

2020 Year 9 Topic Tests Information Sheet

2020 Year 9 Topic Tests is a set of short answer questions and their solutions.

The topics covered are:

- Number and Algebra (4 questions)
- Linear and non-linear relationships (4 questions)
- Measurement, Geometry and Trigonometry (4 questions)
- Probability and Statistics (5 questions)

2020 Year 9 Topic Tests also includes a **mid-year test** that consists of:

- 15 multiple choice questions
- 5 short answer questions
- 2 extended response questions

Please also note the following information.

Distribution

We will email zipped copies to you

File format

MS Word docx format (compatible with word 2007/2010/2013/2016)

Sample

We have attached sample questions below

Release date

1st of March 2020

Price

\$100

Question 3 (10 marks)

a. What is the value of b such that $3^4 \times 3^5 = 3^b$?

1 mark

b. Evaluate 2020^0 .

1 mark

c. Expand and simplify $(x + 2z)^2$.

2 marks

d. Simplify $12x^2y \div (3x^2y^3)^2$.

2 marks

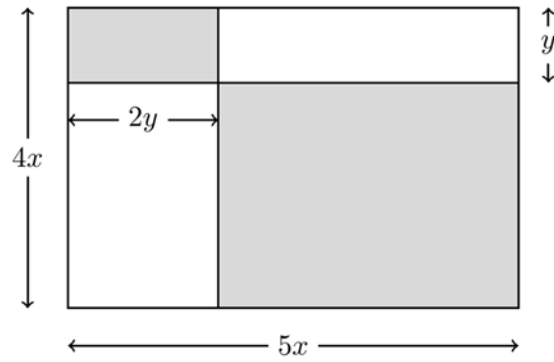
e. Write the product of a and b in scientific notation, where $a = 6234$ and $b = \frac{1}{12468000}$.

2 marks

f. Solve the equation $\frac{x+3}{2} = 6 - x$.

2 marks

c. For the rectangle shown below, show that the shaded area is given by $20x^2 - 13xy + 4y^2$. 3 marks



Question 2 (11 marks)

Consider the graphs of the following straight lines labelled from **A** to **F**.

A. $y = \frac{2}{3}x + 2$

B. $y = x + 1$

C. $y = \frac{1}{3}x - 1$

D. $y = 2x$

E. $y = -\frac{1}{2}x + 5$

F. $y = -4x - 3$

a. State the lines that:

i. pass through the origin

1 mark

ii. have a negative gradient

1 mark

iii. pass through the point $(1, -7)$

1 mark

iv. are perpendicular to each other

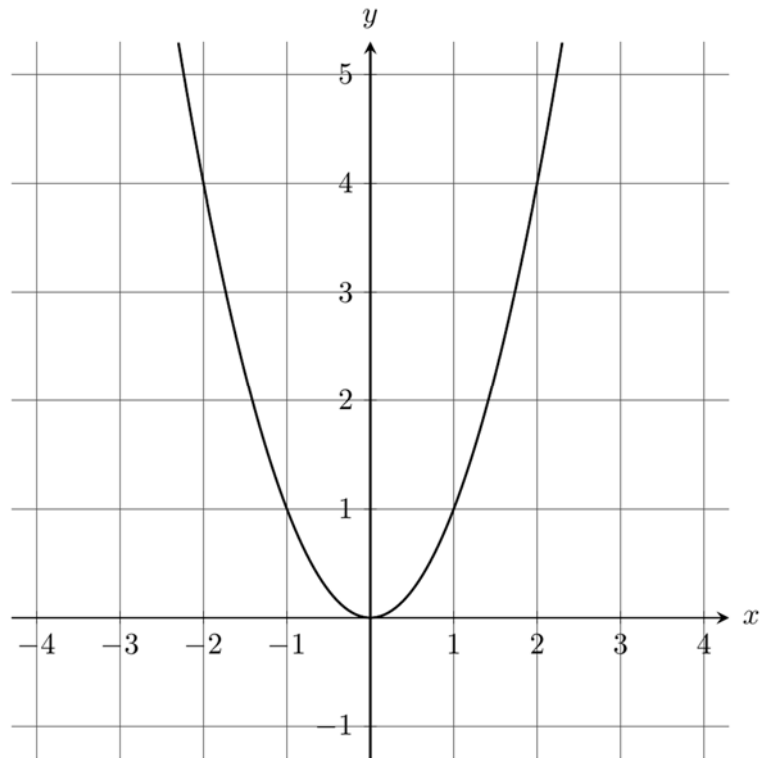
1 mark

v. pass through the fourth quadrant (bottom right quadrant of the Cartesian plane).

1 mark

6

b. The parabola with equation $y = x^2$ is shown below.



i. Sketch the graph of $y = \frac{1}{2}x^2$ on the set of axes above.

1 mark

ii. Describe a transformation that maps the parabola $y = x^2$ to the parabola $y = \frac{1}{2}x^2$.

1 mark

2020 Year 9 Mathematics
Measurement, Geometry and Trigonometry Test

Time allowed: 1 hour
Total marks: 35 marks

Question 1 (6 marks)

a. Here are some metric units.

centimetres metres kilograms grams seconds hours litres

Choose the most sensible metric unit that would be used to measure each of the following.

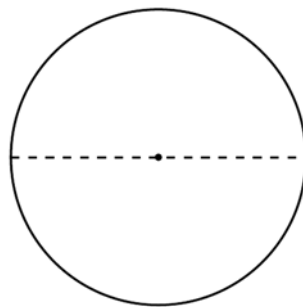
i. the volume of orange juice in a jug 1 mark

ii. the duration of a flight from Sydney to Auckland 1 mark

iii. the mass of a banana 1 mark

iv. the length of a pencil. 1 mark

b. The diameter of the circle below is 2.7 cm.

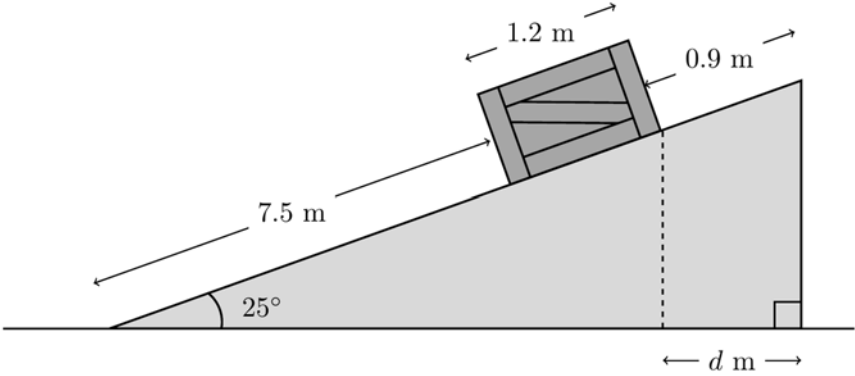


Find the combined perimeter, in centimetres, of ten of these circles. 2 marks
Round your answer to two decimal places.

c. A 1.2 m long crate is placed on a plane inclined at 25° to a flat surface.

3 marks

d is the horizontal distance between one edge of the crate and one edge of the plane, as shown in the diagram below.



Find the value of d in centimetres.
Round your answer to one decimal place.

**2020 Year 9 Mathematics
Statistics and Probability Test**

**Time allowed: 1 hour
Total marks: 33 marks**

Question 1 (6 marks)

There are 3 white shirts and 4 grey shirts in Jacob's closet.



Jacob takes out two shirts at random without replacement.

a. List the sample space.

2 marks

b. Find the probability that Jacob takes out one white shirt and one grey shirt.

2 marks

c. Find the probability that Jacob takes out two shirts of the same colour.

2 marks

Question 2 (8 marks)

Consider the sample space $S = \{1, 2, 3, \dots, 10\}$.

Let $A = \{\text{multiples of 3 less than 10}\}$ and $B = \{\text{primes numbers less than 10}\}$.

a. Write out the elements in each of the following sets:

i. A

1 mark

ii. B

1 mark

iii. $A \cup B$.

1 mark

b. Find $n(A \cap B)$.

1 mark

c. Complete the following two-way table by writing down the appropriate number in each space. 3 marks

	A	A'	Total
B		3	4
B'	2	4	
Total	3		10

A number is randomly selected from S .

d. Find $\Pr(A' \cap B)$.

1 mark



2020 YEAR 9 MATHEMATICS

MIDYEAR TEST

Reading time: 15 minutes

Writing time: 2 hours

QUESTION BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	15	15	15
B	5	5	25
C	2	2	20
			Total 60

SECTION A

Instructions for Section A

Answer **all** questions.

Choose the response that is **correct** for the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Question 1

If $a = 2$, $b = -3$ and $c = 4$ then the expression $\frac{a \times b \times c}{a + b + c}$ is equal to

- A. $-\frac{1}{8}$
- B. $\frac{1}{8}$
- C. 8
- D. -8
- E. 24

Question 2

The selling price of a heater is \$850.

If the heater has been marked up by 25%, the cost price of the heater is

- A. \$212.50
- B. \$637.50
- C. \$680
- D. \$1062.50
- E. \$1912.50

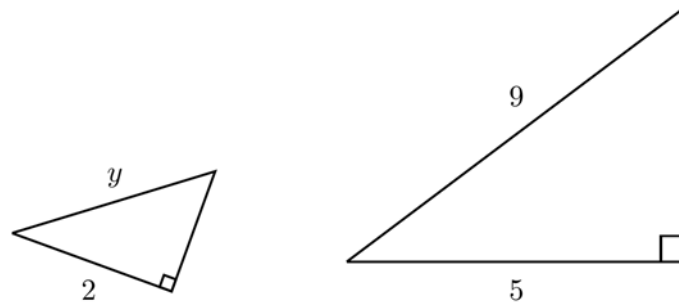
Question 3

Making l the subject in the equation $T = 2\pi\sqrt{\frac{l}{g}}$ results in

- A. $l = \frac{gT^2}{2\pi}$
- B. $l = \frac{\sqrt{g}T^2}{4\pi^2}$
- C. $l = \frac{\sqrt{g}T^2}{2\pi}$
- D. $l = \frac{gT}{2\pi}$
- E. $l = \frac{gT^2}{4\pi^2}$

Question 12

The two right-angled triangles shown below are similar.

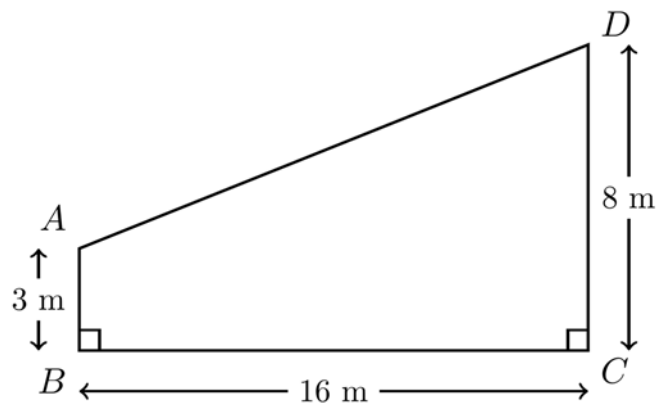


The value of y is

- A. 3.6
- B. 4
- C. 10
- D. 22.5
- E. 56

The following information relates to Questions 13 – 14.

The diagram below shows trapezium $ABCD$.



Question 13

The area of $ABCD$ is

- A. 40 m^2
- B. 48 m^2
- C. 88 m^2
- D. 128 m^2
- E. 176 m^2

SECTION B

Instructions for Section B

Answer **all** questions.

In all questions where a numerical answer is required, an **exact** value must be given unless otherwise specified.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (5 marks)

a. What is one third of \$261? 1 mark

b. Is the statement “2.4 is an integer” true or false? 1 mark
Circle the correct answer.

True

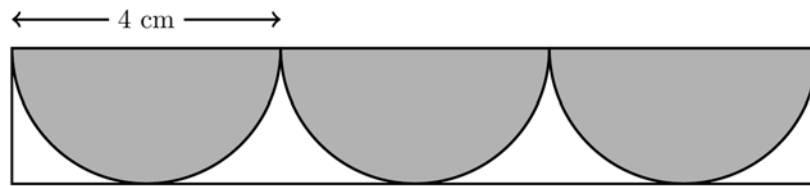
False

c. What is the sum of the internal angles of a pentagon? 1 mark

d. Jason gets paid \$18.50 per hour. 2 marks
One day, he worked 6 hours at the usual rate and an additional 2 hours at double his usual rate.
How much did he get paid on that day?

Question 4 (5 marks)

In the diagram below, the shaded region consists of three identical semi-circles, each with a diameter of 4 cm, that are inscribed inside a rectangle.



a. Find the shaded area in terms of π .

2 marks

b. Is the unshaded area of the rectangle the same as the area of one semi-circle?
Justify your answer.

3 marks

SECTION C

Instructions for Section C

Answer **all** questions.

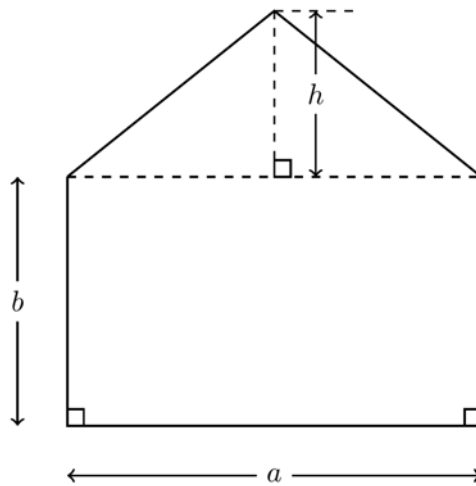
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In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1 (10 marks)

Consider the composite shape below.



a. Show that the area of the shape, A , is given by $A = \frac{a(2b+h)}{2}$.

2 marks

b. Find the area of the shape, in cm^2 , if $a = 6$ cm, $b = 4$ cm and $h = 2.5$ cm.

2 marks

**2020 Year 9 Mathematics
Patterns and Algebra Test**

Question 1 (6 marks)

a. 1 mark

$$\begin{aligned}\frac{3}{5} - \frac{1}{2} &= \frac{6}{10} - \frac{5}{10} \\ &= \frac{1}{10} \quad (\text{A1})\end{aligned}$$

b. 1 mark

$$\begin{aligned}-2 + 3 - (-2 + 4) \\ &= -2 + 3 + 2 - 4 \\ &= -1 \quad (\text{A1})\end{aligned}$$

c. 1 mark

$$2.68 \quad (\text{A1})$$

d. 1 mark

$$6\frac{3}{4} = 6.75 \quad (\text{A1})$$

e. 1 mark

$$\frac{12}{15} \times 100 = 80\% \quad (\text{A1})$$

f. 1 mark

$$\begin{aligned}330 \times 30\% &= 330 \times \frac{30}{100} \\ &= 99 \quad (\text{A1})\end{aligned}$$

2020 Year 9 Mathematics
Measurement, Geometry and Trigonometry Test

Question 1 (6 marks)

a.

i. litres (A1) 1 mark

ii. hours (A1) 1 mark

iii. grams (A1) 1 mark

iv. centimetres (A1) 1 mark

b. 2 marks

$$\text{Perimeter} = 10 \times 2 \times \pi \times \frac{2.7}{2} \quad (\text{A1})$$

$$\approx 84.82 \text{ cm} \quad (\text{A1})$$

2020 Year 9 Mathematics
Statistics and Probability Test

Question 1 (6 marks)

a. 2 marks

{Grey Grey, Grey White, White Grey, White White}

- All of the elements in the set are correct. (A1) × 2
- Accept {GG, GW, WG, WW}.
- Penalise one mark per error.

b. 2 marks

$\Pr(\text{WG}) + \Pr(\text{GW})$

$$= \frac{3}{7} \times \frac{4}{6} + \frac{4}{7} \times \frac{3}{6} \quad (\text{A1})$$

$$= \frac{2}{7} + \frac{2}{7}$$

$$= \frac{4}{7} \quad (\text{A1})$$

c. 2 marks

$$\Pr(\text{Same colour}) = 1 - \frac{4}{7} \quad (\text{A1})$$

$$= \frac{3}{7} \quad (\text{A1})$$

- Accept calculating $\Pr(\text{WW}) + \Pr(\text{GG})$.

Question 2 (8 marks)

a.

i.

1 mark

$$A = \{3, 6, 9\} \text{ (A1)}$$

ii.

1 mark

$$B = \{2, 3, 5, 7\} \text{ (A1)}$$

iii.

1 mark

$$A \cup B = \{2, 3, 5, 6, 7, 9\} \text{ (A1)}$$

b.

1 mark

Since $A \cap B = \{3\}$, $n(A \cap B) = 1$. (A1)

c.

3 marks

	A	A'	Total
B	1	3	4
B'	2	4	6
Total	3	7	10

- Award (A1)×3 for all three correct values.
- Penalise one mark per error.

d.

1 mark

$$\Pr(A' \cap B) = \frac{3}{10} \text{ (A1)}$$

- Accept 0.3.

2020 YEAR 9 MIDYEAR TEST

SOLUTIONS

SECTION A

Question	Answer
1	D
2	C
3	E
4	B
5	C
6	E
7	D
8	C
9	A
10	C
11	C
12	A
13	C
14	B
15	C

Question 1

$$\begin{aligned} \frac{a \times b \times c}{a + b + c} &= \frac{2 \times (-3) \times 4}{2 + (-3) + 4} \\ &= \frac{-24}{3} \\ &= -8 \end{aligned}$$

Answer is **D**.

Question 2

Cost price + mark up = selling price

$$\text{Cost price} + \text{Cost price} \times \frac{25}{100} = 850$$

$$\text{Cost price} \times \frac{125}{100} = 850$$

$$\begin{aligned} \text{Cost price} &= 850 \times \frac{100}{125} \\ &= \$680 \end{aligned}$$

Answer is **C**.

Question 2 (5 marks)

a.

1 mark

$$\begin{aligned}h &= 0 \times (20 - 0) \\ &= 0 \text{ m (A1)}\end{aligned}$$

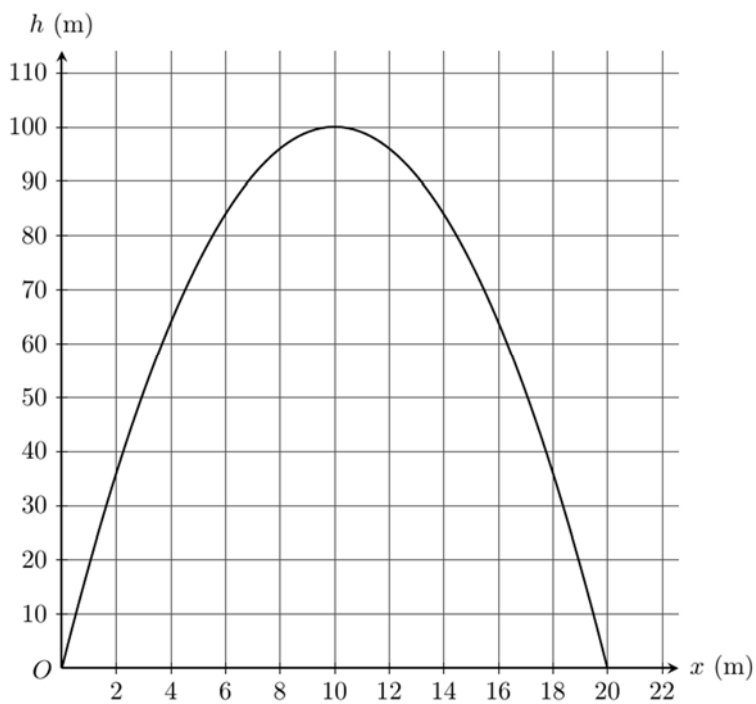
b.

1 mark

$$\begin{aligned}h &= 10 \times (20 - 10) \\ &= 100 \text{ m (A1)}\end{aligned}$$

c.

3 marks



- An upside-down parabola is sketched. (A1)
- The turning point of the parabola is (10,100). (A1)
- The parabola is sketched for $0 \leq x \leq 20$. (A1)