

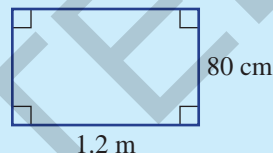
Semester review 2

Ratios and rates

Multiple-choice questions

- 1 The ratio of the length to the width of this rectangle is:

A 12 : 80 B 3 : 20 C 3 : 2
D 20 : 3



- 2 Simplify the ratio 500 cm to $\frac{3}{4}$ km.

A 2 : 3 B 1 : 150 C 3 : 2 D 150 : 1

- 3 \$18 is divided in the ratio 2 : 3. The larger part is:

A \$3.60 B \$7.20 C \$10.80 D \$12

- 4 Calvin spent \$3 on his mobile phone card for every \$4 he spent on his email account. Calvin spent \$420 on his phone last year. How much did he spend on his email account for the same year?

A \$140 B \$315 C \$560 D \$240

- 5 A boat sailed 30 kilometres in 90 minutes. What was the average speed of the boat?

A 15 km/h B 45 km/h C 3 km/h D 20 km/h

Short-answer questions

- 1 Simplify these ratios.

a 24 to 36 b 15 : 30 : 45 c 0.6 m to 70 cm
d 15 cents to \$2 e $\frac{3}{4}$ to 2 f 60 cm to 2 m

- 2 a Divide 960 cm in the ratio of 3 : 2. b Divide \$4000 in the ratio of 3 : 5.
c Divide \$8 in the ratio of 2 : 5 : 3.

- 3 A 20-metre length of wire is used to fence a rectangular field with dimensions in the ratio 3 : 1. Calculate the area of the field.

- 4 A business has a ratio of profit to costs of 5 : 8. If the costs were \$12 400, how much profit was made?

- 5 Complete these rates.

a 5 g/min = _____ g/h b \$240 in 8 hours = \$_____/h
c 450 km in $4\frac{1}{2}$ h = _____ km/h



- 6 A shop sells $1\frac{1}{2}$ kg bags of apples for \$3.40. Find the cost of a one kilogram at this rate.
- 7 A car travels the 1035 km from southern Sydney to Melbourne in 11.5 hours. Calculate its average speed.

Extended-response question

A small car uses 30 litres of petrol to travel 495 km.

- At this rate, what is the maximum distance a small car can travel on 45 litres of petrol?
- What is the average distance travelled per litre?
- Find the number of litres used to travel 100 km, correct to one decimal place.
- Petrol costs 117.9 cents/litre. Find the cost of petrol for the 495 km trip.
- A larger car uses 42 litres of petrol to travel 378 km. The smaller car holds 36 litres of petrol while the larger car holds 68 litres. How much further can the larger car travel on a full tank of petrol?

Equations and inequalities

Multiple-choice questions

- The sum of a number and three is doubled. The result is 12. This can be written as:
A $x + 3 \times 2 = 12$ **B** $2x + 6 = 12$ **C** $2x + 3 = 12$ **D** $x + 3 = 24$
- The solution to the equation $2m - 4 = 48$ is:
A $m = 8$ **B** $m = 22$ **C** $m = 20$ **D** $m = 26$
- The solution to the equation $-5(m - 4) = 30$ is:
A $m = -10$ **B** $m = -2$ **C** $m = 2$ **D** $m = \frac{-34}{5}$
- If $\Delta < -5$, then Δ can have the value:
A 0 **B** $-\frac{1}{5}$ **C** -6 **D** -4
- Which of the following inequalities is represented by the number line below?



- A** $x \leq -1$ **B** $x \geq -1$ **C** $x > -1$ **D** $x < -1$

Short-answer questions

- 1 Solve each of these equations.

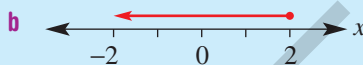
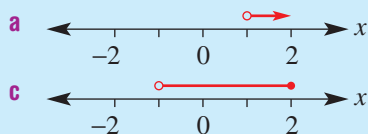
a $3w = 27$	b $12 = \frac{m}{6}$	c $4 - x = 3$
d $4a + 2 = 10$	e $2w + 6 = 0$	f $\frac{x}{5} - 1 = 6$

- 2 Solve:

a $6 = 4 - 4m$	b $3a + 4 = 7a + 8$	c $3(x + 5) = 15$
d $\frac{x}{5} + \frac{x}{3} = 1$	e $2(5 - a) = 3(2a - 1)$	f $\frac{a + 7}{2a} = 3$

- 3 Double a number less three is the same as 9. What is the number?
- 4 A father is currently six times as old as his son. In 10 years' time his son will be 20 years younger than his dad. How old is the son now?

5 Write the inequality shown by each graph below.



6 Solve:

a $2x > -16$

b $3x + 8 \leq 17$

c $\frac{x}{5} - 6 \leq 0$

Extended-response question

EM Publishing has fixed costs of \$1500 and production costs of \$5 per book. Each book has a retail price of \$17.

- a** Write an equation for the cost (C) of producing n books.
- b** Write an equation for the revenue (R) for selling n books.
- c** A company 'breaks even' when the cost of production equals the revenue from sales. How many books must the company sell to break even?
- d** Write an equation for the profit (P) of selling n books.
- e** Calculate the profit if 200 books are sold.
- f** What is the profit if 100 books are sold? Explain the significance of this answer.

Probability and statistics

Multiple-choice questions

- 1 For the set of numbers 3, 2, 1, 3, 5, 1, 3, 9, 3, 5 the mode is:
A 3 **B** 3.5 **C** 8 **D** 35
- 2 Consider the data 8, 9, 10, 10, 16, 19, 20, 20. Which of the following statements is true?
A Median = 13 **B** Mean = 13 **C** Mode = 13 **D** Range = 13
- 3 In a box there are 75 blue marbles and 25 pink marbles of the same size. If 12 marbles are drawn from the box, one at a time, at random and replaced each time, the most likely number of pink marbles is:
A 6 **B** 3 **C** 12 **D** 9
- 4 A coin and a six-sided die are tossed together. The number of elements in the sample space is:
A 2 **B** 6 **C** 12 **D** 8
- 5 A die is rolled 60 times. The number 4 appears exactly 24 times. The experimental probability of obtaining the number 4 is:
A 0 **B** $\frac{2}{5}$ **C** $\frac{2}{3}$ **D** $\frac{1}{6}$

Short-answer questions

1 Find **i** the mean, **ii** the median and **iii** the range of these data sets.

a 10, 15, 11, 14, 14, 16, 18, 12

b 1, 8, 7, 29, 36, 57

c 1.5, 6, 17.2, 16.4, 8.5, 10.4

2 For the data set 1, 1, 3, 5, 8, 8, 9, 10, 12, 17, 24, 30, find:

a the median score

b the lower quartile

c the upper quartile

d the interquartile range

3 The mean mark for a Chemistry quiz for a class of 20 students was 16 out of 20. On the same quiz, another class of 15 students had a mean of 18 out of 20. What is the combined mean of all the students? Give your answer correct to one decimal place.

4 Calculate the mean and median for:

a 1, 2, 5, 10, 10, 13, 13, 18, 19, 24,
25, 28, 28, 30, 35

b

Score	Frequency
10	15
11	29
12	11
13	5

5 Draw a histogram for the frequency table in Question 4b.

6 A six-sided die and a coin are tossed together. Write down all the outcomes using a table.

7 A bag contains 16 balls of equal size and shape. Of these balls 7 are yellow, 1 is blue and the rest are black. If one ball is chosen from the bag at random, find the probability that it is:

a yellow

b blue

c not blue

d black

e pink

8 The ages of 50 people at a party are shown in the table below.

Ages	0–9	10–19	20–29	30–39	40–49	50–59	60+
Frequency	3	7	1	28	6	2	3

If one person is chosen at random to prepare a speech, find the probability that the person is aged:

a 0–9

b 30 or older

c in their twenties

d not in their fifties

Extended-response question

Two groups of students have their pulse rates recorded as beats per minute. The results are listed here:

Group A: 65, 70, 82, 81, 67, 74, 81, 88, 84, 72, 65, 66, 81, 72, 68, 86, 86

Group B: 83, 88, 78, 60, 81, 89, 91, 76, 78, 72, 86, 80, 64, 77, 62, 74, 87, 78

a How many students are in group B?

b If the median pulse rate for group A is 76, what number belongs in the .

c What is the median pulse rate for group B?

d Which group has the largest interquartile range?

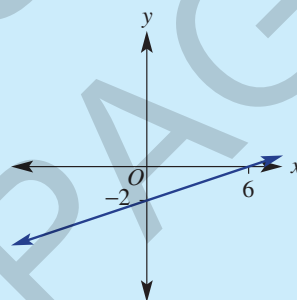
Straight line graphs

Multiple-choice questions

- The point $(2, -1)$ lies on the line with equation:
A $y = 3x - 1$ **B** $y = 3 - x$ **C** $x + y = 3$ **D** $y = 1 - x$
- The coordinates of the point 3 units directly above the origin is:
A $(0, 0)$ **B** $(0, 3)$ **C** $(0, -3)$ **D** $(3, 0)$
- The rule for the table of values shown is:

x	0	2	4
y	4	8	12

A $y = 2x$ **B** $y = 2x + 2$ **C** $y = 2(x + 2)$
D $y = x + 4$
- The gradient of the line through $A(4, 7)$ and $B(8, -1)$ is:
A $-\frac{1}{2}$ **B** 2 **C** $\frac{1}{2}$ **D** -2
- The equation of the line shown is:
A $y = 6x - 2$
B $y = 3x - 2$
C $y = x - 2$
D $3y = x - 6$



Short-answer questions

- In which quadrant does each point lie?
a $(5, 1)$ **b** $(-3, 4)$ **c** $(-5, -1)$ **d** $(8, -3)$

- a** Complete these tables of values.

i $y = 2x + 1$

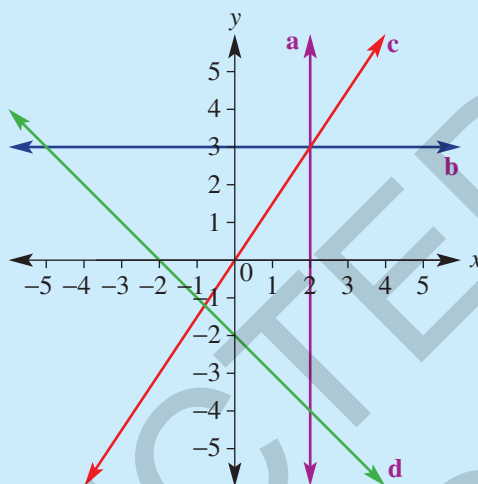
x	0	1	2	3
y				

ii $y = 4 - x$

x	0	1	2	3
y				

- Sketch each line on the same number plane and state the point of intersection of the two lines.

- 3 Give the equation of each line shown on this grid.



- 4 Consider the Cartesian plane shown in Question 3.
- Which line(s) has/have:
 - a positive gradient?
 - a negative gradient?
 - a zero gradient?
 - a gradient of 1.5?
 - Which lines intersect at the point $(2, -4)$?
- 5 Sketch the curves $y = x^2$ and $y = 2x$ on the same number plane, by first completing a table of values with x from -2 to 3 . Write down the point of intersection of the two graphs in the first quadrant.

Extended-response question

The cost (\$ C) of running a coffee shop is given by the rule $C = 400 + 5n$, where n is the number of customers on any given day. On average, a customer spends \$13.

- Write a rule for the coffee shop's expected daily revenue (income from customers).
- What is the fixed cost for the coffee shop on any given day? What could this be?
- Show the graphs of the rules for the cost and the revenue on the same set of axes by first completing two tables of values for $n = 0, 5, 10, 15, \dots, 60$
- What is the 'break even' point for the coffee shop?
- If they are particularly busy on a Saturday, and serve 100 people, calculate the shop's profit.

Transformation and congruence

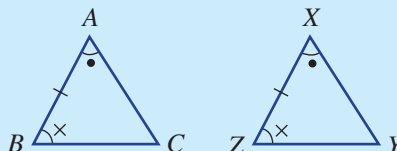
Multiple-choice questions

- 1 The number of lines of symmetry in a square is/are:

A 0 B 2 C 4 D 6

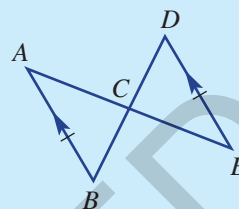
- 2 The side AC corresponds to:

A XZ B XY
C ZY D BC



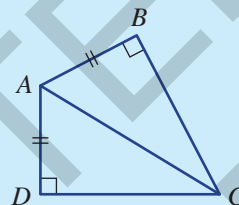
3 A congruency statement for these triangles is:

- A** $\triangle ABC \equiv \triangle CED$ **B** $\triangle ABC \equiv \triangle CDE$
C $\triangle ABC \equiv \triangle ECD$ **D** $\triangle ABC \equiv \triangle EDC$



4 Which test is used to show triangle ABC congruent to triangle ADC ?

- A** SSS **B** SAS
C AAS **D** RHS



5 Which of the following codes is not enough to prove congruency for triangles?

- A** SSS **B** AAS **C** AAA **D** SAS

Short-answer questions

1 How many lines of symmetry does each of these shapes have?

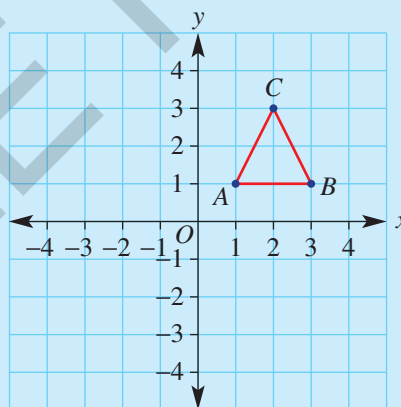
- a** Scalene triangle **b** Rhombus **c** Rectangle **d** Semicircle

2 Write the vectors that translate each point P to its image P' .

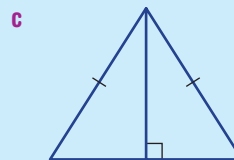
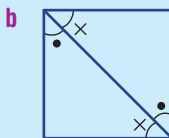
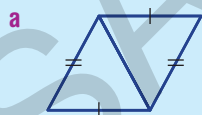
- a** $P(1, 1)$ to $P'(3, 3)$ **b** $P(-1, 4)$ to $P'(-2, 2)$

3 Triangle ABC is on a Cartesian plane as shown. List the coordinates of the image points A' , B' and C' after:

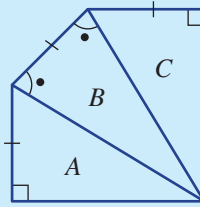
- a** a rotation 90° clockwise about $(0, 0)$
b a rotation 180° about $(0, 0)$



4 Write the congruency test that would be used to prove the following pairs of triangles congruent.



- 5 Which two triangles are congruent?



- 6 a Which two shapes in this diagram are similar and why?
 b Which vertex in $\triangle AEC$ corresponds to vertex C in $\triangle BDC$?
 c Find the value of x .

Extended-response question

A circle of radius 3 cm is enlarged so that the ratio of radii becomes 2 : 5.

- a What is the diameter of the enlarged image?
 b What is the ratio of the circumference of the original circle to its image?
 c What is the ratio of their areas?
 d If the ratio of a circle's area to its image becomes 9 : 100, what is the radius of the image?

