[illegible]

4045/01

20 July 2023

2 hours

Candidates answer on the Question Paper.

Write your candidate name, class and index number in the spaces at the top of this page.
Write in dark blue or black pen.
You may use a HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.

The number of marks is given in brackets [] at the end of each question or part question.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

The total of the marks for this paper is 70.

The use of an approved scientific calculator is expected, where appropriate.

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If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π , use either your calculator value or 3.142.

For Examiner's use
Marks
70

Parent's Signature: _____

This question paper consists of **15** printed pages and **1** blank page.

*Mathematical Formulae**Compound interest*

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved Surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

Answer **all** the questions.

1. List the following numbers in descending order, starting with the largest.

1.8^2

π

$\sqrt[3]{42}$

3.14

Answer [2]
(largest) (smallest)

2. (a) Solve the inequality $4y > -38$.

Answer [1]

- (b) Find the smallest integer satisfying $4y > -38$.

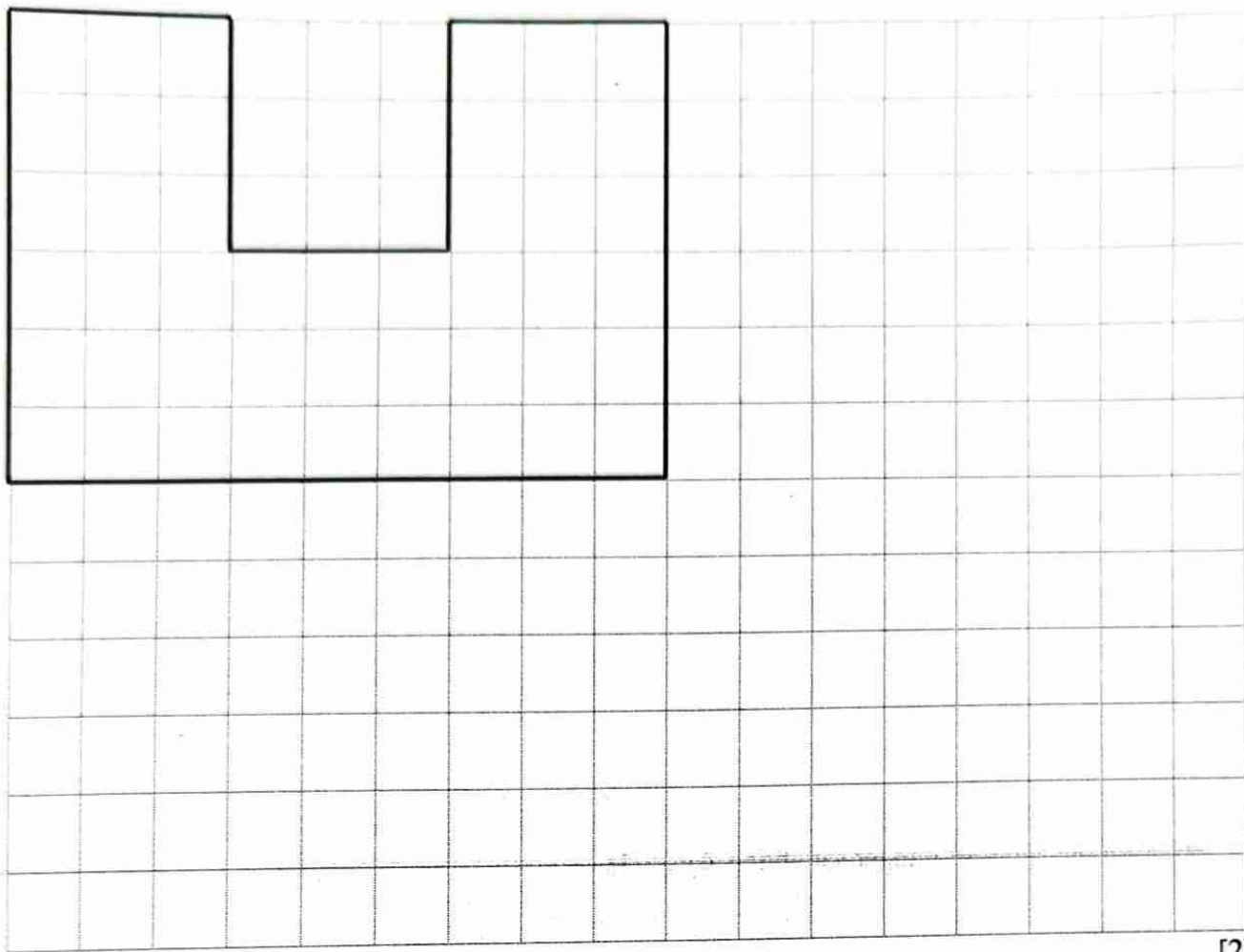
Answer [1]

3. Factorise $3xy - py + 6xq - 2pq$ completely.

Answer [2]

4. Draw a reduction of the figure using a scale factor of $\frac{2}{3}$.

Answer

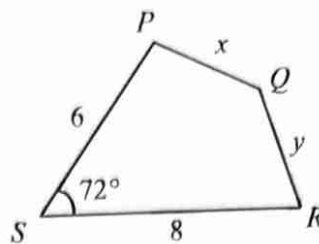
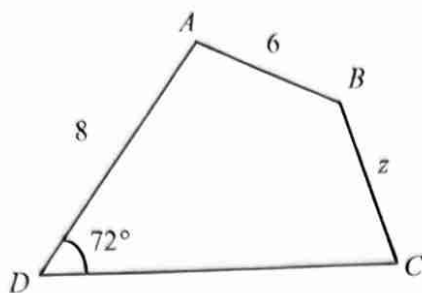


[2]

5. Solve $3(1 - x) = 15$.

Answer $x = \dots\dots\dots$ [2]

6.



Quadrilaterals $ABCD$ and $PQRS$ are similar.

All the lengths are in centimetres.

(a) Calculate x .

Answer $x = \dots\dots\dots$ [2]

(b) Find y in terms of z .

Answer $y = \dots\dots\dots$ [1]

7.

2, 9, 16, 23, 30, ...

(a) Write down the next 2 terms in the sequence.

Answer $\dots\dots\dots$, $\dots\dots\dots$ [1]

(b) Find an algebraic expression for the n th term in the sequence.

Answer $\dots\dots\dots$ [2]

(c) Find the 154th term of this sequence.

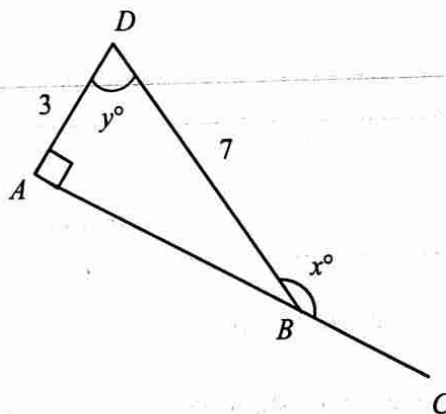
Answer $\dots\dots\dots$ [1]

8. It is given that y is inversely proportional to the square of x .
When $x = 6$, $y = 4$.

Find the value(s) of x when $y = 100$.

Answer $x = \dots\dots\dots$ [3]

9. In the diagram, ABC is straight line, angle $BAD = 90^\circ$, $AD = 3$ cm and $BD = 7$ cm.



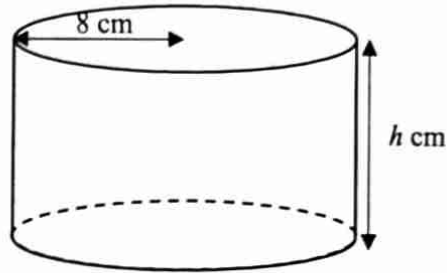
- (a) Write $\sin x^\circ$ as a fraction.

Answer $\dots\dots\dots$ [1]

- (b) Find y .

Answer $y = \dots\dots\dots$ [2]

10. A solid cylinder has radius 8 cm and height h cm.



Given that the total surface area of the cylinder is 650 cm^2 , calculate h .

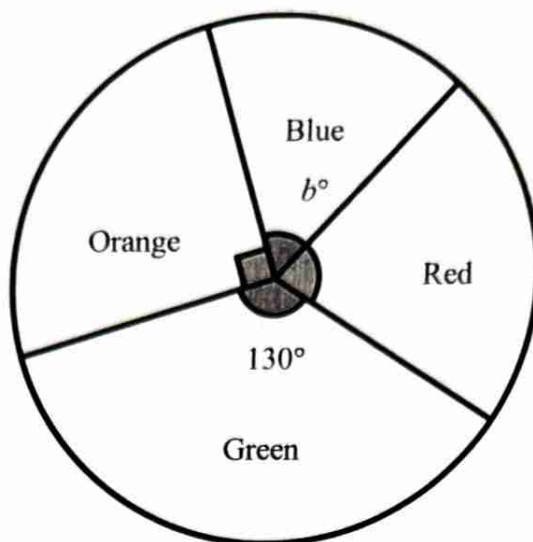
Answer $h = \dots\dots\dots \text{ cm}$ [3]

11. Simplify $\frac{3}{x-5} + \frac{x}{x^2-25}$.

Answer $\dots\dots\dots$ [3]

12.

8



The diagram (not drawn to scale) shows a circle divided into sectors of different colours. Given that $\frac{2}{9}$ of the circle is red, find b .

Answer $b = \dots\dots\dots$ [3]

13. The equation of a straight line is $3y = 12 - 2x$.

Find the coordinates of the point where the line cuts the y -axis.

Answer ($\dots\dots\dots$, $\dots\dots\dots$) [2]

14. Jenny travelled from Singapore to Thailand.

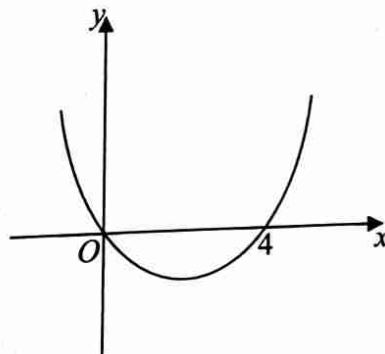
She exchanged 800 dollars (\$) into Thai Baht (THB) when the exchange rate is $\$1 = 25$ THB. While in Thailand, she spent 10 800 THB.

On her return, she exchanged the remaining Thai Baht into dollars when the exchange rate was $\$1 = 24$ THB.

How many dollars (\$) did she receive?
Leave your answer correct to the nearest dollar.

Answer \$ [3]

15.



(a) Which one of the following is a possible equation for the graph?

$$y = 4x - 16$$

$$y = x(4 - x)$$

$$y = x(x - 4)$$

$$y = x^2$$

Answer [1]

(b) Write down the equation of line of symmetry.

Answer [1]

16. (a) Rearrange this equation to make a the subject of the formula.

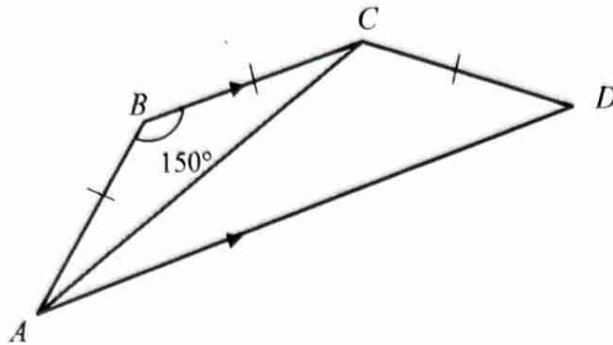
$$\frac{3a + c}{d} = 2$$

Answer $a = \dots\dots\dots$ [2]

(b) Hence or otherwise, find the value of a if $c = -5$ and $d = 8$.

Answer $a = \dots\dots\dots$ [2]

17. The diagram below shows a trapezium, where $AB = BC = CD$, BC is parallel to AD , and angle $ABC = 150^\circ$.



- (a) Find angle ACD .

Answer $^\circ$ [2]

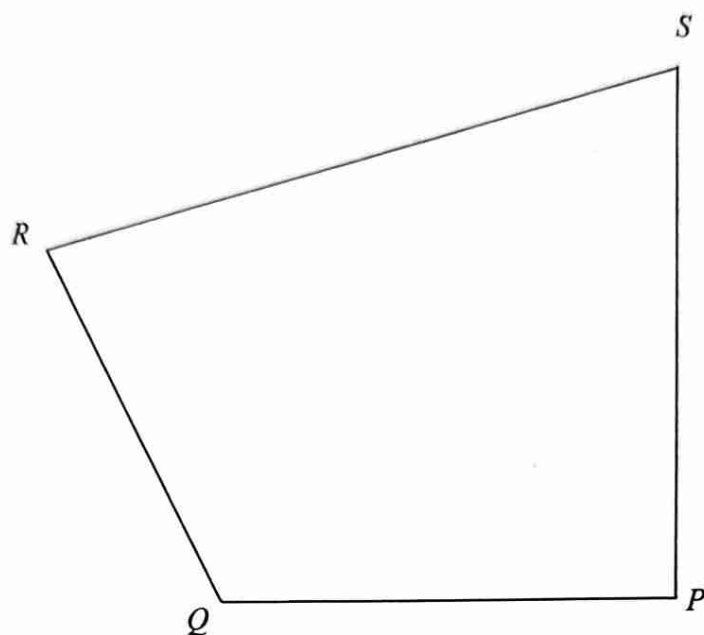
- (b) Explain why AC bisects angle BAD .

Show working and/or reasons clearly.

Answer

[3]

18. The diagram below shows the layout of a garden.



(a) Measure angle QRS .

Answer angle $QRS = \dots\dots\dots^\circ$ [1]

(b) Construct the angle bisector of angle RQP .

[1]

(c) Construct the perpendicular bisector of PS .

[1]

19. $(x+1)^2 - 11$ can be expressed in the form $x^2 + bx + c$.

(a) Find the value of b and c .

Answer $b = \dots\dots\dots$, $c = \dots\dots\dots$ [2]

(b) Solve the equation $(x+1)^2 - 11 = 0$, leaving your answers correct to two decimal places.

Answer $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

20. (a) Jae invested \$4500 at 2.5% compound interest per annum, compounded annually.

Calculate the compound interest Jae will receive at the end of 5 years?
Give your answer correct to the nearest cent.

Answer \$ $\dots\dots\dots$ [3]

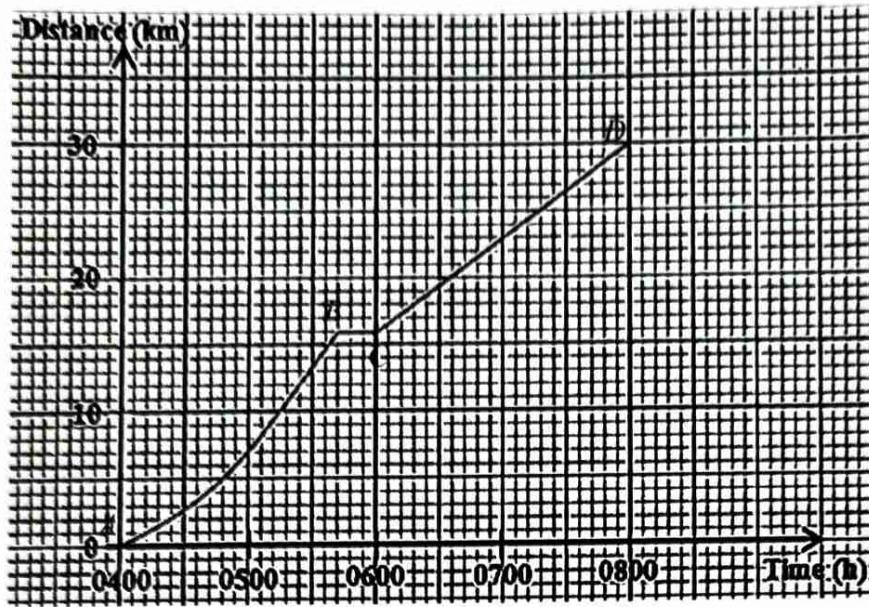
(b) Gina invested some money in government bonds.
One year later her investment had gained 8.5% of its original value.
It was then worth \$8029.

How much did Gina invest originally?

Answer \$ $\dots\dots\dots$ [2]

21. George participated in a 30 km marathon.

The distance-time graph below represents his run from the start to finish.



- (a) What does the line BC represent?

Answer [1]

- (b) How long did it take for George to reach point B?

Answer h min [1]

- (c) 'George's average running speed from A to B is faster than his average running speed from C to D .'

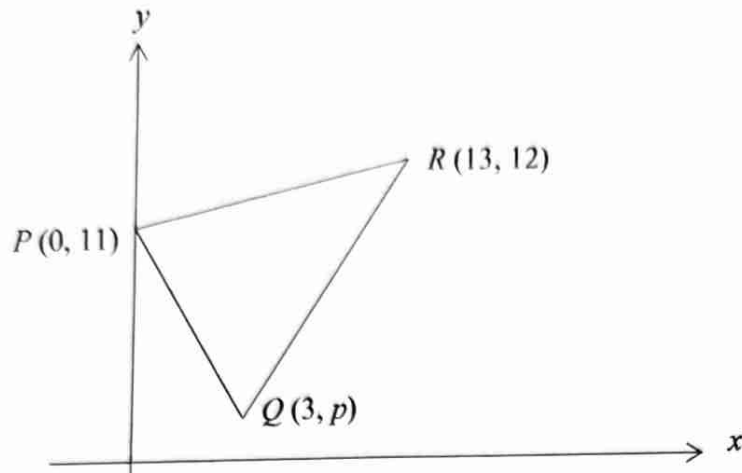
Is this statement correct?

Explain your answer.

Answer

22. The diagram below, which is not drawn to scale, shows a triangle PQR .

The coordinates of P , Q and R are $(0, 11)$, $(3, p)$ and $(13, 12)$ respectively.



- (a) Find the length of PR , leaving your answer correct to 2 decimal places.

Answer [2]

- (b) Given that the gradient of RQ is 1, find the value of p .

Answer $p =$ [2]

- (c) Find the equation of RQ .

Answer [2]

END OF PAPER

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