HUA YI SECONDARY SCHOOL SUMMATIVE REVIEW 2024

2-G3

NAME

CLASS

INDEX NUMBER

MATHEMATICS PAPER **4052**

03 October 2024

2 hour 15 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your Name, Class, and Index Number on all the work you hand in.
Write all answers on the writing paper provided.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue, or correction fluid.

Answer **all** questions in **Section A** and **Section B.**
The number of marks is given in brackets [ ] at the end 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 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 your answers in degrees to one decimal place.
For π, use either your calculator value, or 3.142.

For Examiner's Use
90

Section A (45 marks)

1 **(a)** Simplify $5(2x - y) - 3(x + 4y)$.

Answer ..... [2]

(b) Factorise completely $x^2 - 6xy - 2wx + 12wy$.

Answer ..... [2]

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2 Write as a single fraction in its simplest form $\frac{3}{4x-1} - \frac{1}{x+2}$.

Answer ..... [2]

3 It is given that $c = \sqrt{\frac{3a-b}{a}}$.

(a) Calculate the value of c when $a = 5.24$ and $b = -7.82$.
Write your answer correct to 2 decimal places.

Answer ..... [1]

(b) Rearrange the formula to make a the subject.

Answer ..... [3]

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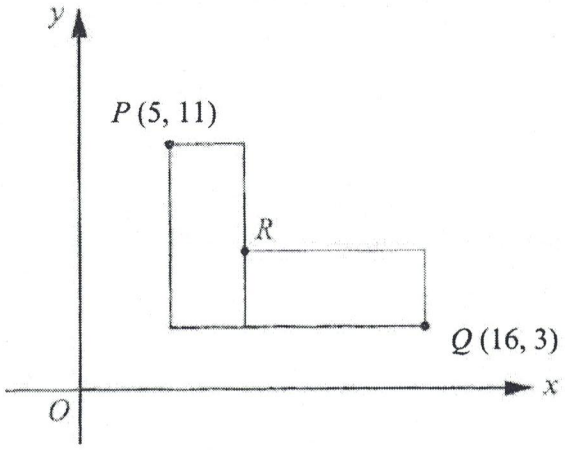
4 **(a)** Factorise $8x^2 - 18$ completely.

Answer ..... [2]

(b) Hence simplify $\frac{3-2x}{8x^2-18}$.

Answer ..... [1]

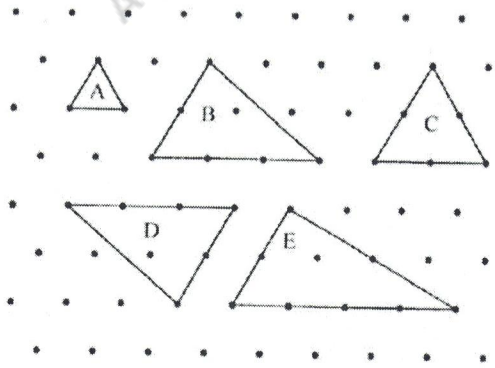
5 **(a)** The diagram shows two congruent rectangles.
The sides are horizontal and vertical.
Point P has coordinates (5, 11) and Q has coordinates (16, 3).



Find the coordinates of R.

Answer (....., ...) [2]

(b) The diagram shows five triangles.



(i) Write down two triangles that are congruent to each other.

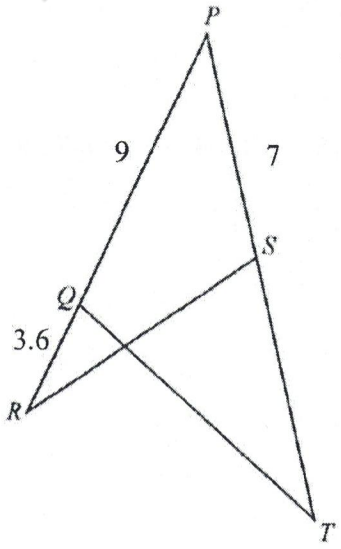
Answer Triangle ..... and triangle ..... [1]

(ii) Triangle A is a reduction of triangle C using a scale factor of k.

Find k.

Answer k = ... [1]

6 Triangles PRS and PTQ are similar. $PQ = 9$ cm, $QR = 3.6$ cm and $PS = 7$ cm.



Calculate the length of ST.

Answer .....cm [2]

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7 **(a)** Solve the inequality $\frac{x-15}{4} \geq x + 7$.

Answer ..... [2]

(b) Hence state the greatest integer value of x.

Answer ..... [1]

8 **(a)** Expand and simplify $(5n-3)^2$.

Answer ..... [1]

(b) Hence show that $(5n-3)^2+6$ is a multiple of 5 for all integer values of n.

Answer [2]

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9 A bag contains some red marbles, some blue marbles and some yellow marbles.
The probability of choosing a red marble at random is 0.35.
The probability of choosing a blue marble at random is 0.4.

(a) Find the probability of choosing a yellow marble at random.

Answer ..... [1]

(b) In the bag, there are 6 more blue marbles than red marbles.
Find the total number of marbles in the bag.

Answer ..... [2]

10 **(a)** Factorise $5x^2 + 7x - 6$.

Answer ..... [1]

(b) Hence solve $5x^2 + 7x - 6 = 0$.

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

11 The scale of a map is 2 cm represents 5 km.

(a) Express the scale in the form 1 : n.

Answer ..... : ..... [1]

(b) The length of the Pan Island Expressway (PIE) on the map is 17.12 cm.
Find the actual length of the expressway.

Answer .....km [1]

(c) The area of Jurong East is 18 km^2. Find the area of Jurong East on the map.

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

12 **(a)** The stem-and-leaf diagram shows the time, in minutes, that each student in a group took to complete a task.

1	6
2	1 1 3 5
3	0 2 4 4 4 8 9
4	0 5 6

Key : 1 | 6 = 16 minutes

(i) Find the median.

Answer .....min [1]

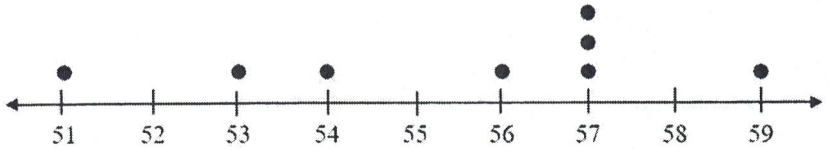
(ii) Find the mode.

Answer .....min [1]

(iii) A student is selected at random. Find the probability that the student selected took less than 25 minutes to complete the task.

Answer ..... [1]

(b) The following dot diagrams shows the time taken by 8 runners during the a race.



Timing in seconds (s)

(i) Calculate the mean.

Answer ..... s [2]

(ii) 25% of the runners took no more than than p seconds.
Find the value of p.

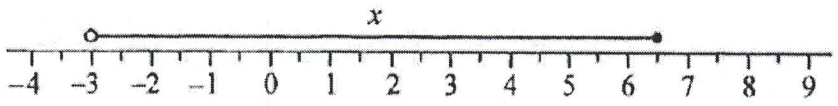
Answer ..... [1]

(iii) It was later discovered that the timing were recorded wrongly.
The actual timing of each runner should be 2 seconds less than what was recorded.
Explain how the error has impacted the mean.

Answer

[1]

13 **(a)** A range of values of x is represented on the number line below.



Write down the inequalities that represent this range of values for x.

Answer ..... [1]

(b) Given that $-3 \leq a \leq 2$ and $1 \leq b \leq 5$, find

(i) the greatest value of $a + b$,

Answer ..... [1]

(ii) the greatest value of $b^2 - a^2$.

Answer ..... [1]

Section B (45 marks)

14 **(a)** Simplify $\frac{15x^2}{8y^3z} \div \frac{5xy}{z}$.

Answer ..... [2]

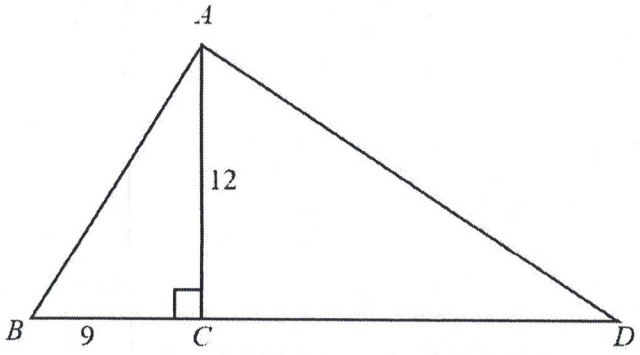
(b) Solve the equation $\frac{2x+5}{14} = \frac{x-1}{3}$.

Answer $x =$ ..... [3]

15 The curved surface area of a cone with radius 20 cm is 580π cm^2.
Find the volume of the cone, leaving your answer in terms of π.

Answer .....cm^3 [3]

16 In the diagram, $AC = 12$ m , $BC = 9$ m and triangle ABC is a right angled triangle.
BCD is a straight line.
The area of triangle ABD is 180 m^2.



(a) Show that the length of CD is 21 m.

Answer [1]

(b) Find the length of AB.

Answer .....m [1]

(c) Determine if triangle ABD is a right angled triangle.
Show your working clearly.

Answer [3]

17 **(a)** It is given that y is directly proportional to $\sqrt{4x-5}$ and $y = 21$ when $x = 13.5$.

(i) Find the equation connecting x and y.

Answer ..... [2]

(ii) Calculate the value of x when $y = 12$.

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

(b) 12 workers can build a bridge in 7 days. How many days would it take to build the bridge if only half the workers can report to work?
State one assumption made.

Answer [2]

18 Bella and Caleb each has a card with a number written on it.
Bella's number is b and Caleb's number is c.

(a) If Bella multiplies her number by 5 and adds 11, the result is the same as that obtained by Caleb when he subtracts his number from 55.
Show that $5b + c = 44$.

Answer [1]

(b) If Bella's number is 10 more than Caleb's, form another equation.

Answer [1]

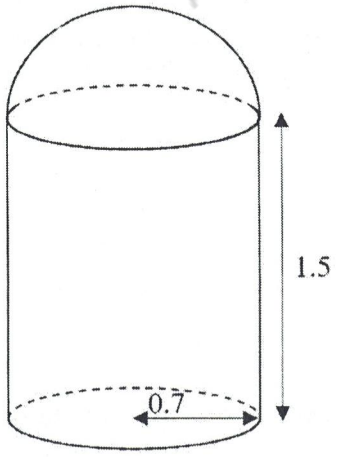
(c) Hence solve the simultaneous equations algebraically.

Answer $b =$ .....

$c =$ .....

[3]

19 A hollow sculpture consists of a cylinder of height 1.5 m wielded to a hemisphere shown in the diagram. The circular base has a radius of 0.7 m.



(a) Find the volume of the sculpture.

Answer .....m^3 [2]

(b) It is intended for the sculpture to be covered with gold foil.
John has a piece of gold foil of area 15 m^2.
Would it be enough to cover the sculpture? Explain, showing your workings.

Answer

[3]

20 The table shows the correspoding values of x and y for the curve $y = 5 + 4x - x^2$.

x	−2	−1	0	1	2	3	4	5	6
y	−7	0	5	8	s	8	5	0	−7

(a) Find the value of s.

Answer $s =$ ..... [1]

(b) On the grid, draw the graph of $y = 5 + 4x - x^2$.

[2]

(c) Using your graph,

(i) find the value of y when $x = 3.7$,

Answer ..... [1]

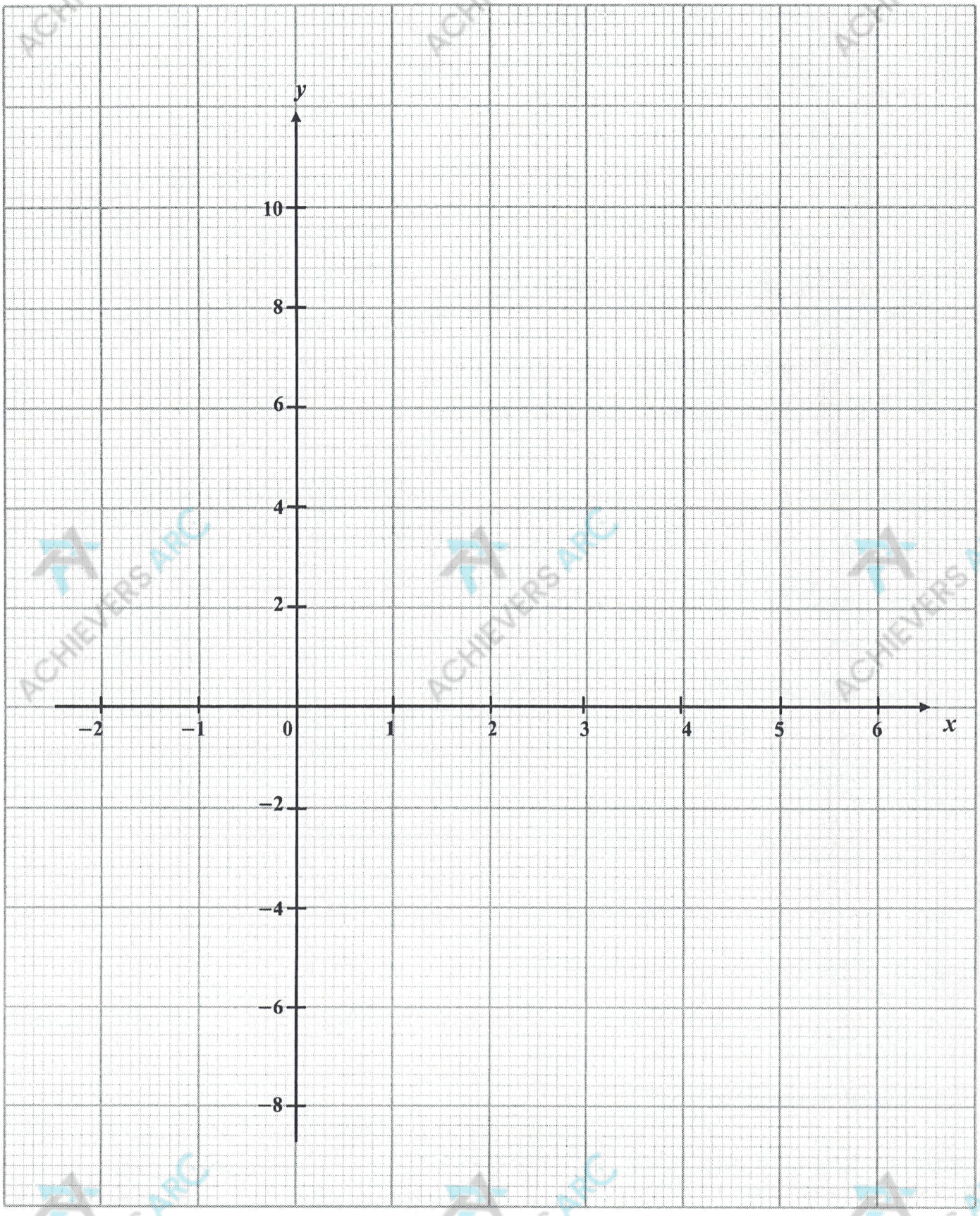
(ii) state the equation of the line of symmetry.

Answer ..... [1]

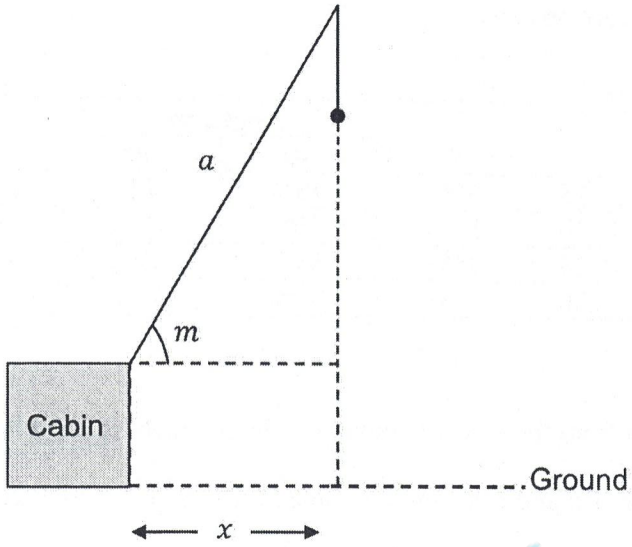
(d) On the same grid, draw the graph of $y = 10$. [1]

Hence explain why $4x - x^2 - 5 = 0$ has no solution.

Answer [1]



21 The diagram shows a crane which has lifted a load from the ground. Loads are lifted and lowered vertically. The length of the arm of the crane is a metres and the angle the arm makes with the horizontal is $m°$. The horizontal distance from the base of the cabin to the load when resting on the ground is x metres.



(a) Find x when $m = 60°$ and $a = 30$.

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

(b) Find m when $x = 5$ and $a = 15$, leaving your answer correct to 1 decimal place.

Answer $m =$ ..... [1]

The safety manual for the crane includes the following information.

The maximum load the crane can lift is 6000 kg.
The table shows the percentage of the maximum load that can be lifted when the length and angle of the arm are changed.

		Angle, $m°$			
		20	40	60	80
Length, a (m)	15	65%	70%	90%	100%
	20	55%	65%	70%	90%
	25	35%	55%	65%	70%
	30	10%	35%	55%	65%

Use the information from the safety manual to help you answer the following questions.

(c) Find the value of a and of m for the crane to lift a load of 6000 kg.

Answer $a =$……., $m =$…….. [1]

(d) Explain if it is safe for a crane operator to operate the crane with an arm length of 20 m at $m = 40°$ to lift a load of 3500 kg.

Answer [2]

(e) If $x = 4.34$ and $a = 25$, find the maximum load that the crane can lift.

Answer ……kg [3]

END OF PAPER