships in the real world
- Sample 5 Geometry: Sorting quadrilaterals
- Sample 6 Number: Ratios
- Sample 7 Number: Halfway
- Sample 8 Algebra: Solving linear equations
- Sample 9 Statistics: Venn diagrams and two-way tables
- Sample 10 Measurement: Circumference and area
- Sample 11 Measurement: Rain on the roof
- Sample 12 Number and measurement: Investigating circles
- Sample 13 Geometry: Congruence
- Sample 14 Measurement: Perimeter and area
- Sample 15 Number: Integers
- Sample 16 Number: Percentages

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# Mathematics

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This portfolio of student work shows the solving of everyday problems involving rates, ratios and percentages (WS1, WS2, WS6, WS16), including those involving profit and loss (WS16). The student uses efficient mental and written strategies to carry out the four operations with integers (WS15) and describes rational numbers (WS7). The student explains issues related to the collection of data and the effect of outliers on means and medians in that data (WS3). The student solves linear equations (WS8) and graphs linear relationships on the Cartesian plane (WS4). The student deduces the properties of quadrilaterals (WS5), names the features of circles and calculates the areas and perimeters of plane shapes including circles (WS10, WS12, WS14). The student solves problems relating to the volume of prisms (WS11). The student investigates the conditions for congruence and applies these conditions to triangles (WS13). The student models authentic situations with two-way tables and Venn diagrams (WS9).

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# Mathematics

Year 8  
Satisfactory

## Number and measurement: Food pyramids

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

*By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They recognise index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data.*

*Students use efficient mental and written strategies to carry out the four operations with integers. They simplify a variety of algebraic expressions. They solve linear equations and graph linear relationships on the Cartesian plane. Students convert between units of measurement for area and volume. They perform calculations to determine perimeter and area of parallelograms, rhombuses and kites. They name the features of circles and calculate the areas and circumferences of circles. Students determine complementary events and calculate the sum of probabilities.*

### Summary of task

Students were given this task to consolidate previously studied units on rates, ratios and percentages.

# Mathematics

Year 8  
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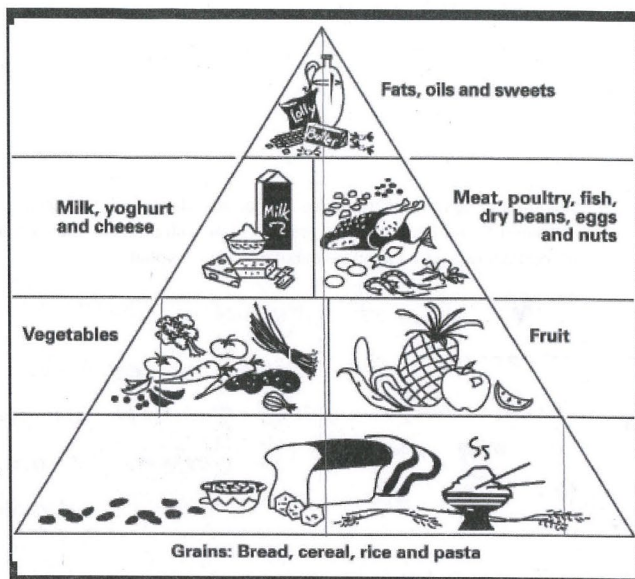
## Number and measurement: Food pyramids

### 9. Food Pyramids

This “pyramid” is used to offer advice to people about what amounts of different kinds of food they should eat each day.

The larger the area of the region, the more of that kind of food is recommended.

So, for example, people are encouraged to eat lots of grains, but very little fats, oils and sweets.



1. By finding the area of particular sections of the “pyramid”, state the recommended percentages of the total daily diet which should be allocated to:

- fats, oils, and sweets;

$$3.2 \times 2.6 \times \frac{1}{2} = 4.16$$

$$12.4 \times 10 \times \frac{1}{2} = 62$$

$$4.16 \times 100 \div 62 = 6.7\%$$

- vegetables;

$$2.5 \times 3.5 = 8.75$$

$$2.5 \times 1.5 \times \frac{1}{2} = 1.875$$

$$8.75 + 1.875 = 10.625$$

$$10.625 \times 100 \div 62 = 17.14\%$$

### Annotations

*Splits sections into triangles and rectangles to facilitate calculation of area, but does not record lengths as measured.*

*Calculates the areas of the necessary triangles.*

*Demonstrates fluency with percentage calculations but does not interpret the answer in the context of the problem.*

*Splits the trapezium into a rectangle and triangle in order to calculate its area.*

Food Pyramids used by kind permission of NSW Department of Education and Communities. Note: For the purpose of the work sample portfolio, the image has been reduced in size.



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## Number: Feed the family

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### Summary of task

Students were given a task to complete in class time relating to the unit of work they had completed on ratios and scales.

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## Number: Feed the family

### FEED THE FAMILY ON FATHERS DAY

Remember:  
1kg = 1000g

The whole family are coming to your house for Father's Day and you have to cook pancakes for everyone!

This is the recipe to make enough pancakes for 4 people

#### Ingredients

Plain Flour – 200g

Self Raising Flour – 300g

Milk – 200g (200mL)

Egg – 1

1. Write down the **simplified** ratio of

Plain Flour : Self Raising Flour 2 : 3	Milk : Dry ingredients 2 : 5
---	---------------------------------

2. If this feeds a family of 4, **show** how you would calculate what quantities you would need for **20 people**. Put your answers in the table below

(WORKING SPACE)

$200 \times 5 = 800$   
 $300 \times 5 = 1200$   
 $200 \times 5 = 800$   
 $4 \times 1 = 4$

$200 : 300 : 200 : 1 = 700$   
 $700 \div 2 = 35$   
 $35 \times 200 = 7000$   
 $35 \times 300 = 10,500$   
 $35 \times 200 = 7000$   
 $35 \times 1 = 35$

you will need  
 7000g plain flour  
 10,500g self raising flour  
 7000g milk  
 35 eggs

Number of people	Flour	SR Flour	Milk	Eggs
20	<del>200g</del> 1kg 1000g	<del>300g</del> 1.5kg 1500g	<del>200g</del> 1L 1000g	5

### Annotations

Simplifies ratios using given quantities in both a simple and more complex question.

Identifies that original recipe needs to be scaled by a factor of 5.

Corrects answers in table using 5 as the scale factor and converts to larger units of measure.

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## Number: Feed the family

### Annotations

#### 3. Pricing

Items can only be bought in the following quantities

Flour \$3.50 per kg	Flour \$3.50 per kg	Milk \$1 per 1kg (1 litre)	Eggs: packs of 6 for \$4
---------------------	---------------------	----------------------------	--------------------------

- a) How many packets of each item will you have to buy?  
(WORKING SPACE)

	Flour	SR Flour	Milk	Eggs
Packets	1	2	1	1

- b) What is the total cost?

\$15.50

- c) What quantity of each item will be left over?

1 egg & 500g of self-raising flour

4. How many people could you feed for \$50? (WORKING SPACE)

37 people

$$15 \times 2 = 30$$

$$\frac{1}{2} 15 = 7.5$$

$$= 30 + 7.5 = 37.5 = 37$$

5. How would you change the recipe to feed

- a) 60 people 500g more Flour + self-raising

- b) 2 people

Number of people	Flour	SR Flour	Milk	Eggs
60				
2				

How will you manage this?

Calculates number of packets of each ingredient and cost based on answer to question 2 but does not communicate the reasoning used.

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## Statistics: Books, cricket and pets

### Year 8 Mathematics achievement standard

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### Summary of task

Students were given a task to complete in class time relating to the unit of work they had completed on statistical analysis of data and the effects of outliers on the interpretation of data.

# Mathematics

Year 8  
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## Statistics: Books, cricket and pets

### Annotations

Suppose you have a grandmother who gives you one cent on your first birthday. The next year she gives you 3 cents, the following year 9 cents. Each year she triples the amount she gave the year before. Leave all answers correct to two decimal places.

a) How much money would you have on your 14th Birthday?

BIRTHDAY	MONEY
1	1c
2	3c
3	9c
4	27c
5	81c
6	<del>\$1.17</del> \$2.43
7	\$7.29
8	\$65.61
9	<del>\$181.96</del> \$509.49
10	\$1528.47
11	<del>\$428.45</del> \$4585.41
12	\$13756.23
13	\$41268.69
14	<del>\$123806.07</del> \$61921.66
TOTAL	

Calculates mean, median and mode from a list of discrete data.

b) What percentage is the amount of money on your 14<sup>th</sup> birthday to the total money given by your grandmother

$$\frac{61921.66 - 41268.69}{41268.69} \times 100 = 50.05\%$$

Recognises that the outlier would increase the mean but have little effect on the median but is unable to predict the effect on the mode.

You are going to use the money your grandmother gave you to refurbish the study at home. Let us do our homework

#### FLUENCY:

1) Find the selling price of each of the following products from the product catalogue

Item	Cost price	%	Profit/ loss	Selling Price
TV storage combo	\$1796	30%	profit	\$2334.80
Set of 4 draws	\$45.00	75%	loss	\$11.25
Two seat sofa	\$2698.00	33 $\frac{1}{3}$ %	profit	<del>\$1899.75</del> \$3597

# Mathematics

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## Statistics: Books, cricket and pets

2. In a cricket match, Australia scored a total of 347 runs. There were 11 batters.

a) What was the mean number of runs per player?

31

b) Do you know how many runs each batter scored? Why/Why not?

you do not know, because ~~the~~ as each  
get 100 and one could get 5.

c) If you are told that the median score was 36, write down a possible score for each player in the table below.

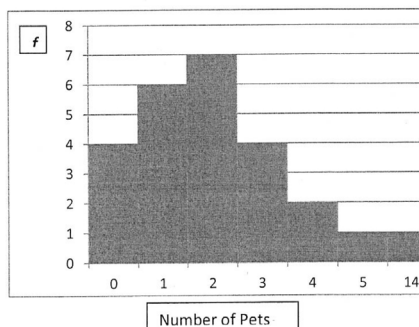
1	1	1	2	36	36	37	38	40	65	90
Batter 1	Batter 2	Batter 3	Batter 4	Batter 5	Batter 6	Batter 7	Batter 8	Batter 9	Batter10	Batter11

3. A survey was taken in a year 8 class asking each student how many pets they had at home.

A frequency distribution histogram was drawn of the results.

a) Fill out the frequency distribution table

x	f	fx
0		4
1		6
2		7
3		4
4		2
5		1
14		1
		59



How many students were surveyed?

25

How many pets were there all together?

59

What is the mean number of pets?

9.8

What is the effect of the outlier?

It adds 14 to the number  
of pets leaving it 59.

WHO MIGHT BE THIS INFORMATION BE USEFUL FOR?

pet owners.

### Annotations

Calculates an approximation for the mean but does not show working.

Demonstrates understanding that the sum of the data values does not provide information about individual data values.

Creates a data set with the correct median and number of values.

Interprets tabulated data to find the number of students surveyed and the total number of pets but is unable to calculate the mean using these numbers.

Recognises 14 as the outlier and understands that it significantly increases the number of pets in the survey but does not connect it to the mean.

# Mathematics

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## Algebra: Linear relationships in the real world

### Year 8 Mathematics achievement standard

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### Summary of task

Students were asked to research the peak rates for taxi hire in the ACT and NSW. The rates at the time are shown in the table below.

	ACT	NSW
Flag fall	\$4.70	\$3.50
Price/km	\$1.90	\$2.14

Students were asked to use their knowledge of graphing and equations to make comparisons between the two sets of information and to use mathematical reasoning to draw conclusions from the investigation.



# Mathematics

Year 8  
Satisfactory

## Algebra: Linear relationships in the real world

### Comparing rates

- Fill in the following tables to compare the Peak rates of NSW and ACT

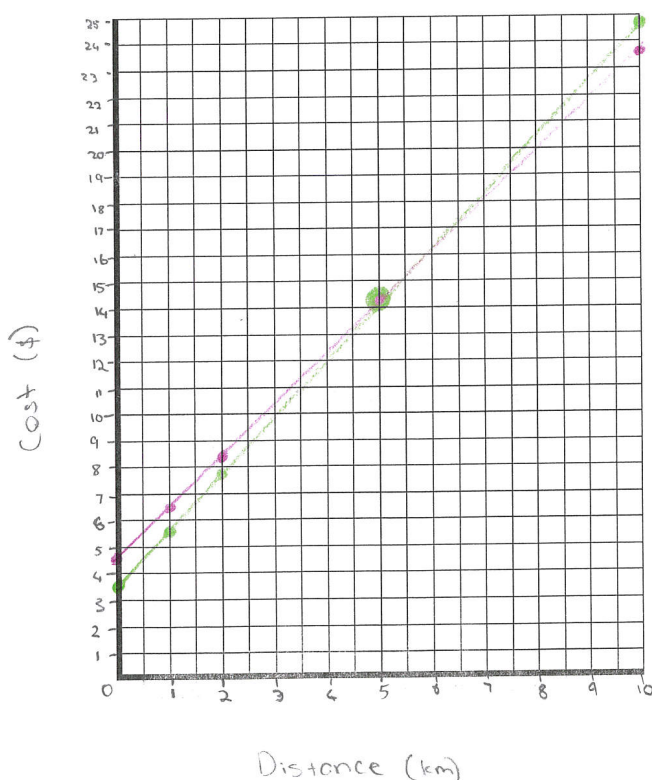
1.9 ACT

Flag rate	Flag + 1km	Flag + 2km	Flag + 5km	Flag + 10km
\$4.70	\$6.60	\$8.50	\$14.20	\$23.70

2.14 NSW

Flag rate	Flag + 1km	Flag + 2km	Flag + 5km	Flag + 10 km
\$3.50	\$5.64	\$7.78	\$14.20	\$24.90

- Plot the two tables on the graph provided, using a different colour for each.



### Annotations

Graphs linear relationships, labelling the axes, units and a key.

# Mathematics

Year 8  
Satisfactory

## Algebra: Linear relationships in the real world

3. Write an Algebraic equation to suit the ACT Taxi rates.  
(Hint: flag rate + price per km = Cost of ride)

$$\begin{aligned} \$4.70 + \$1.90 \text{ p/km} &= C \\ \$4.70 + \$1.90 x &= C \end{aligned}$$

4. Write an Algebraic equation to suit the NSW Taxi rates

$$\begin{aligned} \$3.50 + \$2.14 \text{ p/km} &= C \\ \$3.50 + \$2.14 x &= C \end{aligned}$$

5. Explain how your equations work, in words:

The first number is the flag rate, the second is the price per km. When you add these together you get the cost of ride or C.

6. At which distance does NSW become more expensive than ACT taxis and why?

At 10km NSW becomes more expensive than ACT taxis. This is because if it is cheaper then they need to make more money the farther you go.

7. If you had \$20, how far could you travel in a taxi in the ACT?

8 km (approx)

$$4.70 + 1.90x = 20$$

$$4.70 + 1.90 \times 8 = 19.90$$

### Annotations

Derives correct linear equations from the information given.

Explains the place of the flag rate in the equation but does not include multiplication of the distance by the rate/km in the explanation.

Compares the tables of values of two linear relationships but does not recognise the meaning of the distance at which the costs become equal in the context.

Sets up a correct equation and to solves it to answer the question.

# Mathematics

Year 8  
Satisfactory

## Geometry: Sorting quadrilaterals

### Year 8 Mathematics achievement standard

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### Summary of task

Students were given a task to complete in class time relating to the unit of work they had completed on quadrilaterals. They were required to indicate their reasoning when drawing conclusions.

## Geometry: Sorting quadrilaterals

### 19. Sorting Quadrilaterals

In the table below, sketch a quadrilateral with the properties indicated by each box in the table. Label all right angles and sides that are parallel.

If it is impossible to fill a particular box in the table, write "impossible" and a brief justification for this.

(Two cells in the table have already been completed for you.)

If a particular case is possible, write in the most specific name you can for the quadrilateral you have drawn underneath your drawing (e.g. rectangle, trapezium, etc.)

Number of pairs of parallel sides (exactly)

	0	1	2
0	 kite	 Parallelogram	 Parallelogram
1	 	 	 
2	To have 2 $\angle$ s you would need 2 parallel line IMPOSSIBLE	 	to have 2 parallel lines you would need have more $\angle$ s IMPOSSIBLE
3	to have 3 right angles there would have to be a quadrilateral IMPOSSIBLE		
4	If a quadrilateral has 4 right angles, it must be a square or a rectangle, and that can't have 0 parallel sides. Impossible	Impossible  RECTANGLE	 SQUARE

if a quadrilateral has 4 right angles it must have 2 parallel sides

### Annotations

Demonstrates an understanding of the features of quadrilaterals.

Recognises the constraints of combining the number of right angles and parallel sides in the construction of quadrilaterals.

# Mathematics

Year 8  
Satisfactory

## Number: Ratios

### Year 8 Mathematics achievement standard

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### Summary of task

Students were given a task to complete in class time relating to the unit of work they had completed on reasoning using problem-solving strategies.

# Mathematics

Year 8  
Satisfactory

## Number: Ratios

The ratio of the number of adults to the number of children in a group is 2:5. The ratio of males to females is 10:11.

Explain how this group could be made up, presuming that the group includes at least 1 adult, 1 child, 1 male and 1 female. Use diagrams where appropriate.

2:5 = adults to children  
10:11 = males to females

	Adults	Children
Male		
Female		

\*Other ways to express the ratio:

- 22:55 = 77:3 = 231
- 110:121 = 231
- 6:15 = 21:3 = 63
- 30:33 = 63
- 12:30 = 42:3 = 126
- 60:66 = 126
- 10:25 = 35:3 = 105
- 50:55 = 105

There can be many different numbers of people in the group but to figure this out the formula is:  $(A \times ? + C \times ?) \times 3 = \text{Number of people}$

A = Adults  
C = Children  
? = Any number ~~not~~ number?

\*The number of children + adults must be equal to the number of male/females.  
ALL ANSWERS DIVISIBLE BY 3

## Annotations

Uses a variety of data representations to assist with solving the problem.

Demonstrates that there are numerous solutions to the problem and attempts to find a general solution.

Finds equivalent ratios which satisfy the criteria given in the question.



# Mathematics

Year 8  
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## Number: Halfway

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

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### Summary of task

Students were given a task to complete in class time relating to the unit of work they had completed on rational numbers. The task required students to demonstrate their reasoning and problem-solving skills to answer the questions.



# Mathematics

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## Number: Halfway

A teacher asks "what number is half way between  $\frac{1}{4}$  and  $\frac{1}{6}$  on the number line?"

Kurt answers "5".

"Yes" says the teacher. "So what number is half way between  $\frac{1}{4}$  and  $\frac{1}{6}$ ?"

" $\frac{1}{5}$ " answers Chantelle.

"Think again" says the teacher!

Why was Kurt correct and Chantelle wrong? Explain your answer fully, using your understanding of fractions. What should Chantelle's answer have been? Show this on a number line.

$$\frac{1}{6} = \frac{2}{12} = \frac{4}{24}$$

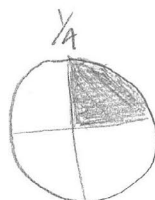
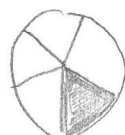
$$\frac{1}{4} = \frac{3}{12} = \frac{6}{24}$$



- After changing the two fractions into twelfths and then twenty-fourths, we can figure out the answers on a number line more easily.



- Chantelle is wrong because  $\frac{1}{5}$  is not exactly in between  $\frac{1}{4}$  and  $\frac{1}{6}$ . It is in fact closer to  $\frac{1}{4}$  than  $\frac{1}{6}$ .



### Annotations

Illustrates relative position of both rational numbers on a number line.

Compares the two rational numbers using equivalent fractions with the same denominator.

Represents rational numbers on a number line but does not ensure that the line segments on the number line are equally spaced.

Reasons that in the rational number system,  $\frac{1}{5}$  is not the midpoint between  $\frac{1}{4}$  and  $\frac{1}{6}$ .

# Mathematics

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## Algebra: Solving linear equations

### Year 8 Mathematics achievement standard

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### Summary of task

Students were given a task to complete in class time after a unit of work on algebraic expansions and solving equations.

# Mathematics

Year 8  
Satisfactory

## Algebra: Solving linear equations

### Algebraic Expressions – Equations

Please expand the expression to solve the equation

$9(d + 6) = 63$ $63 \div 9 = 7$ $7 - 6 = 1 \quad \therefore d = 1$	$8(y + 5) = 80$ $80 \div 8 = 10$ $10 - 5 = 5$ $\therefore y = 5$
$6(f - 10) = 18$ $18 \div 6 = 3$ $3 + 10 = 13$ $\therefore f = 13$	$5(m - 1) = 10$ $10 \div 5 = 2$ $2 + 1 = 3$ $\therefore m = 3$
$4(x + 9) = 56$ $56 \div 4 = 14$ $14 - 9 = 5$ $\therefore x = 5$	$8(4y - 3) = 72$ $72 \div 8 = 9$ $3 + 9 = 12$ $\therefore y = 3$
$2(3t + 5) = 10$ $10 \div 2 = 5$ $5 - 5 = 0$ $\therefore t = 0$	$7(x - 4) = 56$ $56 \div 7 = 8$ $8 + 4 = 12$ $\therefore x = 12$
$3(4x + 3) = 93$ $93 \div 3 = 31$ $31 - 3 = 28$ $28 \div 4 = 7$ $\therefore x = 7$	$10(2a - 3) = 50$ $50 \div 10 = 5$ $3 + 5 = 8$ $\therefore a = 4$
$4(x + 2) = 40$ $40 \div 4 = 10$ $10 - 2 = 8$ $\therefore x = 8$	$7(2z + 1) = 21$ $21 \div 7 = 3$ $3 - 1 = 2$ $\therefore z = 1$
$3(2t - 9) = 15$ $15 \div 3 = 5$ $5 + 9 = 14$ $\therefore t = 7$	$3(3a - 1) = 42$ $42 \div 3 = 14$ $14 + 1 = 15$ $15 \div 3 = 5$ $\therefore a = 5$
$5(2x + 3) = 55$ $55 \div 5 = 11$ $11 - 3 = 8$ $8 \div 2 = 4$ $\therefore x = 4$	$4(p + 7) = 32$ $32 \div 4 = 8$ $8 - 7 = 1$ $\therefore p = 1$

### Annotations

Calculates answers correctly but does not follow instruction to expand first.

Demonstrates an understanding of how to calculate the answer but does not set out steps.

# Mathematics

Year 8  
Satisfactory

## Statistics: Venn diagrams and two-way tables

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

*By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They recognise index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data.*

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### Summary of task

Students had been using Venn diagrams and two-way tables to model information and hence draw conclusions.

Students were required to complete the activity involving Venn diagrams and a two-way table.

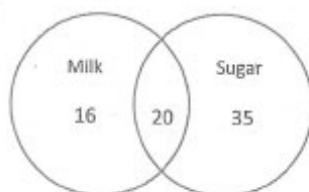
# Mathematics

Year 8  
Satisfactory

## Statistics: Venn diagrams and two-way tables

- Stephen asked 100 coffee drinkers whether they like milk or sugar in their coffee.
- According to the diagram below, how many like

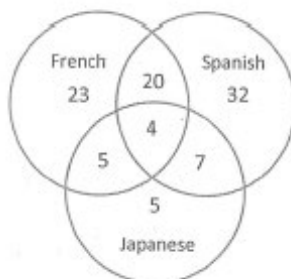
- Milk?
- Sugar?
- Sugar but not milk?
- Milk but not sugar?
- Milk and sugar?
- Milk or sugar?



- a)  $16 + 20 = 36$   
 b)  $20 + 36 = 56$   
 c) 35  
 d) 16  
 e) 20  
 f)  $16 + 20 + 35 = 71$

- From the Venn diagram below how many people study

- French and Spanish
- French, Spanish and Japanese
- French and Japanese



- a) 20  
 b) 4  
 c) 5

- Copy and complete the two-way table for Year 9 transport survey

	Male	Female	Total
Walk	34	46	80
Car	28	17	45
Bus	15	12	27
Cycle	52	17	69
Total	129	92	221

### Annotations

*Interprets and uses information supplied in Venn diagrams.*

*Completes a two-way table from the given information.*

# Mathematics

Year 8  
Satisfactory

## Measurement: Circumference and area

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

*By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They recognise index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data.*

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### Summary of task

Students were given a task to complete in class time after a unit of work on circles.

# Mathematics

Year 8  
Satisfactory

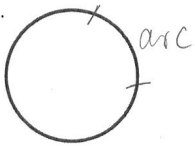

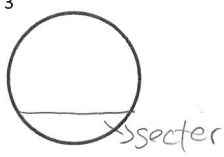
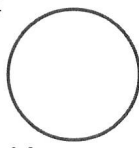
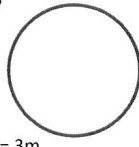
## Measurement: Circumference and area

### Circumference and area of circles

a) on one of the circles label:

- I. an arc
- II. a sector
- III. a segment

b) Calculate the circumference and area of each of the given circles

1.  r=2 cm	C= $2 \times \pi \times 2$ 12.6 cm  A= $3.14 \times 2^2$ 12.6 cm
2.  r=1.5 cm	C= $2 \times \pi \times 1.5 = 9.42 \text{ cm}$  A= $\pi \times 2.25 = 7.07 \text{ cm}$ $1.5^2 = 2.25$
3.  r=1.4 m	C= 8.80 m  A= $\pi \times 1.96 = 6.16 \text{ m}$ 1.96
4.  r=3.6 mm	C= 22.62 mm  A= 40.72 mm
5.  r= 3m	C= 18.85 m  A= 28.27 m

### Annotations

Identifies and labels an arc but confuses segment and sector.

Performs calculations correctly but states incorrect units for area and provides no evidence about how the answers were rounded.



# Mathematics

Year 8  
Satisfactory

## Measurement: Rain on the roof

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

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### Summary of task

Students were given a task to complete in class time after a unit of work on volume.

# Mathematics

Year 8  
Satisfactory

## Measurement: Rain on the roof

### Rain on My Roof

Typical roof areas:

Home Type	Roof area(m <sup>2</sup> )
2 bedroom home	100
3 bedroom home	150
4 bedroom home	200
5 bedroom home	250

Assume the roof is flat. (This makes little difference to the amount of rain collected).

From the table, choose a home.

Using your choice of home, calculate the amount of rainwater in litres (L) collected by the roof of your chosen home when one millimetre (1mm) of rain falls.

My choice of home: 3 bedroom

Calculations:

$$1\text{m}^3 = 1000\text{L} \therefore 150\text{m}^2 = 150000\text{L}$$

$$150000 \times 0.001 = 150$$

Amount of rainwater collected by the roof when 1mm of rain falls is 150 L

### Annotations

Calculates an answer which is correct.

Answers the question for their choice of house.

# Mathematics

Year 8  
Satisfactory

## Number and measurement: Investigating circles

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

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### Summary of task

Students had been learning about the concept of irrational numbers, including  $\pi$ , and the relationship between the circumference of a circle and the radius.

The students were asked to investigate the relationship between the circumference and the diameter of a circle by measuring a variety of circular objects. They were given one week to complete the task.

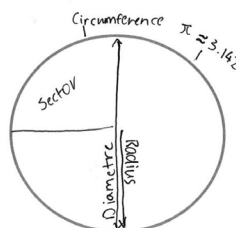
# Mathematics

Year 8  
Satisfactory

## Number and measurement: Investigating circles

### Year 8 Task One: Investigating Circles

1. Label the diagram of the circle to the right including all the important features you know.



2. (a) Use an appropriate method to measure the circumference and the diameter of the circular objects below.  
(b) Represent the ratio circumference : diameter in the form of a:1  
(c) Summarize your findings

Object	Circumference	Diameter	Circumference:Diameter
	160 cm	54 cm	160 : 54 2.96 : 1
	164 cm	60 cm	164 : 60 2 <sup>11</sup> / <sub>15</sub> : 1
	620 cm	<del>98 cm</del> 98.60 cm = 99 cm	<del>620 : 98</del> 620 : 99 6 <sup>16</sup> / <sub>9</sub> : 1

### Annotations

*Names and indicates some parts of a circle.*

*Measures the circumference and diameter of a variety of circular objects but with some inaccuracies.*

*Determines the ratio of the circumference to the diameter and writes it in the form a:1.*

# Mathematics

Year 8  
Satisfactory

## Number and measurement: Investigating circles

Fire hose thing - We used string to measure the circumference and we used the measuring tape to measure the diameter.

Pedestrian sign - ~~Wado~~ We used the same method as the fire hose

Tree garden circle - We used a trundle wheel to find the ~~ph~~ circumference and string to find the diameter.

### Is Circular Drive Circular?

Design and conduct an investigation to determine whether the concrete boundary of Circular Drive is a perfect circle.



$$\frac{\text{Circumference}}{\pi} = d$$

$$d = \frac{74}{\pi}$$

$$d = 23.55$$

23 m - Diameter

74 m - Circumference

We used a trundle wheel to measure the whole circumference and string to measure the diameter. I believe this circle is a perfect circle ~~because~~ because it is 23.55m when I divided it on the calculator, and we got 23m for the diameter, so it's very close

### Annotations

States which instruments were used to measure the circumference and diameter of each object.

Obtains reasonable measurements for the diameter and circumference, and applies the circumference formula to calculate the expected diameter using their measurement of the circumference.

Concludes that the drive is circular by observing that the calculated value of the diameter is approximately equal to their measurement of the diameter.

# Mathematics

Year 8  
Satisfactory

## Geometry: Congruence

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

*By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They recognise index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data.*

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### Summary of task

Students had completed a unit of work on congruence in which they used transformations to create congruent figures and investigated the conditions for the congruence of triangles.

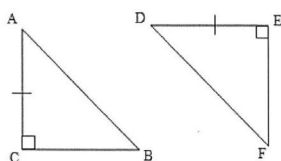
Students were asked to demonstrate and apply their knowledge of transformations and the conditions for the congruence of triangles. They completed the task in class under exam conditions.

# Mathematics

Year 8  
Satisfactory

## Geometry: Congruence

- 1 Identify the matching side and angles in these congruent triangles.

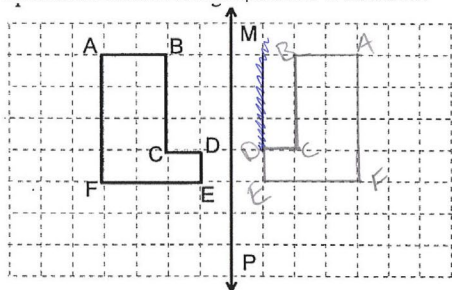


$$BC = \underline{FE}$$

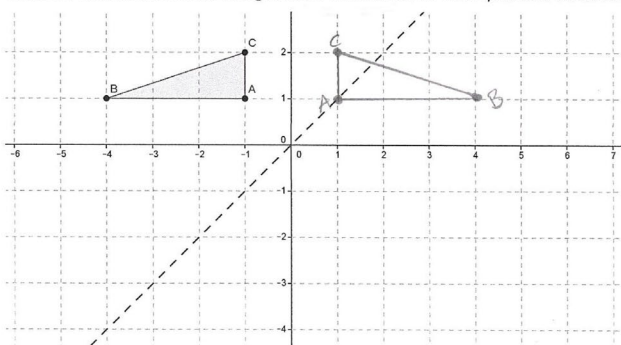
$$\angle ABC = \underline{DEF}$$

$$\angle ACB = \underline{DEF}$$

- 2 Construct the reflection of the shape ABCDEF in the line MP.



- 3 Construct the reflection of the triangle ABC in the dotted line. Label your new vertices A', B' and C'.



### Annotations

Identifies and names corresponding sides and angles of congruent triangles in matching order.

Reflects a figure in a vertical axis.

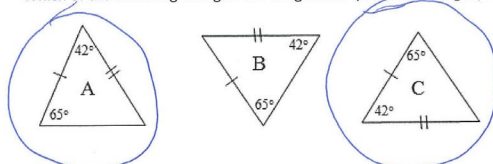


# Mathematics

Year 8  
Satisfactory

## Geometry: Congruence

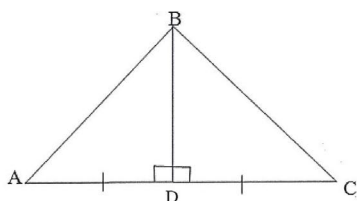
- 4 a Which of the following triangles are congruent? (Circle two triangles; diagrams are not to scale.)



- b Which test shows they are congruent?

SAS.

- 5 Consider the following diagram.



- a Which of the following congruence statements has the correct vertex order?

$\triangle ABD \equiv \triangle DCB$

$\triangle ABD \equiv \triangle DBC$

$\triangle ABD \equiv \triangle CDB$

$\triangle ABD \equiv \triangle CBD$

- b Which congruence test shows that the two smaller triangles are congruent?

RHS.

- c Explain your answer to (b).

They both have, there is a right angle, hypotenuse and side.  $\therefore$  it is RHS.

- d What kind of triangle is  $\triangle ABC$ ? Explain your answer.

### Annotations

Selects a pair of congruent triangles.

States an appropriate test that can be used to show that the triangles are congruent.

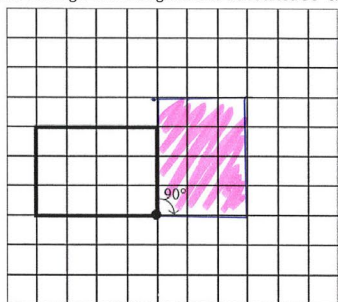
Attempts to identify the correct test for congruency but makes an incorrect assumption.

# Mathematics

Year 8  
Satisfactory

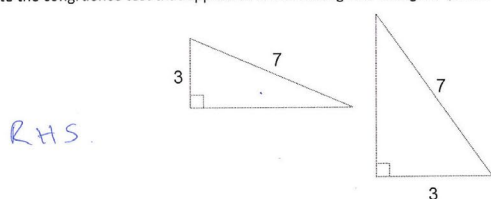
## Geometry: Congruence

- 6 The rectangle in the diagram is to be rotated  $90^\circ$  clockwise about the marked point.



Draw the resulting rectangle inside the diagram.

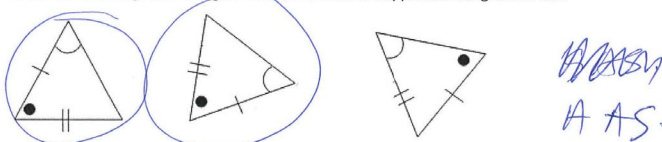
- 7 a State the congruence test that applies to the following two triangles. (The diagram is not to scale.)



- b Explain how the two triangles above could instead be proved congruence by the SSS test.

They could be proved congruence, as two sides are labelled with the exact same measurement. This means <sup>that</sup> the <sub>3rd</sub> connecting side of triangles must be of the same measurement. This is how the two triangles could be proved congruence by the SSS test.

- 8 Circle the two congruent triangles below, and state the applicable congruence test.



### Annotations

Rotates a figure by the desired angle about a given centre of rotation.

Attempts to explain how a different congruency test could be used to prove the triangles are congruent but does not make a connection to Pythagoras' Theorem.

Identifies the two congruent triangles and states a test that can be used to show that the triangles are congruent.

# Mathematics

Year 8  
Satisfactory

## Measurement: Perimeter and area

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

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### Summary of task

Students completed a unit of work on finding the perimeter and area of a range of two-dimensional shapes.

The task required students to answer a number of questions related to the perimeter and area of a range of two-dimensional shapes, including circles. Students were asked to apply their skills to some real-world problems. They completed the task under exam conditions in class time.

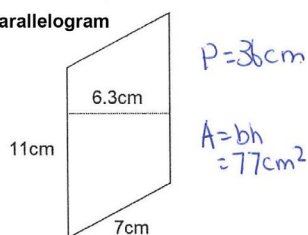
# Mathematics

Year 8  
Satisfactory

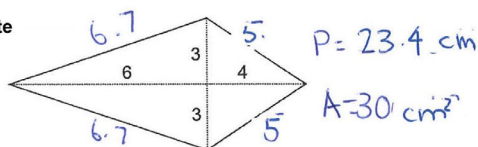
## Measurement: Perimeter and area

- 1 Calculate the perimeter and area of these shapes. Be sure to include units. Make your answers clear. Unless otherwise specified, all measurements given are in centimetres.

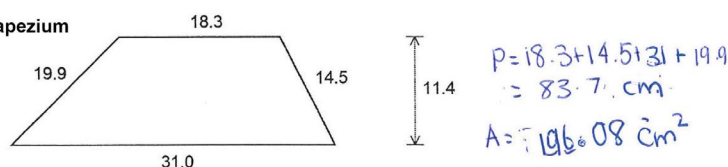
a Parallelogram



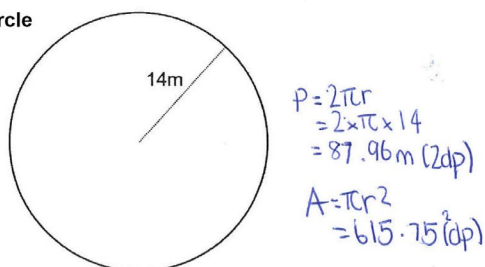
b kite



c Trapezium



d Circle



### Annotations

Determines the perimeters of various plane shapes.

Uses Pythagoras' Theorem to calculate the lengths of unknown sides in order to determine the perimeter.

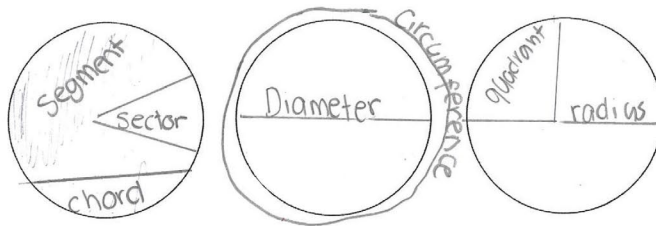
Determines the areas of some plane shapes.

# Mathematics

Year 8  
Satisfactory

## Measurement: Perimeter and area

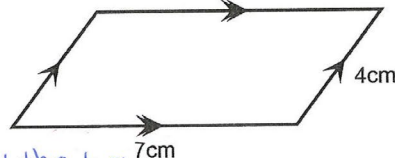
- 2 Using the three circles below, draw and label all the parts of a circle that you know.



### Annotations

*Draws and names most parts of a circle.*

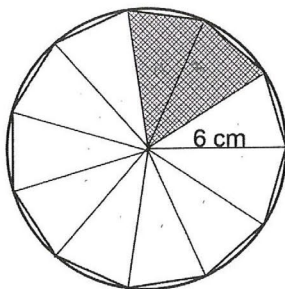
- 3 Explain why it is not possible to find the area of this shape.



*It doesn't display the height of the shape*

*Provides an explanation for why an area cannot be determined.*

4



A reasonable estimate for the shaded area is (in  $\text{cm}^2$  – circle one)

12      16      20      25

Explain your answer.

*Because there is 11 sectors you divide 11 with 360 to get 32.72, you then to do the formula of a sector the double it*

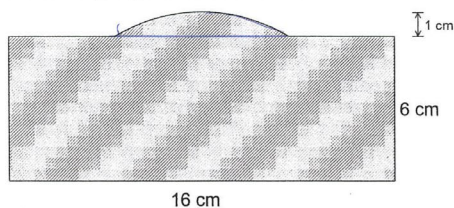
*Explains how to give a reasonable estimate for the shaded area.*

# Mathematics

Year 8  
Satisfactory

## Measurement: Perimeter and area

- 5 The following diagram is drawn to scale.



Estimate the shaded area (nearest  $\text{cm}^2$ ), explaining your answer (with words and/or diagrams).

$A = 97 \text{ cm}^2$  because the rectangles are equal 96 and the curved part is 1 cm higher so you add one centimeter because  $1 \times 1 = 1$ .

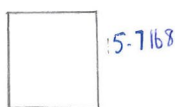
- 6 a The Earth is approximately a sphere. Its diameter is 12 755 km. Find the distance around the equator.

Distance = 40071.0143

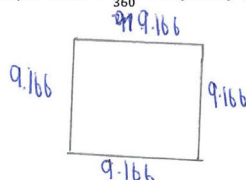
- b The Earth spins on its axis once every 24 hours. If you stand on the equator, you are moving through space very fast because of the Earth's rotation. Calculate this speed.

- 7 Draw a diagram of a figure (neat, shaded, but not to scale) that has:

- a an area of  $(6\text{cm} \times 4\text{cm}) - \pi(2\text{cm})^2$  11.4



- b a perimeter of  $\frac{47}{360} \times 2\pi(13\text{cm}) + 13\text{cm} + 13\text{cm}$



### Annotations

Determines the area of the rectangle but does not provide an appropriate estimate for the area of the segment.

Obtains the answer but does not demonstrate how this answer was obtained or indicate the unit of measurement.

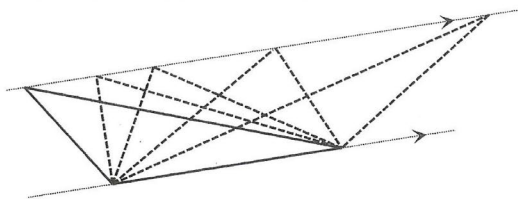
Provides the answer but does not demonstrate how this answer was obtained or indicate the units of measurement.

# Mathematics

Year 8  
Satisfactory

## Measurement: Perimeter and area

- 8 Several triangles are drawn inside two parallel lines in the diagram below.



- a Explain why all the triangles shown have the same area.

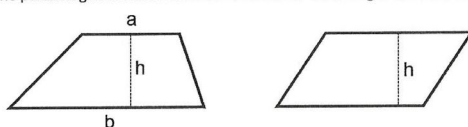
~~The~~ All the triangles extend from the same area and stop and start at the same place so the base is the same. Their heights would also be the same because they can't go any higher.

- b Using appropriate measurements with your ruler, calculate their area.

$$A = 4.95$$

- c Of all the possible triangles you could draw that are like those above, one triangle has the smallest perimeter. Draw this triangle in the diagram above, and briefly explain your answer.

- 9 The trapezium and the parallelogram shown have the same area. How long is the base of the parallelogram?



$$\text{base} = 3.25 \text{ cm}$$

### Annotations

Communicates why the triangles have the same area with some mathematical language but does not refer to the 'perpendicular height'.

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# Mathematics

Year 8  
Satisfactory

## Number: Integers

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

*By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They recognise index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data.*

*Students use efficient mental and written strategies to carry out the four operations with integers. They simplify a variety of algebraic expressions. They solve linear equations and graph linear relationships on the Cartesian plane. Students convert between units of measurement for area and volume. They perform calculations to determine perimeter and area of parallelograms, rhombuses and kites. They name the features of circles and calculate the areas and circumferences of circles. Students determine complementary events and calculate the sum of probabilities.*

### Summary of task

Students had completed a unit of work on integers.

Students were asked a series of questions that involved calculation and reasoning with integers. The use of calculators was not permitted and students were given 20 minutes of class time to complete the task.

# Mathematics

Year 8  
Satisfactory

## Number: Integers

### Annotations

Adds and subtracts integers.

Multiplies integers.

Divides integers but with an error when a negative sign is placed directly in front of a fraction.

Applies the order of operations to evaluate expressions involving integers but with errors when the expression involves a fraction.

Integers		Calculators are NOT permitted	
1) Evaluate:			
a) $5 - 10 = -5$		e) $-8 - 12 = -20$	
b) $20 + -5 = 15$		f) $5 - 11 - 7 = -13$	
c) $-14 + -5 = -19$		g) $9 + 3 - 12 = 0$	
d) $-4 - -7 = 3$		h) $-10 - +4 + 16 = 2$	
2) Evaluate:			
a) $3 \times -5 = -15$		e) $8 \times -1 \times 10 = -80$	
b) $-4 \times -10 = 40$		f) $-2 \times -5 \times -7 = -70$	
c) $7 \times (-3) = -21$		g) $(-2)^3 = -8$	
d) $-5 \times 2 \times -4 = 40$		h) $(-5)^2 = 25$	
3) Evaluate:			
a) $60 \div -6 = -10$		e) $\frac{30}{-6} = -5$	
b) $-45 \div -5 = 9$		f) $\frac{-100}{-20} = 5$	
c) $-24 \div 4 = -6$		g) $-\frac{48}{2} = 24$	
d) $\frac{-40}{4} = -10$		h) $-100 \div -20 \div 5 = 1$	
4) Calculate:			
a) $3 \times 12 \div -6 = -6$		f) $(5 - 7) - (12 - 9) = -5$	
b) $(7 - 13) \times 4 = -24$		g) $5 + \frac{3}{6} - 12 = 4$	
c) $-5 + [20 \times (1 + -6)] = 155$		h) $\frac{2 - 5 \times 4}{-6 \div -2} = 6$	
d) $-12 - 30 \div -6 = 7$		i) $3 - \frac{100 + 8 \times -8}{12 \times -3} = 5$	
e) $-4 \times 11 - 5 \times -7 = 9$			

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# Mathematics

Year 8  
Satisfactory

## Number: Integers

- 5) At 12 am on Monday, the temperature in Vladivostok was recorded as  $-8^{\circ}\text{C}$ . By 6 am the temperature had risen by  $3^{\circ}\text{C}$ . By noon the temperature had risen by a further  $7^{\circ}\text{C}$ . At 6 pm the temperature was  $-5^{\circ}\text{C}$ .

What was the change in temperature between noon and 6 pm?

70C

$$\begin{array}{r} 20 \\ -5 \\ \hline \end{array}$$

- 6) Is the value of  $(-46)^{86}$  positive or negative? Give a reason for your answer.  
[Note: You do not need to find the value of  $(-46)^{86}$ .]

The value would be positive because the power is even and if 2 or an even number is timesed by a negative the result is always positive.

- 7) Place a number in each box to make the statements true:

a)  $20 + \boxed{-80} = -60$

b)  $35 - 5 \times \boxed{-5} = 75$

- 8) Tom wrote:

'If a question with integers involves exactly two minus signs, one plus sign, and no other operations, then the answer is positive.'

Is Tom's statement always correct or sometimes correct or never correct? Provide at least one example to support your decision.

Tom's statement is some times correct as shown below. It works here.  
 $2 - -2 + 3 = 7$  Working:  $(2 \ominus 2) + 3 = 7$   
Or where it doesn't work.  
 $2 - + 3 - 3 = -3$  Working:  $(2 \ominus 3) - 3 = -4$

## Annotations

Calculates the magnitude of the change in temperature in a real-world problem but does not indicate the direction of the change.

Determines the correct answer and attempts to explain their reasoning.

Determines the correct solution to a number sentence involving the addition of integers.

Determines the validity of a given statement, justifying their decision with appropriate examples.

# Mathematics

Year 8  
Satisfactory

## Number: Percentages

### Year 8 Mathematics achievement standard

The parts of the achievement standard targeted in the assessment task are highlighted.

*By the end of Year 8, students solve everyday problems involving rates, ratios and percentages. They recognise index laws and apply them to whole numbers. They describe rational and irrational numbers. Students solve problems involving profit and loss. They make connections between expanding and factorising algebraic expressions. Students solve problems relating to the volume of prisms. They make sense of time duration in real applications. They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals. Students model authentic situations with two-way tables and Venn diagrams. They choose appropriate language to describe events and experiments. They explain issues related to the collection of data and the effect of outliers on means and medians in that data.*

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### Summary of task

Students were given a task to complete in class time after a unit of work on profit and loss.

# Mathematics

Year 8  
Satisfactory

## Number: Percentages

Suppose you have a grandmother who gives you one cent on your first birthday. The next year she gives you 3 cents, the following year 9 cents. Each year she triples the amount she gave the year before. Leave all answers correct to two decimal places.

a) How much money would you have on your 14th Birthday?

BIRTHDAY	MONEY
1	1c
2	3c
3	9c
4	27c
5	81c
6	<del>\$1.81</del> \$2.43
7	\$7.29
8	\$21.87
9	\$65.61
10	<del>\$196.83</del>
11	\$590.49
12	\$1771.47
13	<del>\$5314.41</del>
14	\$15943.23
TOTAL	<del>\$41268.69</del> \$61921.66

b) What percentage is the amount of money on your 14<sup>th</sup> birthday to the total money given by your grandmother

$$\frac{61921.66 - 41268.69}{20652.97} \times 100 = 50.05\%$$

You are going to use the money your grandmother gave you to refurbish the study at home. Let us do our homework

### FLUENCY:

1) Find the selling price of each of the following products from the product catalogue

Item	Cost price	%	Profit/ loss	Selling Price
TV storage combo	\$1796	30%	profit	\$2334.80
Set of 4 draws	\$45.00	75%	loss	\$11.25
Two seat sofa	\$2698.00	33 1/3 %	profit	<del>\$1849.75</del> \$3597.24

A picture of a two seat sofa  
\$2698

A picture of a set of four drawers  
\$45

A picture of a TV storage combo  
\$1796

## Annotations

Uses a correct process to complete the table but omits the money value for his eighth birthday.

Solves simple profit and loss problems.

# Mathematics

Year 8  
Satisfactory

## Number: Percentages

2) For each of the following items, find the percentage profit or loss

Item	Cost price	Selling Price	%	Profit/Loss
TV storage combo	\$1796	\$1600	10.9%	loss
Set of 4 draws	\$45.00	\$60	33.3%	Profit
Two seat sofa	\$2698.00	\$1698	37.1%	loss

3) How can you tell if an item is being sold for profit or a loss

because if the selling price is lower than the

### UNDERSTANDING

4) The Second hand shop buys second hand desks for \$48.00 and sells them for \$60.00

a) What is the ratio of the profit to the cost price

$$48 - 12 = 36$$

$$36 : 48 =$$

b) What is the percentage profit on the cost price?

$$20\%$$

c) What is the ratio of the profit to the selling price?

$$60 - 48 = 12$$

$$12 : 60 = 3 : 15 = 1 : 5$$

d) What is the percentage profit on the selling price

### BUY WHAT YOU WANT AT THE HALF YEARLY SALE

## Annotations

Calculates percentage profit and loss.

Calculates the profit; forms and simplifies the ratio of profit to the selling price.

# Mathematics

Year 8  
Satisfactory

## Number: Percentages

### Annotations

Cushion SALE		
Alvine flora	\$20.00	Now reduced by 25%
Alvina spetsig	\$11.00	Now reduced by 40%
Stockholm	\$13.00	Now reduced by 20%
Eivor Krist	\$18.00	Now reduced by 25%

5)a) Before the sale, how much would it cost to buy an Alvine flora cushion and a Stockholm cushion?

Alvine Flora	\$20
Stockholm cushion	\$13

b) What items could you buy before the sale if you had \$50 to spend?

x2 alvine flora	$20 + 20 = 40$
x4 alvina spetsig	$11 \times 4 = 44$
x3 stockholm + 1 Alvina spetsig	$13 \times 3 + 11 = 50$
1 alvine flora + 1 alvina spetsig + 1 stockholm	$20 + 11 + 13 = 44$

c) Calculate the sale price of the 3 cushions advertised

Alvine flora	\$15
Alvina spetsig	\$6.60
Stockholm	\$10.40

$$\begin{aligned}
 25\% \text{ off } 20 &= 15 \\
 40\% \text{ off } 11 &= 6.60 \\
 20\% \text{ off } 13 &= 10.40
 \end{aligned}$$

Calculates the discounted price of an item.

d) How much would it cost to buy an Alvine flora cushion and a Stockholm cushion at the sale?

Alvine Flora	\$15
Stockholm cushion	\$10.40

e) How much have you saved by buying these 2 items at the sale rather than before the sale?

Alvine Flora	saved \$5
Stockholm cushion	saved \$2.60

$$\begin{aligned}
 \$20 - \$15 &= \$5 \\
 \$13 - \$10.40 &= \$2.60
 \end{aligned}$$



# Mathematics

Year 8  
Satisfactory

## Number: Percentages

6) You find that you need a side table. You can choose from the following tables

Picture of side table 1

Picture of side table 2

\$380 25% discount = \$285

discount \$95

\$450 20% discount \$360

discount \$90

Picture of side table 3

Picture of side table 4

discount \$86.58

discount = 90

\$260 33 $\frac{1}{3}$ % discount = \$173.42

\$600 15% discount = \$510

a) Which has the largest discount?

1

b) Which have the same amount of discount?

2 and 4

c) What is the difference between the largest and smallest discount?

$95.00 - 86.58 = \$8.42$

d) If the \$600 table with a drawer had a discount of 20%, would \$470 be enough to buy it?

$600 \times .20 = 120$

$600 - 120 = 480$  NO

REASONING

e) You are in the coffee table shop and you hear "for today only: take 50% off the original price and then a further forty per cent off that. You hear a customer say: This is fantastic!!!. You get 90% off the original price. Is this statement correct? Explain

No because

### Annotations

Works fluently with percentages to compare discounts.

Does not have a strategy to test this claim.