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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

[Turn over]

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]

-
- 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]

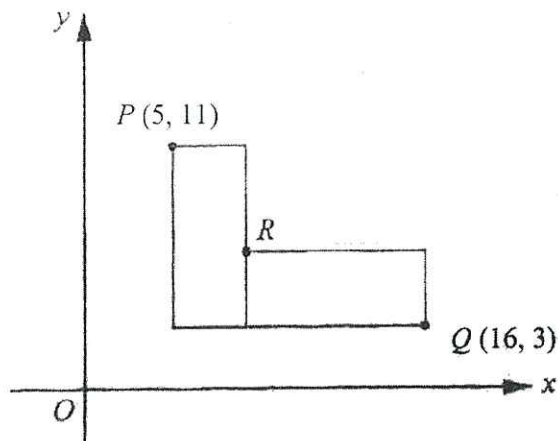
- 4 (a) Factorise $8x^2 - 18$ completely.

Answer [2]

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

Answer [1]

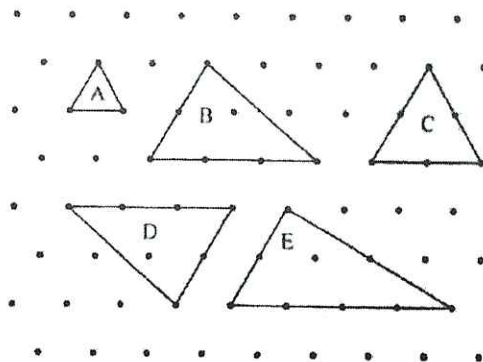
- 5 (a) The diagram shows two congruent rectangles.
The sides are horizontal and vertical.
Point P has coordinates $(5, 11)$ and Q has coordinates $(16, 3)$.



Find the coordinates of R .

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

- (b) The diagram shows five triangles.



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

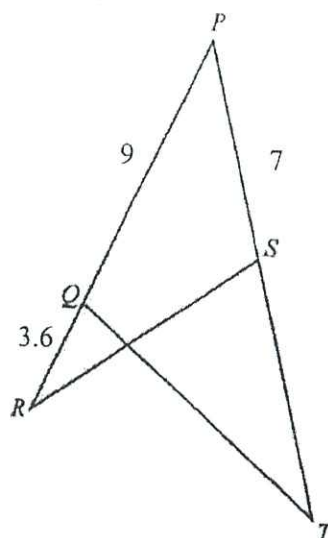
Answer Triangle and triangle [1]

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

Find k .

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

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



Calculate the length of ST .

Answercm [2]

- 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]

-
- 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.

Answerkm [1]

(c) The area of Jurong East is 18 km². Find the area of Jurong East on the map.

Answercm² [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.

Answermin [1]

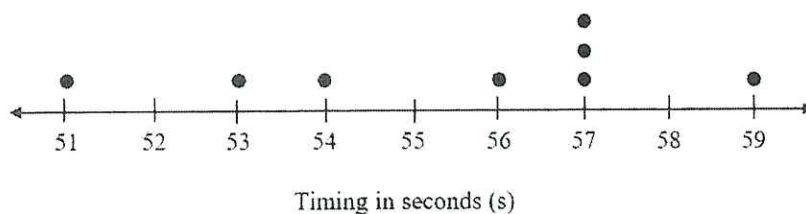
- (ii) Find the mode.

Answermin [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.



- (i) Calculate the mean.

Answer s [2]

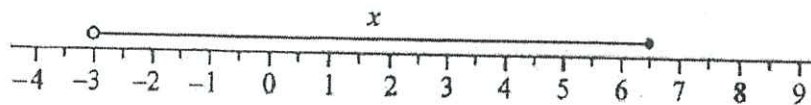
- (ii) 25% of the runners took no more than than p seconds.
Find the value of p .

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]

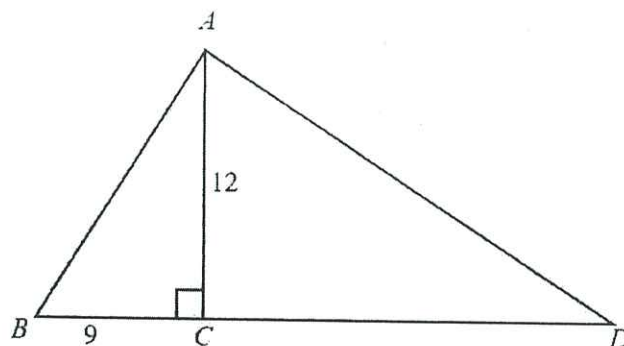
(b) Solve the equation $\frac{2x+5}{14} = \frac{x-1}{3}$.

Answer $x =$ [3]

- 15 The curved surface area of a cone with radius 20 cm is $580\pi \text{ cm}^2$.
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 .

Answerm [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]

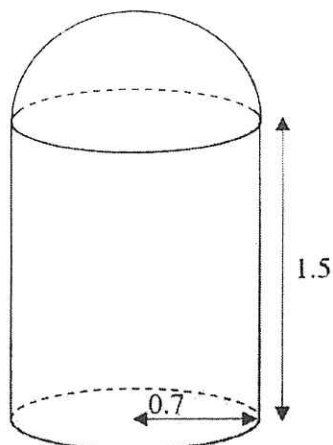
- (c) Hence solve the simultaneous equations algebraically.

Answer $b = \dots\dots\dots$

$c = \dots\dots\dots$

[3]

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



- (a) Find the volume of the sculpture.

Answerm³ [2]

- (b) It is intended for the sculpture to be covered with gold foil.
John has a piece of gold foil of area 15 m².
Would it be enough to cover the sculpture? Explain, showing your workings.

Answer

[3]

- 20 The table shows the corresponding 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 $s = \dots\dots\dots$ [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 $\dots\dots\dots$ [1]

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

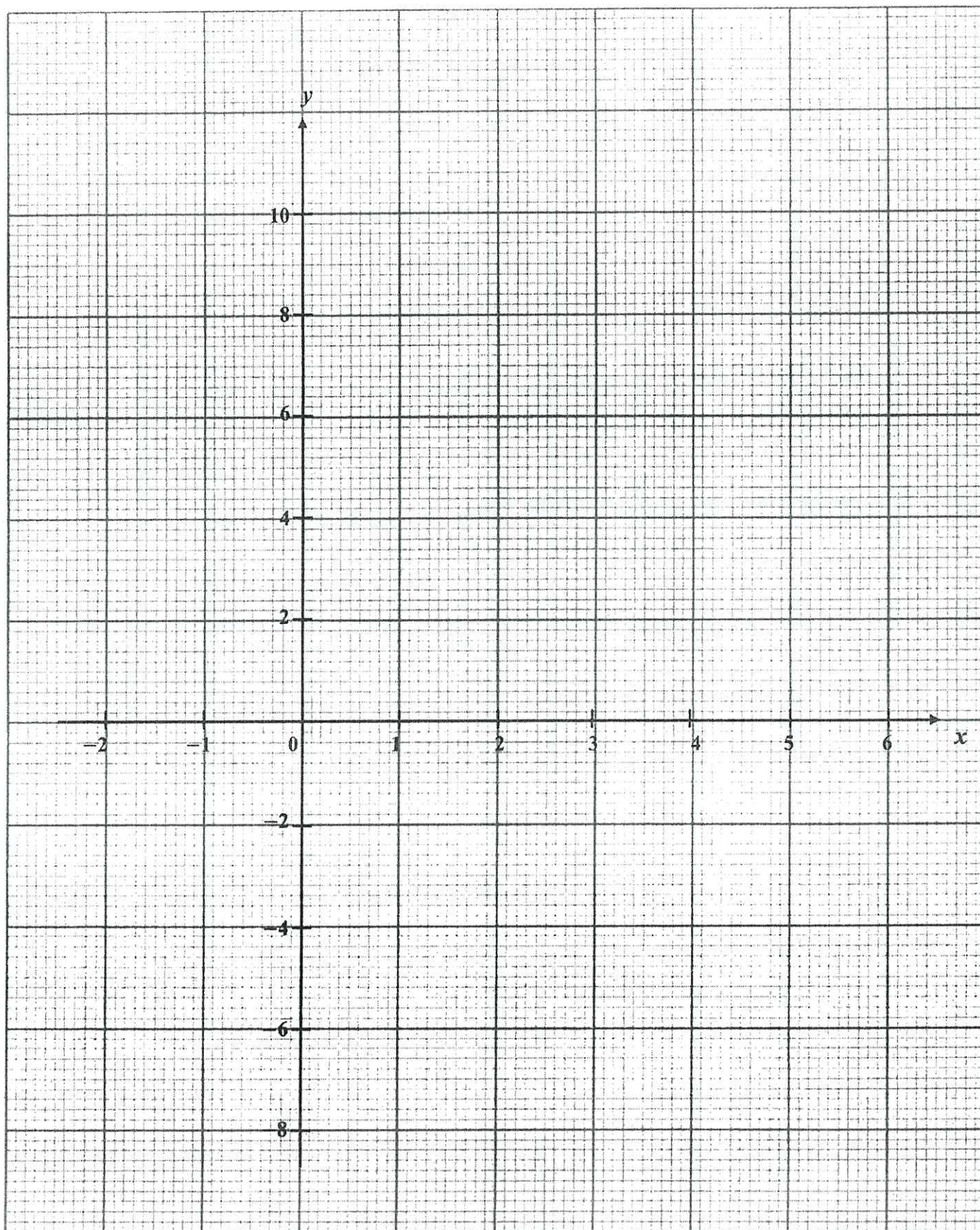
Answer $\dots\dots\dots$ [1]

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

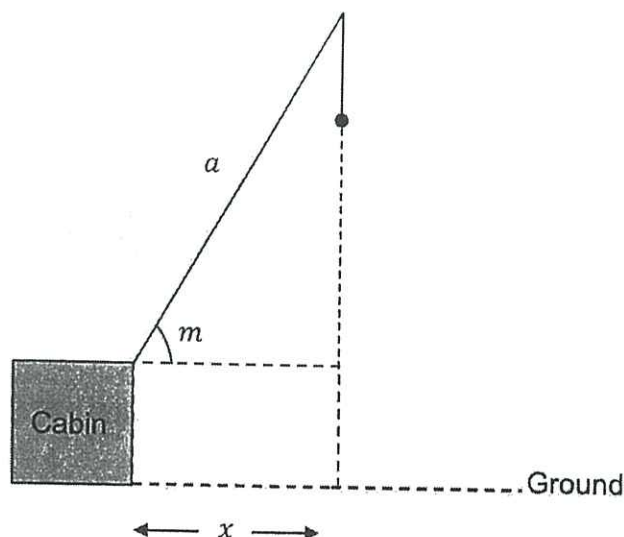
[1]

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

Answer $\dots\dots\dots$ [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 $m = 60^\circ$ and $a = 30$.

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

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

Answer $m = \dots\dots\dots$ [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 $a = \dots\dots\dots, m = \dots\dots\dots$ [1]

- (d) Explain if it is safe for a crane operator to operate the crane with an arm length of 20 m at $m = 40^\circ$ 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 $\dots\dots\dots$ kg [3]

END OF PAPER



HUA YI SECONDARY SCHOOL

SUMMATIVE REVIEW 2024

2-G3

NAME

CLASS

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INDEX
NUMBER

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MATHEMATICS PAPER

02 October 2024

2 hour 15 minutes

Candidates answer on the Question Paper.

MARK SCHEME

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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

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

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

Section A (45 marks)

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

$$10x - 5y - 3x - 12y \quad \text{or} \quad 10x - 5y - (3x + 12y) \quad \text{--M1}$$

$$7x - 17y \text{-----A1}$$

Answer _____ [2]

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

$$x(x - 6y) - 2w(x - 6y) \text{---M1}$$

$$(x - 2w)(x - 6y) \text{---A1}$$

Answer _____ [2]

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

$$\frac{3(x+2)-1(4x-1)}{(4x-1)(x+2)} \text{-----M1}$$

$$\frac{7-x}{(4x-1)(x+2)} \text{-----A1}$$

Answer _____ [2]

3. Given the formula $c = \sqrt{\frac{3a-b}{a}}$

- (a) Calculate the value of c when $a = 5.24$ and $b = -7.82$.
Write your answer to 5 digits.

2.1195 -----B1

Answer _____ [1]

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

$$c^2 a = 3a - b \text{-----M1}$$

$$a(c^2 - 3) = -b \text{-----M1}$$

$$a = \frac{-b}{c^2-3} \text{ or } \frac{b}{3-c^2} \text{-----A1}$$

Answer _____ [3]

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

$$2(4x^2 - 9) \text{-----M1}$$

$$2(2x - 3)(2x + 3) \text{-----A1}$$

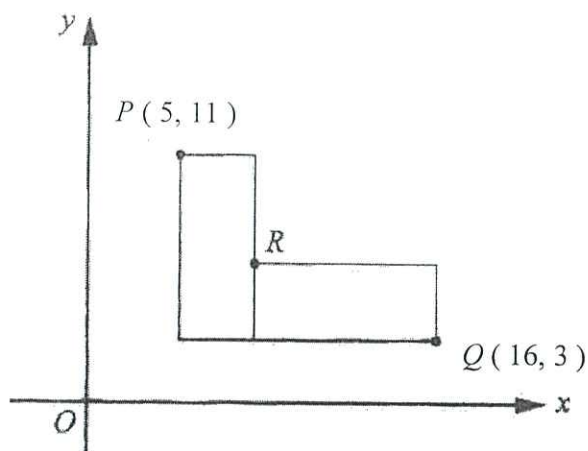
Answer _____ [2]

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

$$\frac{-1}{2(2x+3)} \text{-----B1}$$

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 $(16, 3)$.



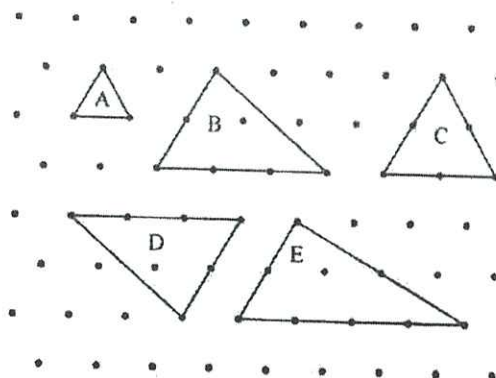
Find the coordinates of R .

Length = 8 units, breadth = 3 units ----M1

$R(8, 6)$ -----B1

Answer (_____, _____) [2]

- (b) The diagram shows five triangles drawn on a 1 cm triangular grid.



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

Answer Triangle ___B___ and triangle ___D___ [1]

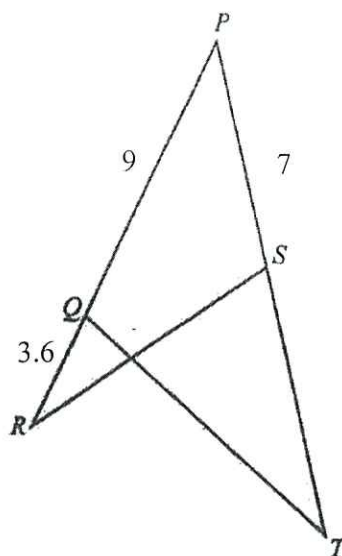
- (ii) Triangle A is a reduction of triangle C using a scale factor of k .

Find k .

$k = \frac{1}{2}$ -----B1

Answer _____ [1]

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



Calculate the length of ST .

$$\begin{aligned}\frac{PR}{PT} &= \frac{RS}{TQ} = \frac{PS}{PQ} \\ \frac{12.6}{7+ST} &= \frac{7}{9} \text{ -----M1} \\ ST &= 9.2 \text{ -----A1}\end{aligned}$$

[2]

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

$$x - 15 \geq 4x + 28 \text{ -----M1}$$

$$x \leq -14\frac{1}{3} \text{ -----A1}$$

Answer _____ [2]

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

$$-15 \text{ -----A1 ECF}$$

Answer _____ [1]

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

$$25n^2 - 30n + 9 \text{---B1}$$

Answer _____ [1]

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

Answer _____ [2]

$$\begin{aligned} &25n^2 - 30n + 15 \text{-----M1} \\ &= 5(5n^2 - 6n + 3) \text{-----A1 for factorising} \end{aligned}$$

-
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.

$$0.25 \text{---B1}$$

Answer _____ [1]

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

$$\begin{aligned} &0.05 \text{ units -----6 marbles -----M1} \\ &1 \text{ unit -----120 marbles----A1} \end{aligned}$$

There are 120 marbles.

Answer _____ [2]

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

$$(5x - 3)(x + 2) \text{-----B1}$$

Answer _____ [1]

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

$$x = \frac{3}{5} \quad \text{or} \quad x = -2 \text{----- A1 for each. ECF}$$

Answer _____ [2]

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

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

1 : 250 000

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.

42.8 km

Answer

[1]

(b) The area of Jurong East is 18 km². Find the area of Jurong East on the map.

Area scale = 4 cm² : 25 km² or equivalent -----M1

Area on the map = 2.88 cm² -----A1

Answer

[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.

32 ----B1

Answer _____ [1]

- (ii) Find the mode.

34----B1

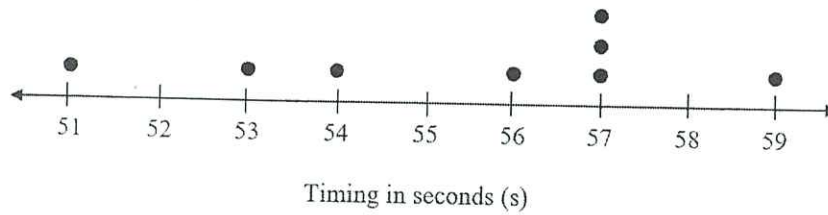
Answer _____ [1]

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

$\frac{4}{15}$ -----B1

Answer _____ [1]

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



- (i) Calculate the mean.

$$\text{Mean} = \frac{51+53+54+56+57 \times 3+59}{8} = 55.5$$

-----m1
-----A1

Answer _____ s [2]

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

2 students took no more than 53 seconds. So $p = 53$ -----B1

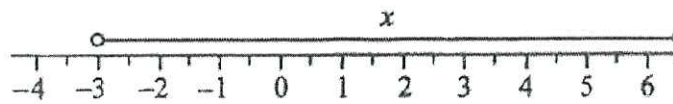
Answer _____ [1]

- (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]

The error would cause the mean to be 2 seconds more than the actual mean.

- 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 .

$-3 < x \leq 6.5$ -----B1

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

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

7-----B1

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

$25 - 0 = 25$

Section B (45 marks)

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

$$\frac{15x^2}{8y^3z} \times \frac{z}{5xy} \text{-----M1}$$

$$\frac{3x}{8y^4} \text{-----A1}$$

Answer

[2]

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

$$3(2x + 5) = 14(x - 1) \text{-----M1}$$

$$-8x = -29 \text{-----M1}$$

$$x = 3.625 \text{ or } 3\frac{5}{8} \text{ or } \frac{29}{8} \text{-----A1}$$

Answer

[3]

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

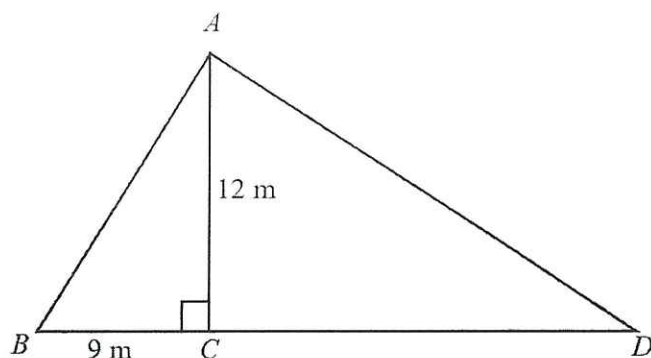
$$\pi \times 20 \times l = 580\pi$$

$$l = 29 \text{-----M1}$$

$$\text{height} = \sqrt{29^2 - 20^2} = 21 \text{-----M1}$$

$$\text{Volume} = \frac{1}{3} \times \pi \times 20^2 \times 21 = 2800\pi \text{-----A1}$$

16. In the diagram below, $AC = 12$ m, $BC = 9$ m and triangle ABC is a right angled triangle. BCD is a straight line.
The area of triangle ABD is 180 m².



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

Answer

[1]

$$\frac{1}{2} \times 12 \times BD = 180 \text{ Use of area to find}$$

$$BD = 30$$

$$DC = 21$$

- (b) Find the length of AB .

$$AB = 15 \text{ ----B1 By Pythagoras thm}$$

Answer _____ [1]

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

Answer

[3]

$$\text{Find } AD^2 = 585 \text{ -----M1 or Find } AD = 24.18677 \text{ (give at least 4 sf)}$$

$$AB^2 + AD^2 = 225 + 585 = 810$$

$$BD^2 = 30^2 = 900 \text{ -----M1}$$

$$AB^2 + AD^2 \neq BD^2$$

By converse of Pythagora's Thm , Triangle ABD is not a right angled triangle. --
--A1

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 .

$$y = k\sqrt{4x-5} \text{ -----M1}$$

$$k = 3$$

$$y = 3\sqrt{4x-5} \text{ -----A1}$$

Answer _____ [2]

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

$$\text{Sub } y = 12, \text{ get } 4 = \sqrt{4x-5} \text{ -----M1}$$

$$4x - 5 = 16$$

$$x = 5.25 \text{ -----A1}$$

Answer _____ [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]

14 days. ----A1

Assumption is that all the workers work at the same rate. --A1

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]

$$5b + 11 = 55 - c \text{-----M1}$$

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

Answer

[1]

$$b = c + 10 \text{-----A1}$$

- c) Hence solve the simultaneous equations algebraically.

by substitution or elimination method -----M1

(M0 if by guess and check)

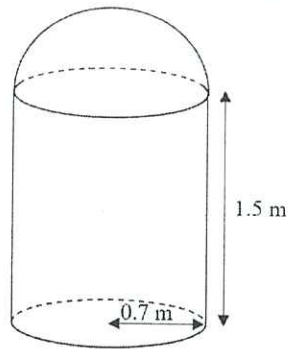
$$c = -1 \text{-----A1}$$

$$b = 9 \text{-----A1}$$

Answer $b =$ _____

$c =$ _____ [3]

19. A hollow sculpture consists of a cylinder of height 1.5 m welded to a hemisphere as show in the diagram below. The circular base has a radius of 0.7 m.



- (a) Find the volume of the sculpture.

$$\text{Volume of hemisphere} = 0.71838 + 2.3091 \text{ ---M1}$$

$$\text{Volume of sculpture} = 3.03 \text{ -----A1}$$

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.

$$\text{M1 for finding curve surfaced area of cylinder} = 6.5982$$

$$\text{M1 for finding curve surface area of hemisphere} + \text{circular base} = 4.6187$$

$$\text{Total area} = 11.2 \text{ (3sf)}$$

Yes it would be enough since the area of the gold foil is more than the total surface area.

Answer _____ m^2 [3]

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

x	-2	-1	0	2	4	6
y	-7	0	5	s	5	-7

- (a) Find the value of s .

9 -----B1

Answer _____ [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 $x = 3.7$,
around 6.2 -----B1 from their graph

Answer _____ [1]

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

$x = 2$ -----B1

Answer _____ [1]

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

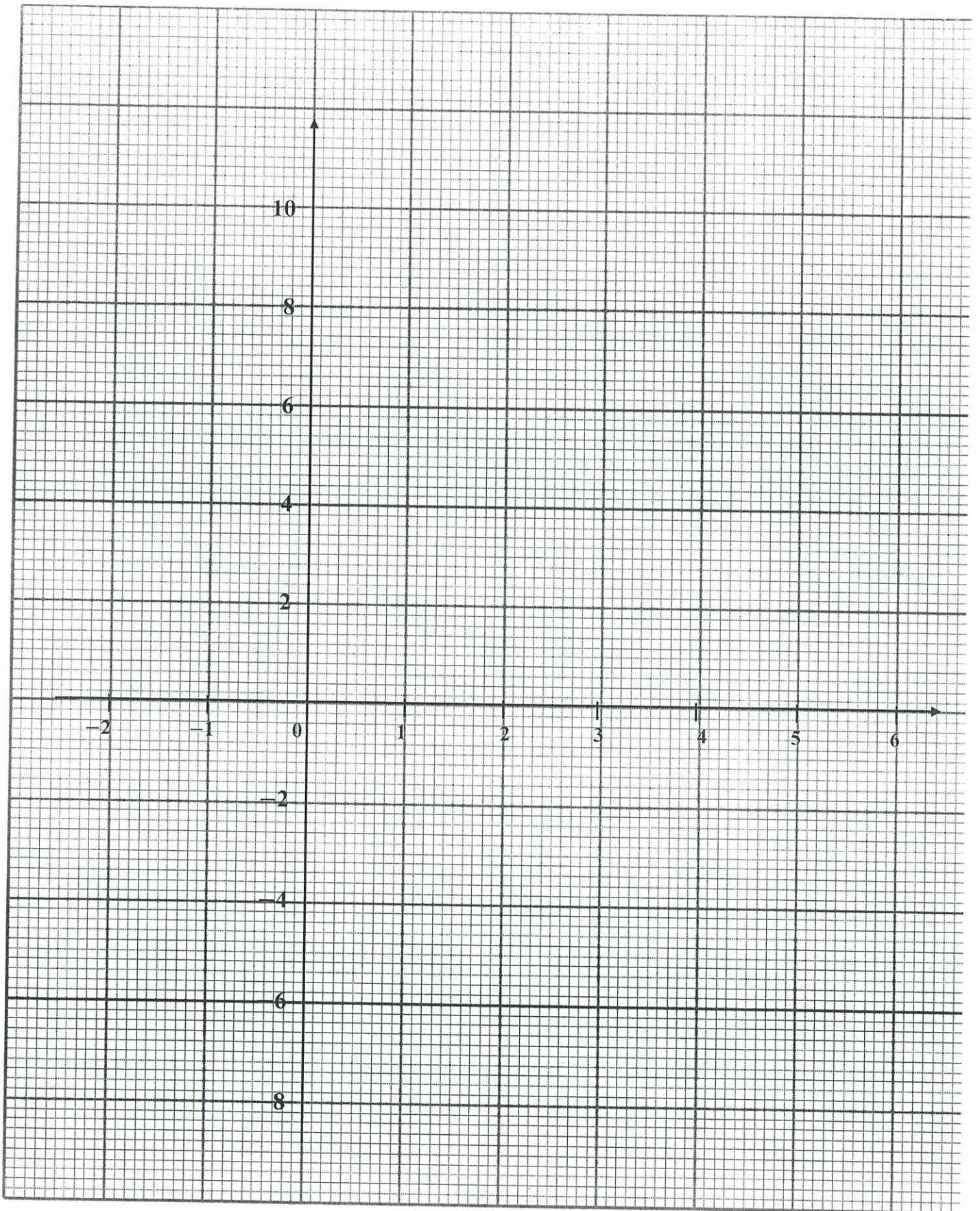
[1]

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

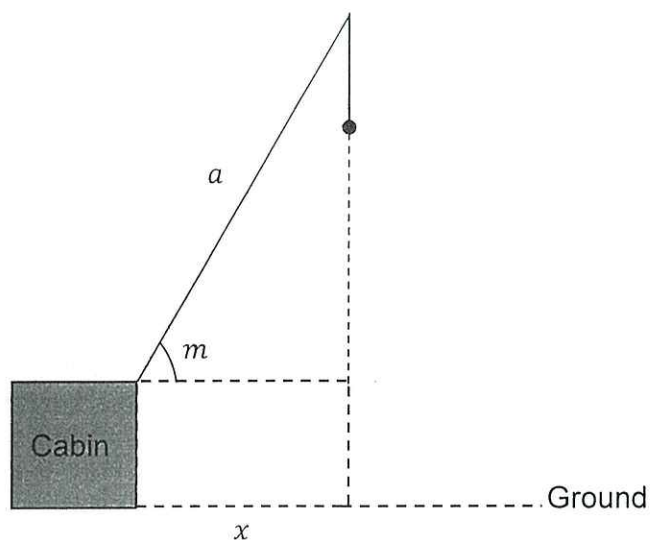
Answer

$$5 + 4x - x^2 = 10 \longrightarrow 4x - x^2 - 5 = 0 \text{ -----M1 with explanation about no intersection}$$

This is because the line $y = 10$ and the curve does not intersect.



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 distance from the base of the cabin to the load when resting on the ground is x metres.



- (a) Find x when $m = 60^\circ$ and $a = 30$.

$$\cos 60 = \frac{x}{30} \text{-----M1}$$

$$x = 15 \text{-----A1}$$

Answer

[2]

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

$$\cos m = \frac{5}{15}$$

$$m = 70.5 \text{-----B1}$$

Answer

[1]

The safety Manual for the crane includes the following information.

The maximum load the crane can lift is 6000 kg.

The table below 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.

$a = 15, m = 80$ -----B1

Answer $a = \underline{\hspace{2cm}}, m = \underline{\hspace{2cm}}$ [1]

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

Answer

[2]

65% of 6000kg = 3900 kg -----M1 (maximum load)

Yes as it has not exceed the maximum load .

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

$$\cos m = \frac{4.34}{25}$$

$m = 80.0$ -----M1

From the table, maximum load is 70% of 6000kg -----M1

So maximum load is 4200 kg. -----A1

Answer $\underline{\hspace{4cm}}$ [3]

END OF PAPER

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