Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 4H

Higher Tier

Tuesday 16 January 2018 – Morning
Time: 2 hours

Paper Reference
4MA0/4H

You must have:
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ▶

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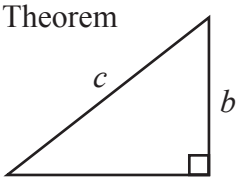
Pearson

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

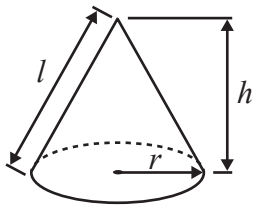
Pythagoras' Theorem



$a^2 + b^2 = c^2$

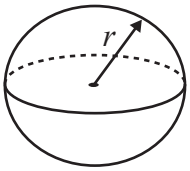
Volume of cone = $\frac{1}{3}\pi r^2 h$

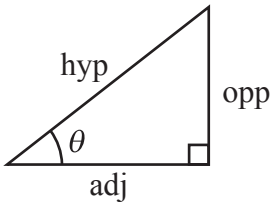
Curved surface area of cone = $\pi r l$



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

Surface area of sphere = $4\pi r^2$





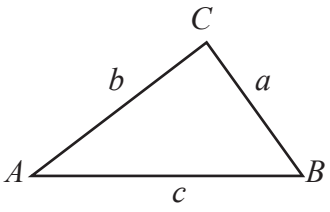
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

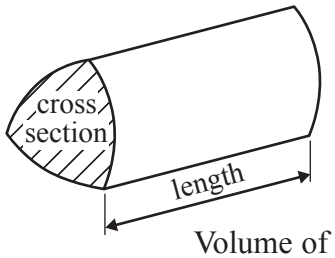
In any triangle ABC



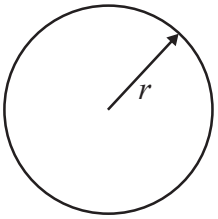
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



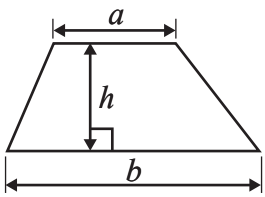
Volume of prism = area of cross section × length

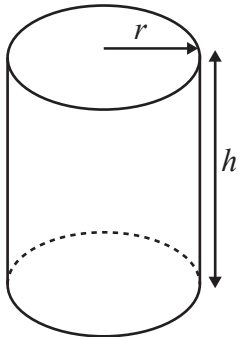


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a+b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Mike buys c pens and r rulers.

Each pen costs 24 cents.
Each ruler costs 37 cents.

Mike spends a total of T cents buying pens and rulers.

Write down a formula for T in terms of c and r.

.....

(Total for Question 1 is 3 marks)

2 A bus leaves Dubai airport and travels to Abu Dhabi.
The bus travels a distance of 165 km at an average speed of 50 km/h.

Work out the time taken by the bus to travel from Dubai airport to Abu Dhabi.
Give your answer in hours and minutes.

..... hours ..... minutes

(Total for Question 2 is 3 marks)

3 (a) Show that $\frac{2}{7} \div \frac{4}{5} = \frac{5}{14}$

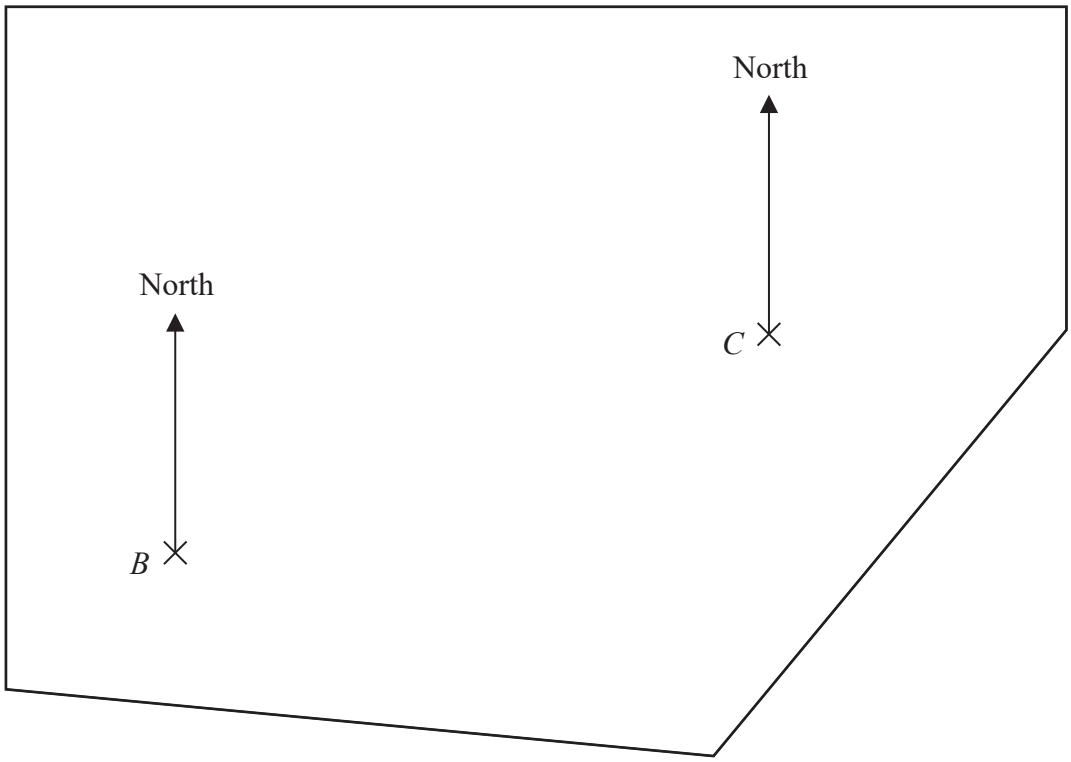
(2)

(b) Show that $3\frac{1}{6} - 1\frac{2}{3} = 1\frac{1}{2}$

(3)

(Total for Question 3 is 5 marks)

4 The accurate scale drawing shows the positions of two trees, *B* and *C*, in a field.



The scale of the drawing is 1 cm to 20 m.

A third tree, *D*, is also in the field.
D is 110 m from *B* and on a bearing of 220° from *C*.

Find the position of *D*.
Mark this point with a cross (×) and label it *D*.

(Total for Question 4 is 3 marks)

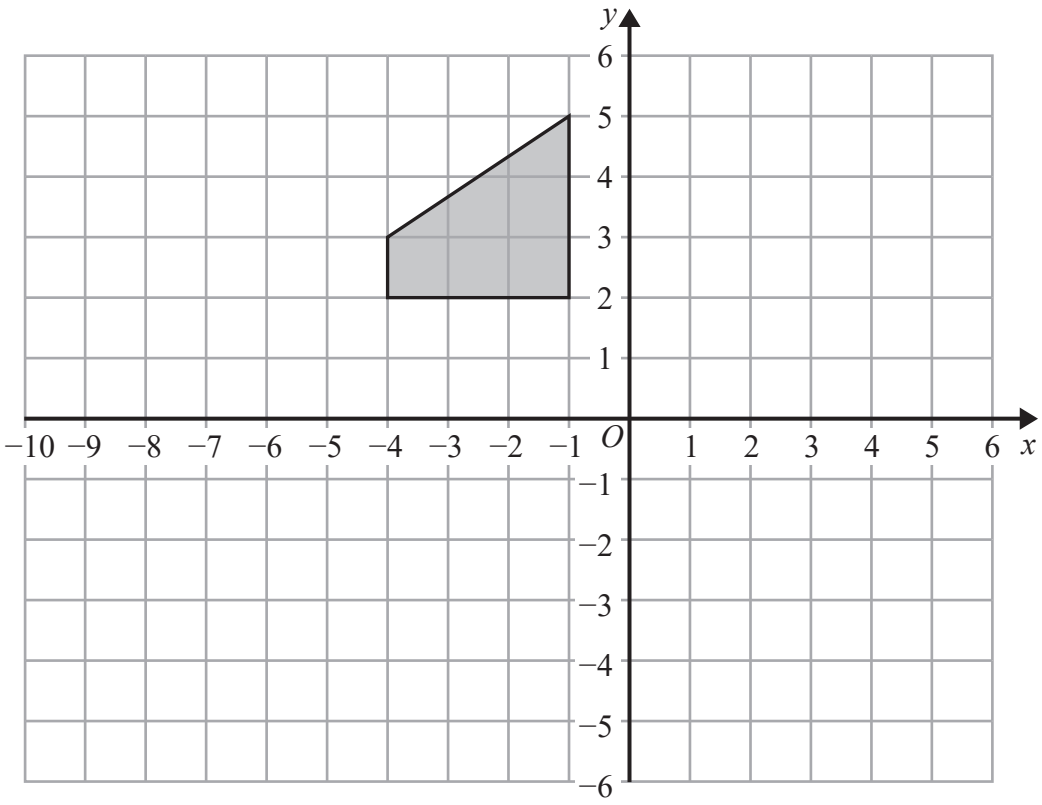
5 A circle has diameter 18 cm.

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 5 is 2 marks)

6



Rotate the shaded shape 90° clockwise about the point (−2, −1)

(Total for Question 6 is 2 marks)

7 There are only white counters, blue counters and red counters in a bag.

Charlie takes at random a counter from the bag.

The probability that he takes a red counter is $\frac{1}{12}$

The probability that he takes a white counter is three times the probability that he takes a blue counter.

Work out the probability that Charlie takes a blue counter.

.....

(Total for Question 7 is 3 marks)

8 In India,
62 million mobile phones were sold from 1st October 2014 to 31st December 2014
14.5% fewer mobile phones were sold from 1st January 2015 to 31st March 2015

(a) Work out the number of mobile phones sold in India from 1st January 2015 to 31st March 2015

..... million
(3)

The table shows information about the mean number of text messages sent by each adult in the UK in 2013 and in 2014

	Mean number of text messages sent by each adult
2013	1656
2014	1404

(b) Work out the percentage decrease in the mean number of text messages sent by each adult in the UK from 2013 to 2014
Give your answer correct to 1 decimal place.

..... %
(3)

The table gives information about the number of minutes Palina used her mobile phone each day in November.

Number of minutes (m)	Frequency
$0 \leqslant m < 10$	3
$10 \leqslant m < 20$	16
$20 \leqslant m < 30$	6
$30 \leqslant m < 40$	4
$40 \leqslant m < 50$	1

(c) Work out an estimate for the total number of minutes Palina used her mobile phone in November.

..... minutes

(3)

(Total for Question 8 is 9 marks)

9 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
$A = \{\text{even numbers}\}$
$B = \{4, 7, 8, 11\}$

(a) List the members of $A \cup B$

.....

(1)

(b) Is it true that $20 \in A$?
Give a reason for your answer.

.....

.....

(1)

C is a set such that $A \cap C = \varnothing$ **and** $B \cap C = \{7\}$
The set C has 3 members.

(c) List the members of one possible set C.

.....

(2)

(Total for Question 9 is 4 marks)

10 (a) Factorise $25m + 30n$

.....

(1)

(b) Expand $p(2p - 3)$

.....

(1)

(c) Simplify fully $\dfrac{y^5 \times y^8}{y^4}$

.....

(2)

(d) Expand and simplify $(x + 7)(x - 3)$

.....

(2)

(e) Factorise fully $36p^3m^2 + 27p^5m$

.....

(2)

(Total for Question 10 is 8 marks)

11 Here is a trapezium.

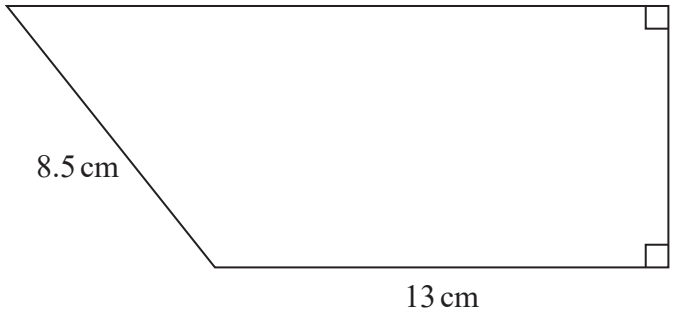


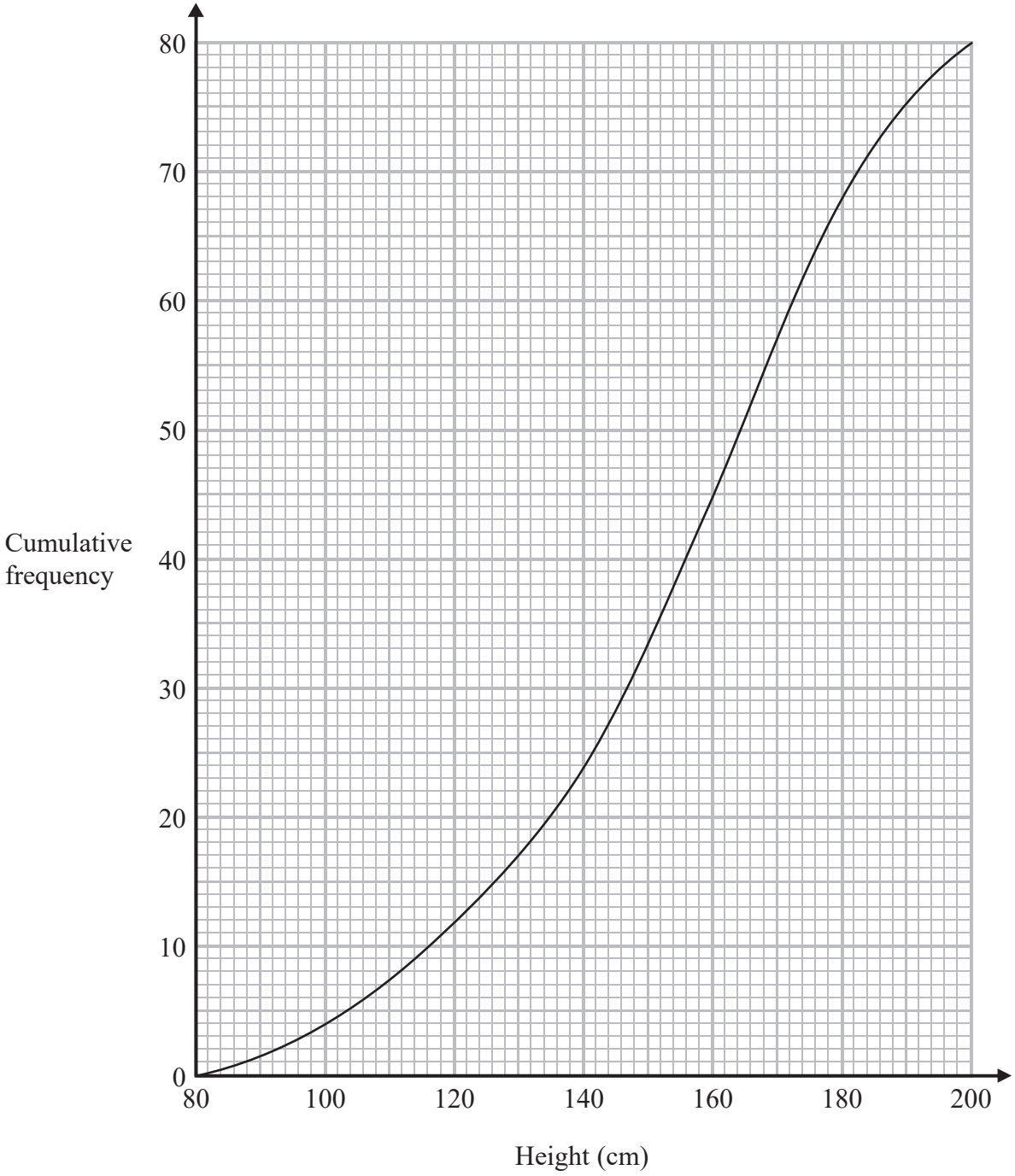
Diagram **NOT** accurately drawn

Work out the area of the trapezium.

..... cm^2

(Total for Question 11 is 4 marks)

12 The cumulative frequency graph gives information about the heights of 80 sunflowers.



(a) Use the graph to find an estimate for the number of sunflowers with a height greater than 150 cm.

.....

(2)

(b) Use the graph to find an estimate for the median.

..... cm

(2)

(Total for Question 12 is 4 marks)

13 (a) Find the Lowest Common Multiple (LCM) of 24 and 30

.....

(2)

$A = 2^5 \times 3^2 \times 5 \times 17$
$B = 2 \times 3^4 \times 7$

(b) Write down the Highest Common Factor (HCF) of A and B.

.....

(1)

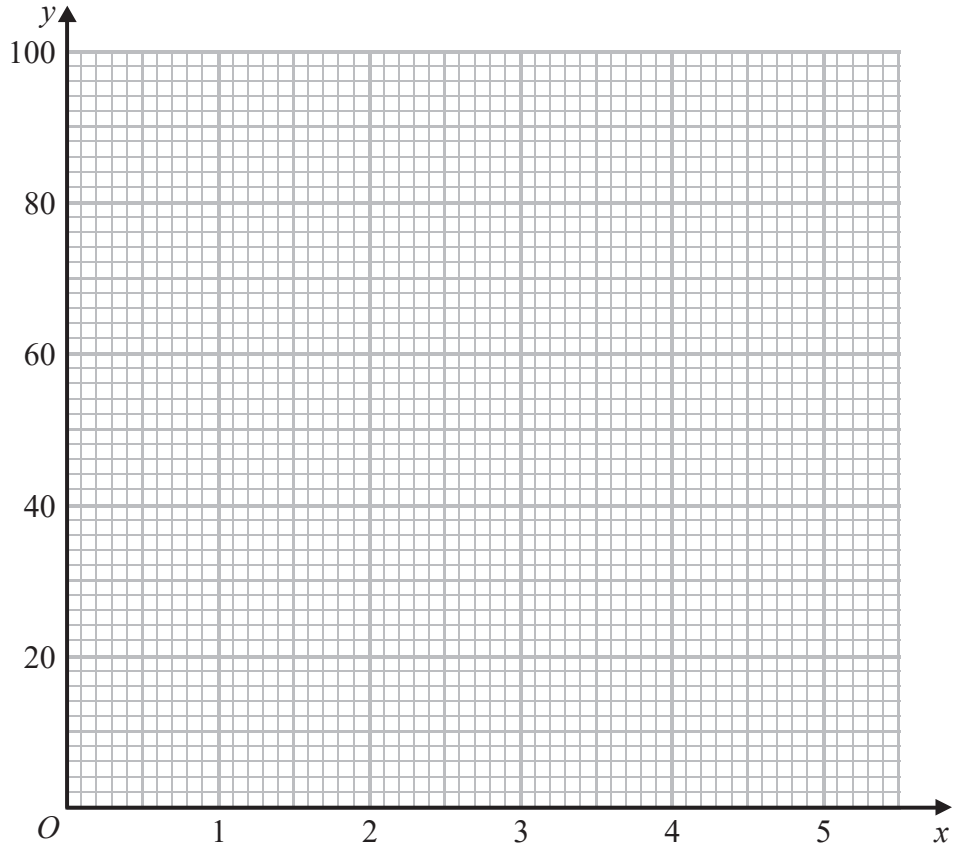
(Total for Question 13 is 3 marks)

14 (a) Complete the table of values for $y = x + \frac{90}{x^2}$

x	1	1.2	1.5	2	2.5	3	4	5
y	91	63.7		24.5	16.9		9.625	8.6

(1)

(b) Draw the graph of $y = x + \frac{90}{x^2}$ for $1 \leqslant x \leqslant 5$



(2)

(c) Use your graph to find an estimate for the solution of $\frac{1}{2}\left(x + \frac{90}{x^2}\right) = 15$ that is in $1 \leqslant x \leqslant 5$

.....

(2)

(Total for Question 14 is 5 marks)

15 P is inversely proportional to the square of d.

$P = 25.6$ when $d = \frac{1}{8}$

Find a formula for P in terms of d.

.....

(Total for Question 15 is 3 marks)

16

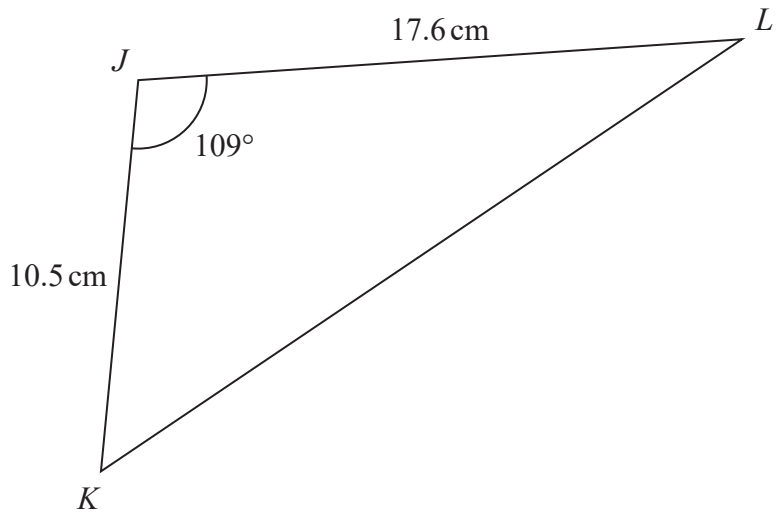


Diagram **NOT** accurately drawn

(a) Work out the area of triangle *JKL*.
Give your answer correct to 3 significant figures.

..... cm^2

(2)

(b) Work out the length of *KL*.
Give your answer correct to 3 significant figures.

..... cm

(3)

(Total for Question 16 is 5 marks)

17 The curve **C** has equation $y = 2x^3 - 9x^2 + 7$

(a) Find $\frac{dy}{dx}$

.....

(2)

The point P lies on the curve **C**.

The gradient at point P of the curve **C** is $-\frac{27}{2}$

(b) Find the coordinates of P.
Show clear algebraic working.

(..... , ...)

(4)

(Total for Question 17 is 6 marks)

18 A, C and D are points such that

$$\overrightarrow{AC} = \begin{pmatrix} 3 \\ -8 \end{pmatrix} \qquad \overrightarrow{DC} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$$

(a) Find $\overrightarrow{DA}$ as a column vector.

.....

(2)

Given that the position vector of D is $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ and E is the point such that $\overrightarrow{DE} = 2\overrightarrow{AC}$

(b) find the coordinates of E.

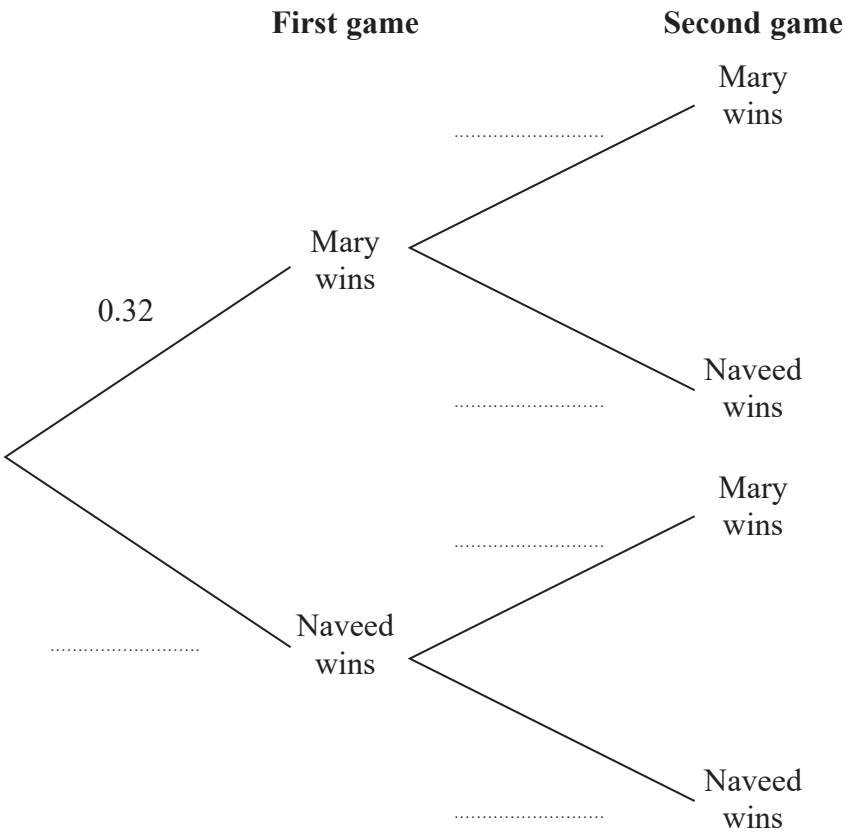
(..... , ...)

(2)

(Total for Question 18 is 4 marks)

19 Mary and Naveed play two games of table tennis against each other.
For each game they play, the probability that Mary wins is 0.32

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Mary wins exactly one game of table tennis.

.....

(3)

In a fridge there are only
3 bottles of water
5 bottles of orange juice
2 bottles of cola

After their games of table tennis, Mary takes at random a bottle from the fridge and then Naveed takes at random a bottle from the fridge.

(c) Work out the probability that Mary and Naveed both take a bottle of the same type of drink.

.....

(3)

(Total for Question 19 is 8 marks)

20 (a) Simplify fully $\left(\frac{125e^{12}}{27f^3}\right)^{-\frac{2}{3}}$

.....

(3)

(b) Given that $2^{\frac{1}{2}} \times 2^{\frac{n}{3}} = \frac{8^x}{4^n}$

express x in terms of n.

.....

(4)

(Total for Question 20 is 7 marks)

21 The diagram shows a solid cone.

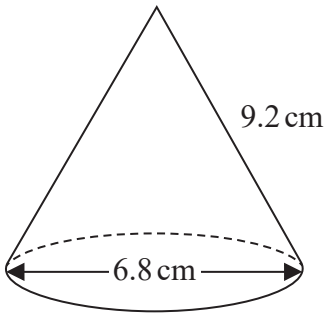


Diagram **NOT** accurately drawn

The cone has base diameter 6.8 cm, correct to 1 decimal place.
The cone has slant height 9.2 cm, correct to 1 decimal place.

The **total** surface area of the cone is $k\pi$ cm^2

Work out the lower bound for the value of k.
Show your working clearly.
Give your answer correct to 3 significant figures.

.....

(Total for Question 21 is 3 marks)

22 Solve the simultaneous equations

$$y + 2x = 3$$
$$x^2 + y^2 = 18$$

Show clear algebraic working.

.....

(Total for Question 22 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS