GREENRIDGE SECONDARY SCHOOL
2024 END-OF-YEAR EXAMINATION
SECONDARY 2 EXPRESS

CANDIDATE NAME

CLASS ____ - ____ INDEX NUMBER ____ ____

MATHEMATICS **4052**

1 October 2024

2 hours 15 minutes

Candidates answer on the Question Paper.

Additional Materials: Nil

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the 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 in the space below the question.
Omission of essential working will result in loss of marks.
The total of the marks for this paper is 90.

The use of an approved scientific calculator is expected, where appropriate.
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	
Total	90

Section A
This section carries 45 marks.

1 Calculate $\sqrt[3]{1.1} - \frac{0.57^2}{2}$.

(a) Write down all the values shown on your calculator display.

Answer ..... [1]

(b) Write down your answer in **(a)** correct to

(i) 2 decimal places,

Answer ..... [1]

(ii) 3 significant figures.

Answer ..... [1]

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2 **(a)** Factorise $3x^2 + x - 10$.

Answer ..... [2]

(b) Hence, simplify $\frac{x^2 - 4}{3x^2 + x - 10}$.

Answer ..... [2]

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3 Factorise completely $3x^2 + 6xy - 2y - x$.

Answer ..... [2]

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4 The formula is given as $T = \dfrac{2p + x}{3p - x}$.

(a) Find T when $p = -1$ and $x = 3$.

Answer ..... [1]

(b) Express p as the subject of the formula.

Answer ..... [3]

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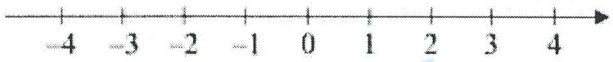
5 **(a)** Solve the inequality $x+7 \leq 13+3x$.

Answer ..... [2]

(b) Represent the solution on the number line below.



[1]

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6 An army camp has enough food for 140 men for 28 days.
Assuming they eat the same amount of food per day, how long will the food last if only 112 men are sent to the camp?

Answer ..... days [2]

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7 A map is drawn to a scale of 1 : 250 000.

(a) Find the actual distance, in km, of a road which is represented on the map by a line which is 3.6 cm long.

Answer ..... km [2]

(b) A lake has an actual area of 170 km^2.
Find the area, in cm^2, of the lake on the map.

Answer ..... cm^2 [2]

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8 Expand and simplify $(5x+4y+3)(5x+4y-3)$.

Answer ..... [2]

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9 Written as a product of its prime factors, $360 = 2^3 \times 3^2 \times 5$.

(a) Express 864 as the product of its prime factors.

Answer 864 = ... [1]

(b) Find

(i) the highest common factor of 864 and 360,

Answer ..... [1]

(ii) the lowest common multiple of 864 and 360,

Answer ..... [1]

(c) The number $\frac{360p}{q}$ is a perfect cube.

p and q are prime numbers.
Find the value of p and the value of q.

Answer p = ...

q = ... [1]

10 Solve $\frac{5}{x+3}+\frac{2}{x-2}=0$.

Answer $x =$ ..... [2]

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11 Given that $p^2+q^2=147$, $pq=11$ and $p+q>0$, find the value of $3p+3q$.

Answer ..... [3]

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12 A car skidded to a halt in an accident.
Traffic police officers measured the skid length, l m, to estimate the speed, v m/s, at which it had been travelling before the accident.
The speed was found to be proportional to the square root of the skid length.

(a) Given that a car travelling at 20 m/s will skid 25 m,

(i) write down a formula for v in terms of l,

Answer $v =$ ..... [2]

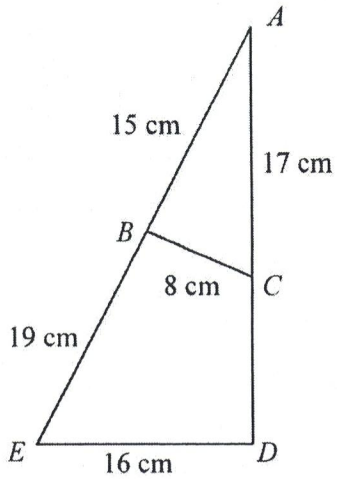
(ii) find the speed of a car which skidded 144 m.

Answer ..... m/s [1]

(b) What happens to the speed of the car when the skid length is increased by 300%?

Answer ..... [1]

13 In the diagram, triangles ABC and ADE are similar.
$AB = 15$ cm, $AC = 17$ cm, $BC = 8$ cm, $BE = 19$ cm and $ED = 16$ cm.



(a) Find the length of CD.

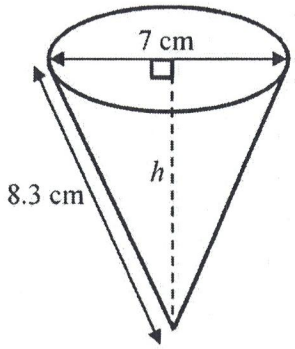
Answer ..... cm [2]

(b) Determine whether triangle ADE is a right-angled triangle.

Answer .....

..... [2]

14 A paper cup is in the shape of a cone.
It has a diameter of 7 cm and a slant height of 8.3 cm.



(a) Find the height, h, of the cup.

Answer ..... cm [2]

(b) There is 85 cm^3 of water in the cup.
Joe claims that the water will not overflow if he drops a marble of 15 cm^3 in.
Do you agree? Give a reason for your answer.

Answer .....

..... [2]

Section B

This section carries 45 marks.

1 The stem-and-leaf diagram shows the test marks of Class A pupils in a History test and a Science test.

History test marks	Stem	Science test marks
9 7 4	3	
4 3 1 1 0	4	8
9 8 3 2 1 1	5	2 3 7 9
7 5 3 2	6	1 2 2 2 3 5 6
5 1	7	3 4 5 6 8
	8	0 2 3

Key: 3 | 4 means 43 marks for the History test and 4 | 8 means 48 marks for the Science test

(a) Find the mean mark for the Science test.

Answer ..... marks [2]

(b) Mr Tan says the class did better in the History test.
Do you agree? Give a reason to justify your answer.

Answer .....

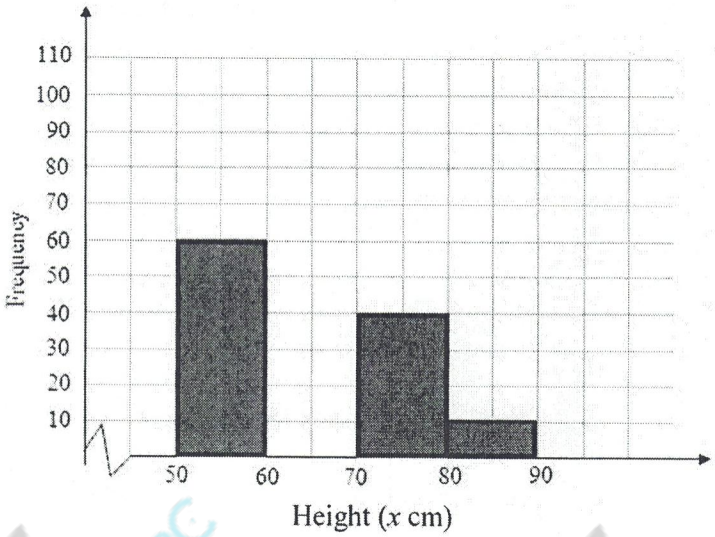
..... [2]

2 The following table shows the height of plants in a garden.

(a) Complete the frequency table and the histogram below.

Answer

Height (x cm)	Frequency
$50 < x \leq 60$	60
$60 < x \leq 70$	90
$70 < x \leq 80$	
$80 < x \leq 90$	10



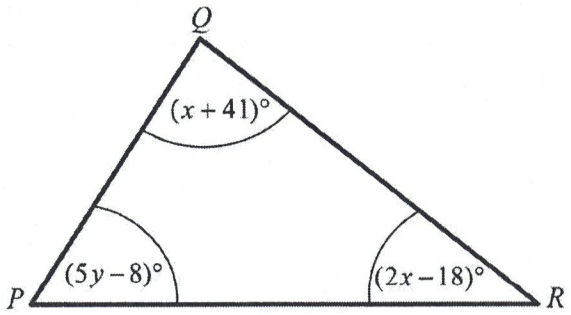
[2]

(b) Plants which are shorter than or equal to 70 cm will be given a special fertiliser to grow taller.

Find the fraction of plants which need the special fertilisers.

Answer ..... [2]

3 The angles of triangle PQR are shown in the diagram below.

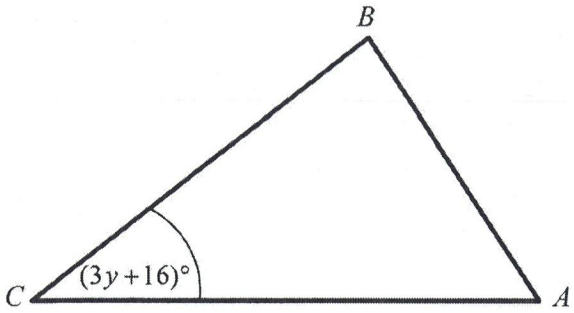


(a) Write down an equation, in terms of x and y, and show that $3x + 5y = 165$.

Answer

[2]

Triangle ABC is congruent to triangle PQR.



(b) Write down an equation, in terms of x and y, and show that $2x - 3y = 34$.

Answer

[1]

(c) Solve the following simultaneous equation.

$$3x + 5y = 165$$
$$2x - 3y = 34$$

Answer x = ...

y = ... [3]

(d) Find angle ABC.

Answer ..... [1]

4 Danny and Ean decided to meet at a park that was in between their respective houses.

Danny left his home for the park at a constant speed of x km/h.

(a) Write down an expression, in terms of x, for the time taken that Danny took to reach the park.

Answer ..... hours [1]

Ean left his home for the park at a constant speed that was 1 km/h slower than Danny.

(b) Write down an expression, in terms of x, for the time taken that Ean took to reach the park.

Answer ..... hours [1]

(c) The time taken by Danny is 2 hours shorter than Ean.
Form an equation, in terms of x, and show that it reduces to $x^2 - 5x - 6 = 0$.

Answer

[3]

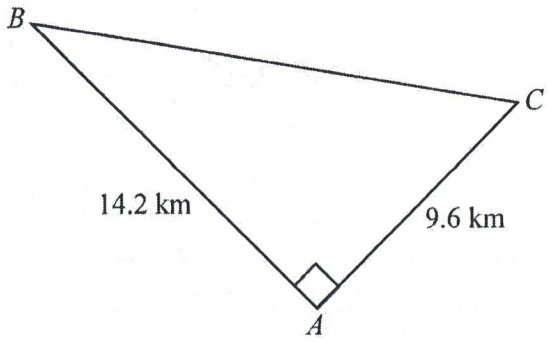
(d) Solve the equation $x^2 - 5x - 6 = 0$.

Answer $x =$ ..... or $x =$ ..... [2]

(e) Hence, find the time taken by Ean to travel from his home to the park.

Answer ..... hours [1]

5 In the diagram, AB, BC and AC are straight paths in a park.
Triangle ABC is a right-angled triangle.
The length of path AB is 14.2 km and the length of path AC is 9.6 km.



(a) Calculate the length of the path BC.

Answer ..... km [1]

(b) Carol walks along the path BC.

Find the shortest distance from Carol to point A during her journey along the path BC.

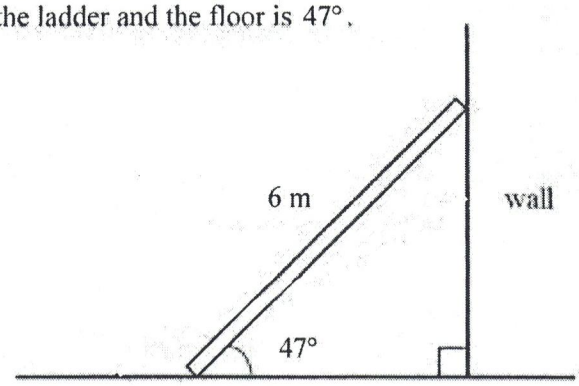
Answer ..... km [2]

(c) Trees are planted along the path AC, with the first tree planted at point A.
Each tree is spaced 200 m apart.

How many trees will be planted along the path AC?

Answer ..... trees [1]

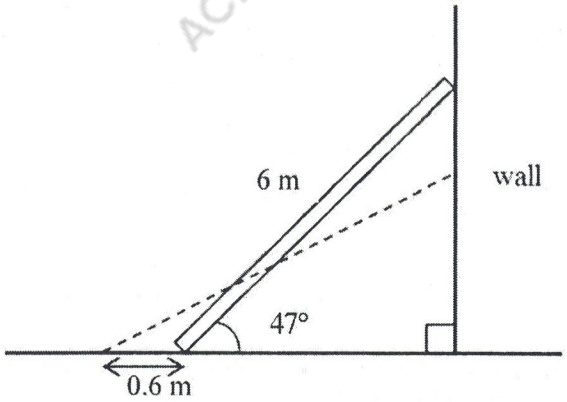
6 A ladder, 6 m long, was leaned against a wall.
The angle between the ladder and the floor is 47°.



(a) Find the distance between the base of the ladder and the foot of the wall.

Answer ..... m [2]

(b) The ladder slid away from the wall and the distance between the base of the ladder and the foot of the wall increased by 0.6 m.



Find the new angle between the ladder and the floor.

Answer ..... [2]

7 A 12 m fencing is used to create a quadrilateral enclosure.

The width of the enclosure is x m.

(a) Show that the area, y, of the enclosure is given by $y = 6x - x^2$.

Answer

[2]

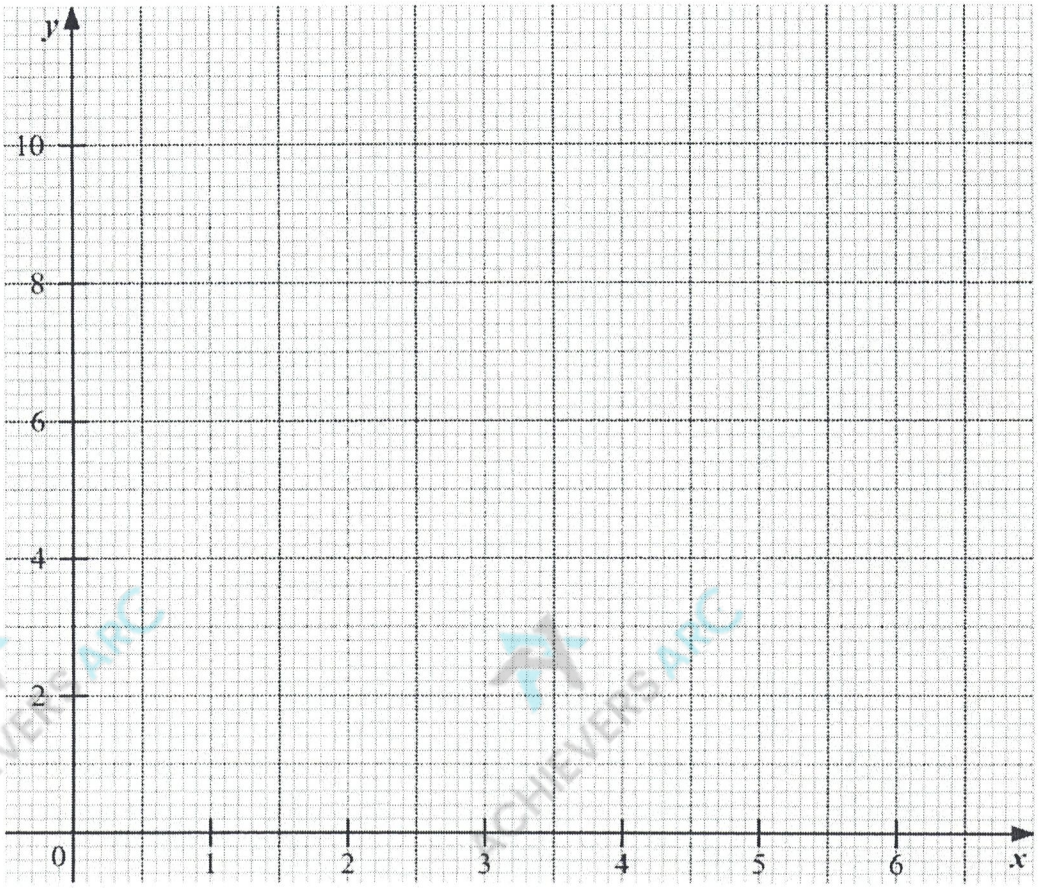
(b) The variables x and y are connected by the equation $y = 6x - x^2$.
Some corresponding values of x and y are given in the table below.

x	0	1	2	3	4	5	6
y	0	5	p	9	8	5	0

Calculate the value of p.

Answer p = ... [1]

(c) Draw the graph of $y = 6x - x^2$ for $0 \leq x \leq 6$. [2]



(d) Use your graph to find

(i) the values of x when the area of the enclosure is 6 m^2,

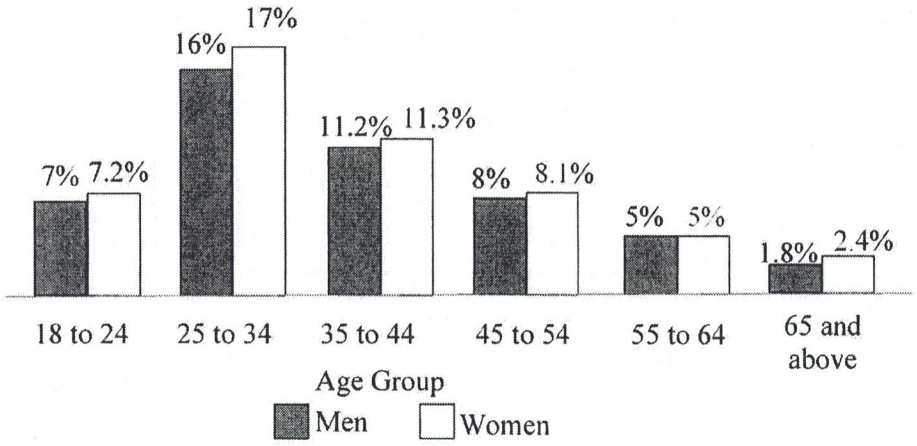
Answer $x =$ ..... or $x =$ ..... [2]

(ii) the maximum possible area of the enclosure.

Answer ..... m^2 [1]

8 Snapbook and Picsup are social media platforms.
Some information on Snapbook usage in City X are shown below.

Percentage of men and women using Snapbook in City X



(a) There are 57120 women who are Snapbook users.

Find the total number of people who use Snapbook in City X.

Answer ..... [2]

(b) City X has a population of 190 000 people.

Find the percentage of City X's population that use Snapbook.

Answer ..... % [1]

There are 45 600 women using Picsup in City X.

Below is some information on Picsup usage of women in City X.

Percentage of women using Picsup in City X

Age Group	Percentage
18 to 24	21.7%
25 to 34	19%
35 to 44	38%
45 to 54	16.6%
55 to 64	4.2%
65 and above	0.5%

(c) Mr Tan wants to promote a product for women of ages 25 to 44 years.
He wants to choose a social media platform, Snapbook or Picsup, that will allow his product to be seen by more women of ages 25 to 44 years.

Which social media platform, Snapbook or Picsup, should he choose?

Justify your decision and show your calculations clearly.

Answer .....

..... [3]

END OF PAPER