

## 2021 Year 9 Topic Tests Information Sheet

**2021 Year 9 Topic Tests** is a set of short answer questions and their solutions.

The topics covered are:

- Computation and Financial Mathematics (3 questions)
- Indices and Numbers of Any Magnitude (3 questions)
- Expressions, Indices and Equations (3 questions)
- Algebraic Techniques and Equations (2 questions)
- Linear Relationships (3 questions)
- Properties of Geometrical Figures and Areas (4 questions)
- Area, Surface Area and Volume (3 questions)
- Right-Angled Triangles (3 questions)
- Bearing and Similarity (3 questions)
- Probability (4 questions)
- Statistics (3 questions)

We have prepared more tests and questions this year so that it is easier for teachers to assess students topic by topic. This is the new format that we are following from now on.

**2021 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

### Distribution

We will email electronic copies

### File format

MS Word DOCX format and PDF format

### Sample

We have attached sample questions

### Release date

1st of March 2021

### Price

\$105



**2021 Year 9 Mathematics  
Computation and Financial Mathematics Test**

**Time allowed: 1 hour  
Total marks: 30 marks**

**Question 1** (10 marks)

**a.** Round 1586.253 to 1 decimal place.

1 mark

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**b.** Write  $3\frac{4}{5}$  as a decimal.

2 marks

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**c.** What type of number is  $\frac{8}{4}$ ?

2 marks

Circle the correct answer(s).

Integer

Rational number

Irrational number

**d.** Evaluate  $1\frac{2}{3} - \frac{4}{5}$ .

2 marks

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**e.** How much, as a percentage, is 250 mL out of 4 L?

2 marks

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**f.** The cost price of a bike is \$380, and it is sold for \$870.  
Find the profit made on the sale of the bike.

1 mark

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**2021 Year 9 Mathematics**  
**Indices and Numbers of Any Magnitude Test**

**Time allowed: 1 hour**  
**Total marks: 30 marks**

**Question 1 (10 marks)**

**a.** Evaluate  $-(-3)^2 + \sqrt{25}$ .

2 marks

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**b.** Write  $x \times x \times x \times x \times y \times y$  in index form.

2 marks

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**c.** Write  $5w^2z^3$  in expanded form.

2 marks

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**d.** Simplify  $\frac{3^a \times 3^{a+2b}}{3^b}$ .

2 marks

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**e.** Simplify  $-\frac{y^2}{xy} \div x^2$ .

2 marks

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**2021 Year 9 Mathematics**  
**Expressions, Indices and Equations Test**

**Time allowed: 1 hour**  
**Total marks: 30 marks**

**Question 1** (11 marks)

- a. Write  $\frac{a}{2} - \frac{a}{5}$  as a single fraction. 2 marks

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- b. Simplify  $\frac{3xy}{10} \div \frac{6x^2y^3}{5}$ . 2 marks

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- c. Expand  $-3x(2x-4)$ . 1 mark

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- d. Expand and simplify  $3y(y-4) - 5(y-4)$ . 2 marks

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**2021 Year 9 Mathematics**  
**Algebraic Techniques and Equations Test**

**Time allowed: 1 hour**  
**Total marks: 30 marks**

**Question 1** (11 marks)

**a.** Expand and simplify  $(2x + 5)(2x - 5)$ .

2 marks

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**b.** Simplify  $\frac{9 - x^2}{x^2 + x - 6}$ .

2 marks

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**c.** Solve  $\frac{3}{x+4} = \frac{2}{x+2}$ .

3 marks

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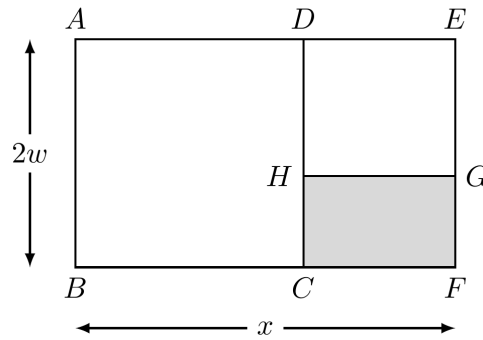
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- d. Consider rectangle  $ABFE$  shown below.  
 $ABCD$  and  $DHGE$  are squares.

4 marks

Show that the area of rectangle  $HCFG$  is given by  $-8w^2 + 6wx - x^2$ .



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**2021 Year 9 Mathematics  
Linear Relationships Test**

**Time allowed: 1 hour  
Total marks: 25 marks**

**Question 1** (10 marks)

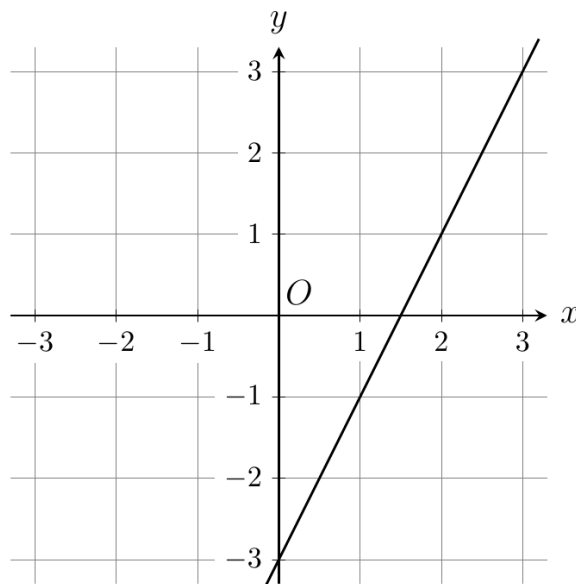
- a. What is the  $y$ -intercept of the graph of  $y = 2x - 3$ ? 1 mark

- b. Write down the correct words or numbers in the boxes provided below. 2 marks

The graph of $x = 2$ is a <input style="width: 100px; height: 20px;" type="text"/> line.
This graph passes through the points $(2, 3)$ and $(\input style="width: 30px; height: 20px;" type="text"}, 5)$ .

- c. What is the gradient of the line with equation  $y = -1 + 4x$ ? 1 mark

- d. The graph shown below passes through the points  $(0, -3)$  and  $(3, 3)$ .



- i. Find the gradient of the line. 2 marks

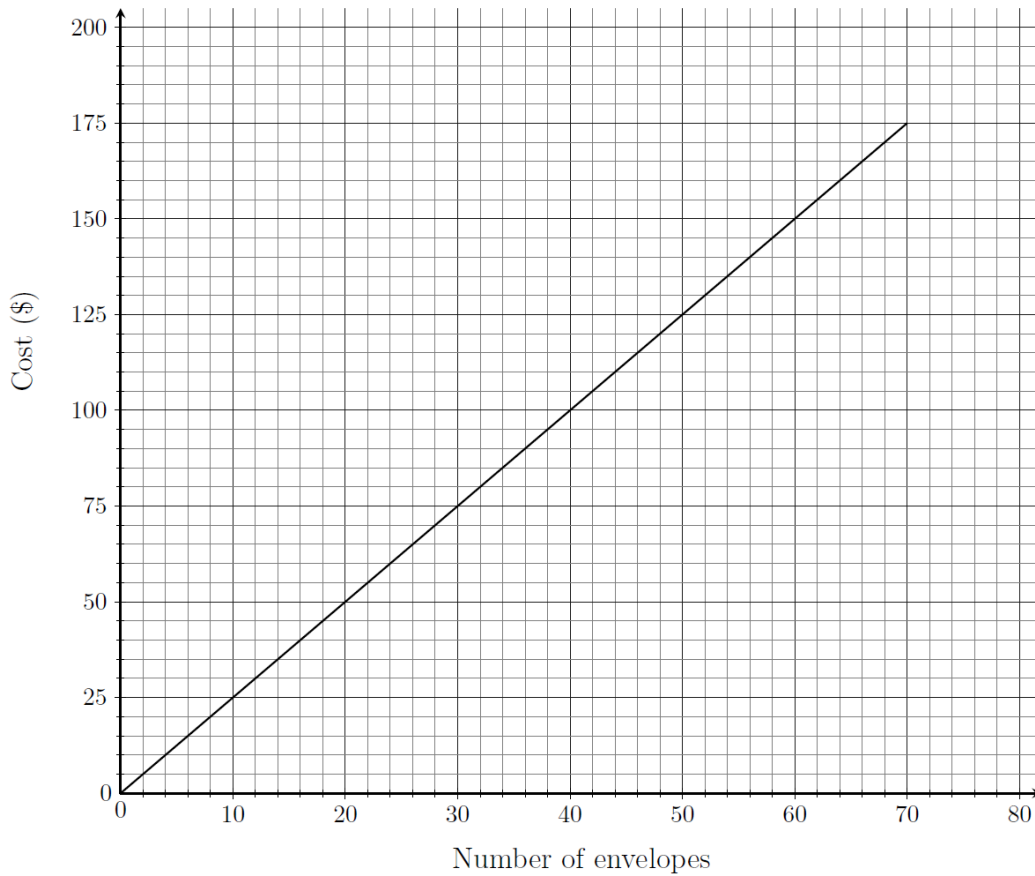
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**Question 3 (5 marks)**

The post office sells prepaid envelopes according to the graph shown below.

Regardless of how many envelopes are bought, the unit price of each envelope is the same.



- a.** Complete the rule relating the number of envelopes bought to the cost by writing down the appropriate numbers in the box below. 2 marks

$$\text{Cost} = \text{number of envelopes} \times \boxed{\phantom{00}} + \boxed{\phantom{00}}$$

- b.** By using the graph above, find the cost of 40 envelopes. 1 mark

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- c.** Find the cost of 80 envelopes. 2 marks

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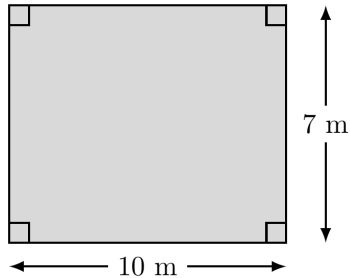


**2021 Year 9 Mathematics**  
**Properties of Geometrical Figures and Areas Test**

**Time allowed: 1 hour**  
**Total marks: 25 marks**

**Question 1 (7 marks)**

Consider the following rectangle.



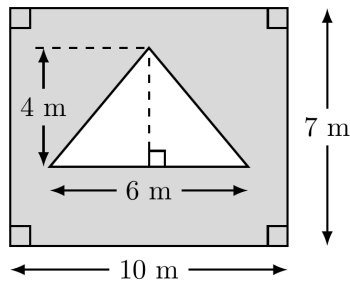
a. Find the perimeter of the rectangle above.

2 marks

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A smaller triangle, with the measurements shown below, is removed from the rectangle.



b. Find the area of the triangle.

2 marks

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c. Find the percentage of the area of the original rectangle that remains after the triangle is removed. 3 marks  
Round your answer to the nearest whole number.

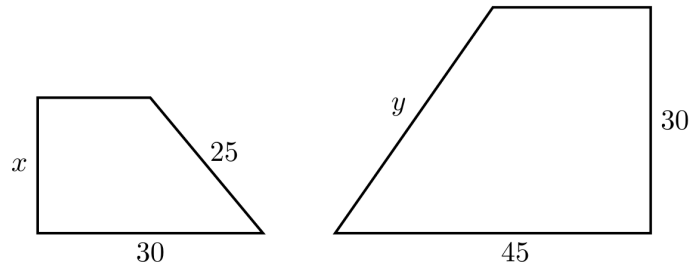
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**Question 4** (8 marks)

a. The following two figures are similar.



i. Show that the scale factor is 1.5.

1 mark

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ii. Find the value of  $x$ .

2 marks

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iii. Find the value of  $y$ .

1 mark

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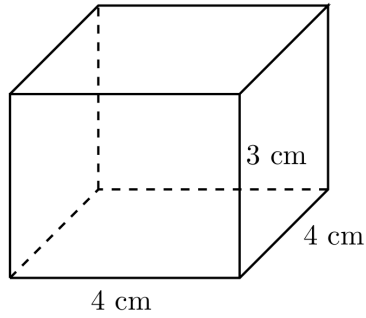
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**2021 Year 9 Mathematics**  
**Area, Surface Area and Volume Test**

**Time allowed: 1 hour**  
**Total marks: 25 marks**

**Question 1 (10 marks)**

Consider the rectangular prism shown below.

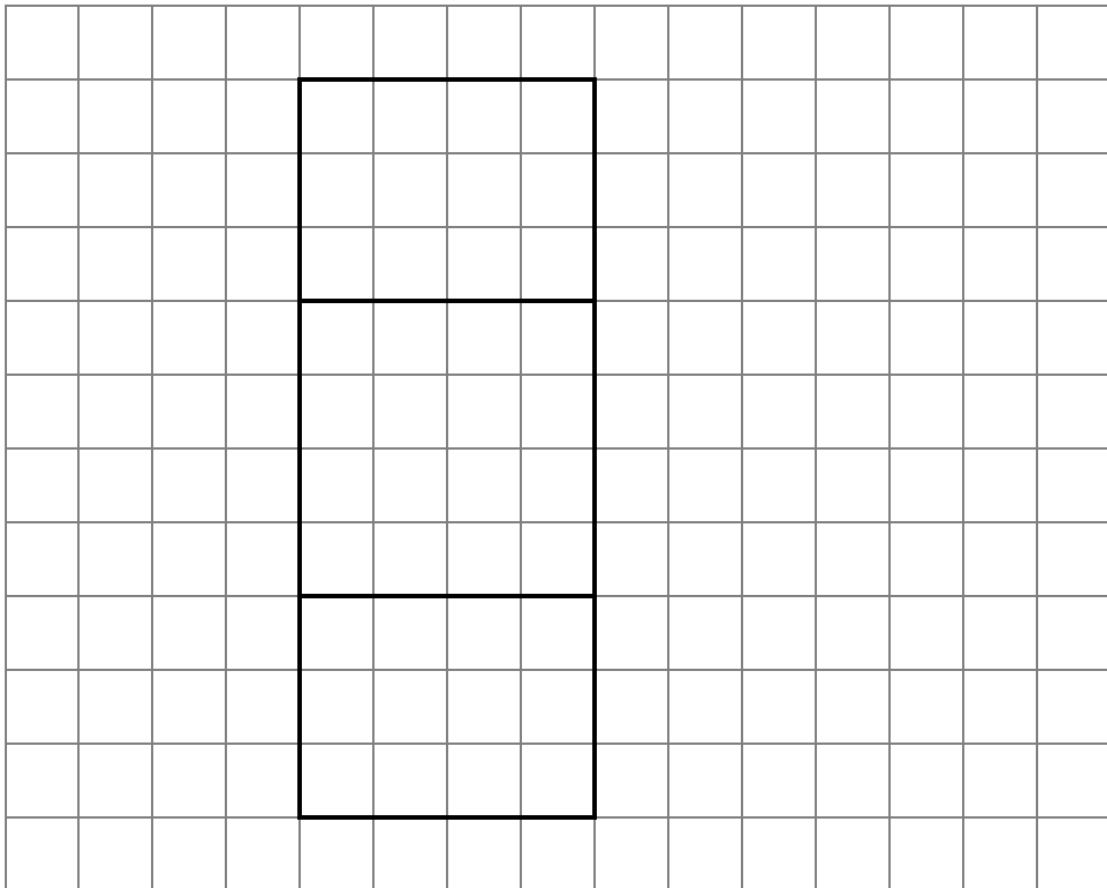


a. How many faces does this rectangular prism have?

1 mark

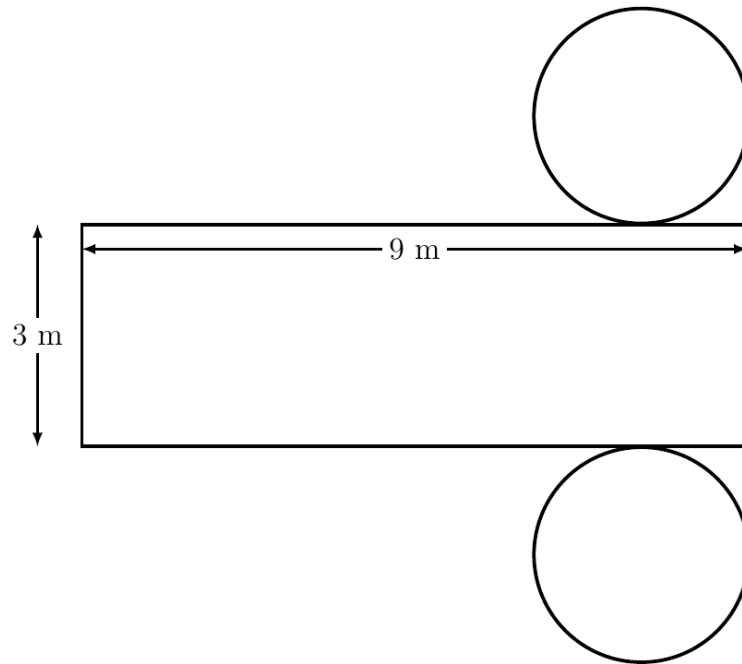
b. On the grid of centimetre squares below, complete the net of the rectangular prism.

3 marks



**Question 2** (7 marks)

The net of a solid is drawn on the grid below.



a. What is the name of the solid?

1 mark

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b. Show that the radius of the circular cross-section is approximately 1.43 m.

2 marks

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c. Find the surface area of the solid.

2 marks

Round your answer to the nearest whole number.

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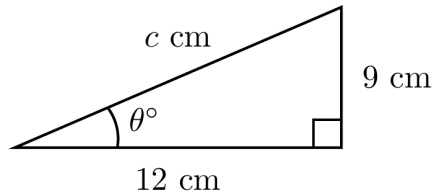
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**2021 Year 9 Mathematics  
Right-Angled Triangles Test**

**Time allowed: 1 hour  
Total marks: 20 marks**

**Question 1 (7 marks)**

Consider the right-angled triangle shown below.



a. Complete the following sentence by writing down the missing word.

1 mark

The hypotenuse is the \_\_\_\_\_ side of a right-angled triangle.

b. Use Pythagoras' theorem to show that  $c = 15$ .

2 marks

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c. Find the values of  $\sin(\theta^\circ)$  and  $\cos(\theta^\circ)$ .

2 marks

Express your answers as simplest fractions.

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d. Find the value of  $\theta$ , rounded to three significant figures.

2 marks

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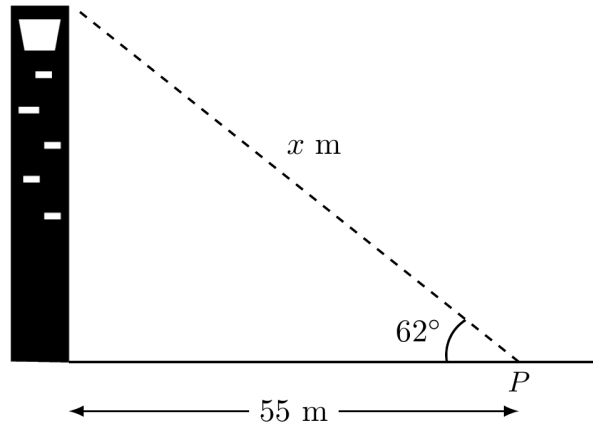
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**Question 3** (6 marks)

The diagram below shows a tower.

The angle of elevation to the top of the tower from a fixed point  $P$  on level ground is  $62^\circ$ .



- a. What is the angle of depression to the top of the tower to the fixed point  $P$  on the ground? 1 mark

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- b. Find the value of  $x$  in the diagram above. 3 marks  
Give your answer in **centimetres**, rounded one decimal place.

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- c. Find the height of the tower in **metres**. 2 marks  
Round your answer to the nearest whole number.

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**2021 Year 9 Mathematics  
Bearing and Similarity Test**

**Time allowed: 1 hour  
Total marks: 19 marks**

**Question 1 (8 marks)**

**a.** Convert  $25.56^\circ$  to degrees, minutes and seconds.

1 mark

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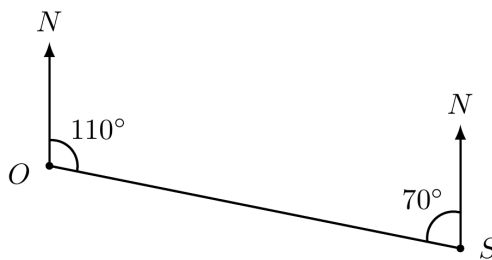
**b.** Convert the angle  $45^\circ 0.5' 6''$  to degrees.

1 mark

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**c.** Consider the diagram below.



**i.** State the bearing of  $S$  from  $O$ .

1 mark

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**ii.** Complete the following sentence by writing down the missing word.

1 mark

Since  $\angle O$  and  $\angle S$  are \_\_\_\_\_ angles, they sum to  $180^\circ$ .

**iii.** Find the bearing of  $O$  from  $S$ .

2 marks

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**iv.** The bearing of  $T$  from  $O$  is  $180^\circ$ .

2 marks

Draw  $T$  on the diagram above, and label the size of angle  $SOT$ .

**2021 Year 9 Mathematics  
Probability Test**

**Time allowed: 1 hour  
Total marks: 27 marks**

**Question 1** (6 marks)

A group of 25 people ordered either cheeseburgers or fried chicken at a restaurant. Each person in the group also ordered either a soft drink or a juice with their food. The following two-way table summarises the results.

	<b>Cheeseburger</b>	<b>Fried chicken</b>	<b>Total</b>
<b>Soft drink</b>	8	6	14
<b>Juice</b>	2	9	11
<b>Total</b>	10	15	25

**a.** How many people did not order a soft drink?

1 mark

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**b.** What is the probability that a randomly selected person from this group ordered a cheeseburger or a soft drink?

2 marks

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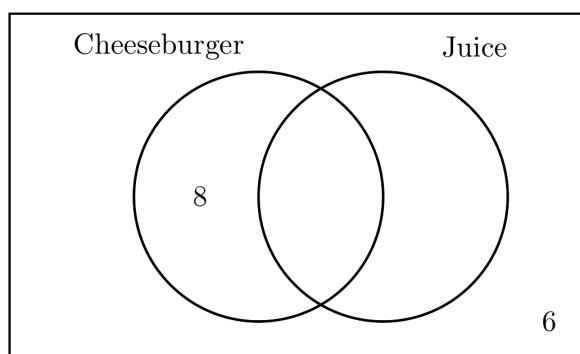
**c.** What is the probability that a randomly selected person from this group ordered a fried chicken and a juice?

1 mark

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**d.** Use the table above to complete the following Venn diagram.

2 marks



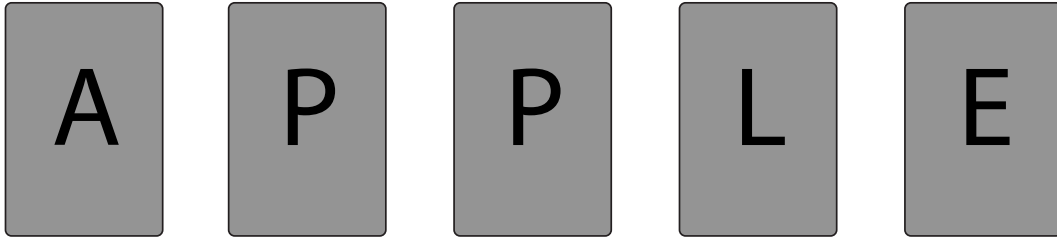


**Question 3** (8 marks)

There is a set of cards that spell “APPLE”.

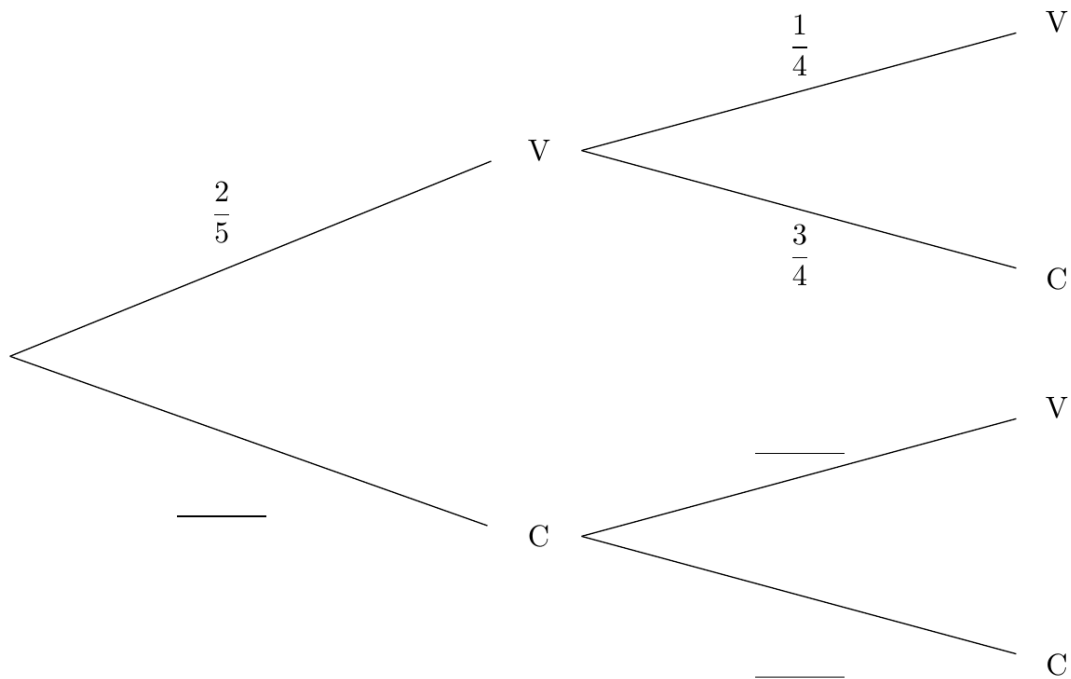
Two of these cards are vowels (V) and the rest are consonants (C).

Two cards are randomly selected one after another, without replacement.



a. Complete the tree diagram by writing the three probabilities in the blank spaces below.

3 marks



b. Write down all of the possible outcomes.

1 mark

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c. Find the probability of obtaining two vowels.

2 marks

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**2021 Year 9 Mathematics  
Statistics Test**

**Time allowed: 1 hour  
Total marks: 17 marks**

**Question 1 (7 marks)**

**a.** The following back-to-back stem-and-leaf plot shows the times taken by a group of boys and a group of girls to complete a cross-country course.

Girls		Boys
	3	2 4 4 5
8 5	4	1 3 5
8 5 3 2	5	5 7
6 5 4	6	0
2	7	

3|2 means 32 minutes

**a.** How many boys participated?

1 mark

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**b.** What was the longest completion time for the girls?

1 mark

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**c.** Show that 42 minutes is the median time for the boys is 42 minutes.

1 mark

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**d.** Which one of the following words best describes the distribution of completion times for the boys?

1 mark

Circle the correct answer.

Positively-skewed

Negatively-skewed

Symmetric

Bi-modal

**e.** Which one of the following words best describes the distribution of completion times for the girls?

1 mark

Positively-skewed

Negatively-skewed

Symmetric

Bi-modal

**Question 2** (4 marks)

The following table shows some information about maternal age groups in Victoria.

<b>Maternal age* group</b>	<b>2010 (%)</b>	<b>2015 (%)</b>	<b>2016 (%)</b>
Younger than 20 years	2.4	1.6	1.5
20–24 years	11.2	10.1	9.6
25–29 years	26.4	26.0	25.7
30–34 years	33.9	37.3	37.9
35–39 years	21.3	20.3	20.5
40+ years	4.7	4.7	4.8
Total	100	100	100
Median age – overall (years)	31	31	31.0

*Source: Registry of Births, Deaths and Marriages (BDM) Victoria, adapted*

- a.** What is the percentage of mothers who were of the age of 35 or above in 2016? 1 mark

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- b.** Briefly describe the trend of the 30-34 years age group from 2010 to 2016. 2 marks

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- c.** Can the findings from the table above be used to make any generalisations for Australia? 1 mark  
Justify your answer.

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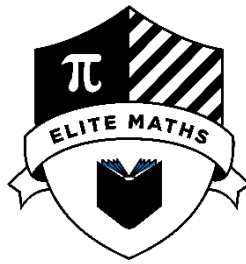


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\*Maternal age: The age of the mother at the time of delivery.



# 2021 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**

Rounding 0.03057 to 2 significant figures gives

- A. 0.0
- B. 0.03
- C. 0.030
- D. 0.031
- E. 0.0306

**Question 2**

$(x^2y)^{-1}$  simplifies to

- A.  $\frac{y}{x^2}$
- B.  $\frac{1}{x^2y}$
- C.  $\frac{x^2}{y}$
- D.  $\frac{x}{y^2}$
- E.  $x^2y$

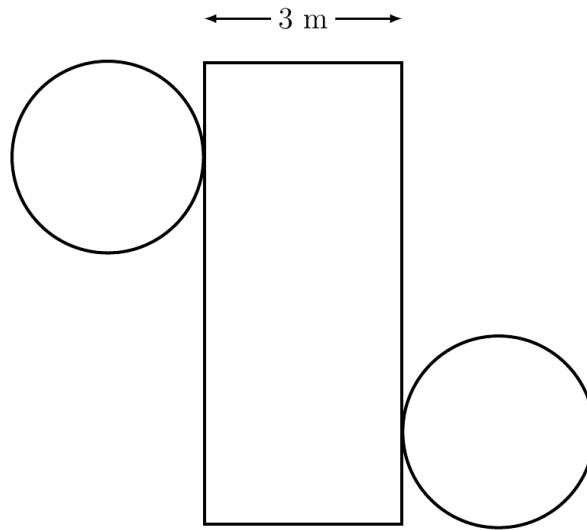
**Question 3**

Which one of the following correctly lists the numbers 0.07,  $2.5 \times 10^{-2}$  and  $\frac{56}{10000}$  in ascending order?

- A.  $\frac{56}{10000}$ ,  $2.5 \times 10^{-2}$ , 0.07
- B. 0.07,  $\frac{56}{10000}$ ,  $2.5 \times 10^{-2}$
- C. 0.07,  $2.5 \times 10^{-2}$ ,  $\frac{56}{10000}$
- D.  $\frac{56}{10000}$ , 0.07,  $2.5 \times 10^{-2}$
- E.  $2.5 \times 10^{-2}$ ,  $\frac{56}{10000}$ , 0.07

**Question 12**

The following is a net of a closed cylinder with a height of 3 m.  
The perimeter of the circular cross-section is given by  $3.4\pi$  m.



The surface area of the cylinder is closest to

- A.  $18.2 \text{ m}^2$
- B.  $32.0 \text{ m}^2$
- C.  $42.7 \text{ m}^2$
- D.  $50.2 \text{ m}^2$
- E.  $53.4 \text{ m}^2$

**Question 13**

Consider the graph with equation  $y = mx - c$ .

The  $y$ -intercept of this graph is greater than 0.

Which one of the following statements is **true**?

- A.  $c < 0$
- B.  $c = 0$
- C.  $c > 0$
- D.  $m > 0$
- E. There is not information given to deduce any restrictions on  $m$  or  $c$

**Question 2** (5 marks)

James has 4 times as many chocolates as Nick.

The total number of chocolates that James and Nick have altogether, with 5 additional chocolates added, is 30. Let  $n$  be the number of chocolates that Nick has.

- a.** Write, in terms of  $n$ , the number of chocolates that James has. 1 mark

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- b.** Write an equation in the form  $ax + b = c$ , where  $a$ ,  $b$  and  $c$  are integers, that represents the situation described above. 2 marks

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- c.** Find the number of chocolates that Nick has by solving the equation in part **b.** 2 marks

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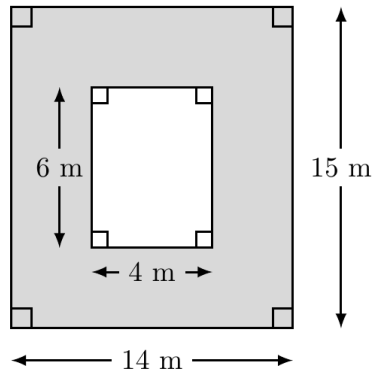
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**Question 4 (5 marks)****a.**

2 marks



Find the area of the shaded part in the diagram above.

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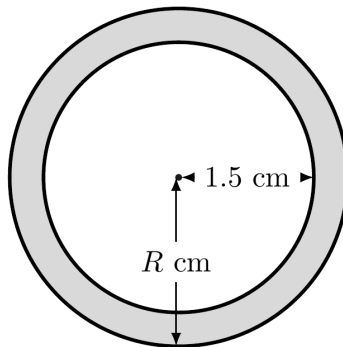
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**b.**

3 marks



The exact area of the annulus shown above is  $3.51\pi \text{ cm}^2$ .  
Find the value of  $R$ .

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**SECTION C****Instructions for Section C**

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** (10 marks)

The surface area of the Earth is approximately  $51.01 \times 10^7 \text{ km}^2$ .



a. Write the surface area of the Earth in scientific notation.

1 mark

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b. The surface area of the Moon is approximately  $3.79 \times 10^7 \text{ km}^2$ .

2 marks

How much larger is the surface area of the Earth than the surface area of the Moon?

Write your answer in scientific notation.

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**2021 YEAR 9 MATHEMATICS MIDYEAR TEST****SOLUTIONS****SECTION A**

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

**Question 1**

$$0.03057 \approx 0.031$$

Answer is **D**.

**Question 2**

$$(x^2y)^{-1} = \frac{1}{x^2y}$$

Answer is **B**.

**Question 3**

The three given numbers in decimal form are

$$0.07$$

$$2.5 \times 10^{-2} = 0.025$$

$$\frac{56}{10000} = 0.0056$$

Therefore, the numbers in ascending order are  $\frac{56}{10000}$ ,  $2.5 \times 10^{-2}$ , 0.07.

Answer is **A**.

**Question 2** (10 marks)**a.****i.**

2 marks

By Pythagoras' theorem

$$\text{Perimeter} = 16 + 25 + \sqrt{16^2 + 25^2} \quad (\text{A1})$$

$$\approx 70.7 \text{ m} \quad (\text{A1})$$

**ii.**

2 marks

$$\tan(z) = \frac{16}{25} \quad (\text{A1})$$

$$z = \tan^{-1}\left(\frac{16}{25}\right)$$

$$\approx 32.6^\circ \quad (\text{A1})$$

• Accept using  $\sin(z) = \frac{16}{\sqrt{16^2 + 25^2}}$  or  $\cos(z) = \frac{25}{\sqrt{16^2 + 25^2}}$ .

**iii.**

2 marks

$$x = 180 - 90 - 32.6 \quad (\text{A1})$$

$$\approx 57.4^\circ \quad (\text{A1})$$

**b.****i.**

1 mark

$$9 \times 9 = 81 \text{ cm}^2 \quad (\text{A1})$$

**ii.**

3 marks

$$4 \times \frac{1}{2} \times 9 \times w + 81 = 216 \quad (\text{A1})$$

$$18w = 135 \quad (\text{A1})$$

$$w = 7.5 \quad (\text{A1})$$