Write your name here

Surname	Other names

Pearson Edexcel Certificate
Pearson Edexcel
International GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 4H

Higher Tier

Thursday 8 June 2017 – Morning
Time: 2 hours

Paper Reference
4MA0/4H
KMA0/4H

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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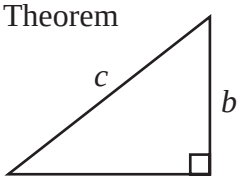
Pearson

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

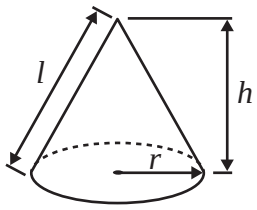
Pythagoras' Theorem



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

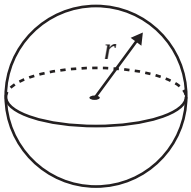
Volume of cone = $\frac{1}{3}\pi r^2 h$

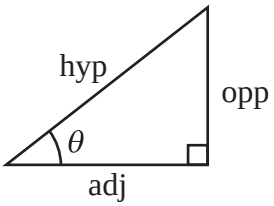
Curved surface area of cone = πrl



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

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





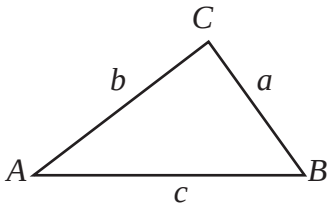
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

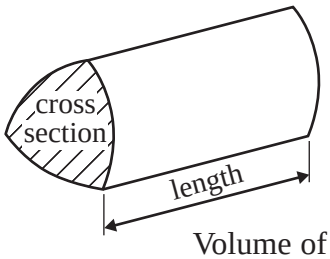
In any triangle ABC



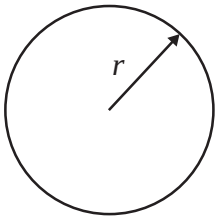
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



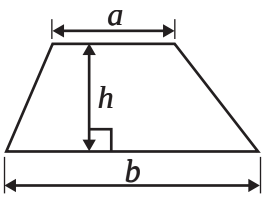
Volume of prism = area of cross section × length

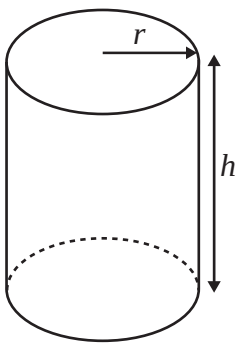


Circumference of circle = $2\pi r$

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

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

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
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Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 $P = \{p, o, r, t, u, g, a, l\}$
$I = \{i, t, a, l, y\}$

(a) List the members of the set

(i) $P \cap I$

.....

(ii) $P \cup I$

.....

(2)

$F = \{f, r, a, n, c, e\}$

(b) Is it true that $I \cap F = \varnothing$?

Tick (✓) the appropriate box.

Yes	No
☐	☐

Explain your answer.

.....

(1)

(Total for Question 1 is 3 marks)

2 $M = 2t^2 - 7t$

(a) Work out the value of M when $t = -3$

$M =$.....

(2)

(b) Solve $4(x + 3) = 9x - 10$
Show clear algebraic working.

$x =$.....

(3)

y is an integer.
$-2 < y \leqslant 3$

(c) Write down all the possible values of y.

.....

(2)

(Total for Question 2 is 7 marks)

3 Lyn went on holiday to India.
She changed £250 into rupees.

The exchange rate was £1 = 97 rupees.

(a) How many rupees did Lyn get?

..... rupees
(2)

When she returns from holiday, Lyn has **four** 500 rupee notes.
She changes this money into pounds.

The exchange rate is now £1 = 93.5 rupees.

(b) Work out how many pounds Lyn gets.
Give your answer to the nearest pound.

£ .....
(3)

(Total for Question 3 is 5 marks)

4 Point *A* has coordinates (−4, 9)
Point *B* has coordinates (1, 5)

Find the coordinates of the midpoint of *AB*.

(..... , ...)

(Total for Question 4 is 2 marks)

5 Each time Astrid plays a game of chess against her computer, she will win or draw or lose.

For each game of chess
the probability that she will win is 0.3
the probability that she will lose is three times the probability that she will draw.

On Monday, Astrid is going to play 20 games of chess against her computer.

(a) Work out an estimate for the number of games of chess Astrid wins on Monday.

.....

(2)

On Tuesday, Astrid plays a game of chess against her computer.

(b) Work out the probability that she will lose.

.....

(3)

(Total for Question 5 is 5 marks)

6 There are 6 batteries in a small packet of batteries.
There are 9 batteries in a large packet of batteries.

Chow buys m small packets of batteries and g large packets of batteries.

The total number of batteries Chow buys is T.

Write down a formula, in terms of m and g, for T.

.....

(Total for Question 6 is 3 marks)

7 (a) Show that $\frac{7}{12} + \frac{3}{8} = \frac{23}{24}$

(2)

(b) Show that $1\frac{2}{3} \times 2\frac{1}{15} = 3\frac{4}{9}$

(3)

(Total for Question 7 is 5 marks)

8 Each interior angle of a regular polygon is 156°

Work out the number of sides of the polygon.

.....

(Total for Question 8 is 3 marks)

9 Manu, Liam and Ned share £420 in the ratios 4 : 5 : 3
Liam then gives Ned £75

Express the amount of money that Ned now has as a percentage of the £420
Give your answer correct to the nearest whole number.

..... %

(Total for Question 9 is 4 marks)

10 (a) Simplify $e^8 \times e^7$

.....

(1)

(b) Simplify fully $\dfrac{12g^{10}}{3g^2}$

.....

(2)

(c) Write down the value of m^0

.....

(1)

(d) Simplify fully $\left(27x^6\right)^{\frac{2}{3}}$

.....

(2)

(Total for Question 10 is 6 marks)

11

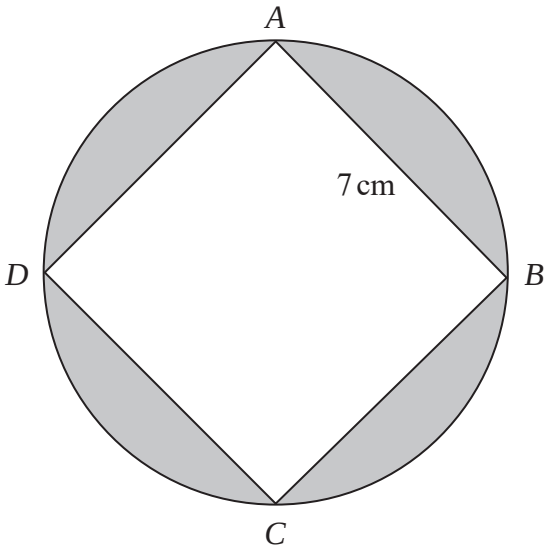


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle.
ABCD is a square of side 7 cm.

Work out the total area of the shaded regions.
Give your answer correct to the nearest whole number.

..... cm^2

(Total for Question 11 is 5 marks)

12 Here are the heights, in millimetres, of 11 seedlings.

16 12 19 17 24 27 19 15 23 27 10

Work out the interquartile range of these heights.

..... mm

(Total for Question 12 is 3 marks)

13 Here are the equations of four straight lines.

Line **A** $y = 2x + 3$
Line **B** $2y = 6 - 3x$
Line **C** $4x - 2y = 3$
Line **D** $y = 3 - 2x$

Two of these lines are parallel.

(a) Which two lines?

.....

(2)

Line **L** has a gradient of $-\frac{5}{2}$ and passes through the point with coordinates (1, 3)

(b) Find an equation of **L**.
Give your answer in the form $ax + by = c$ where a, b and c are integers.

.....

(3)

(Total for Question 13 is 5 marks)

14

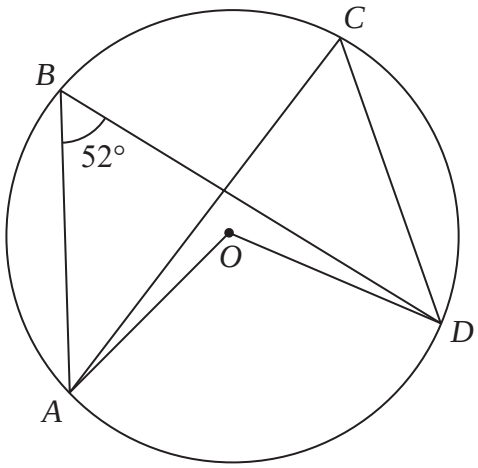


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle, centre *O*.
Angle *ABD* = 52°

(a) (i) Write down the size of angle *ACD*.

..... °

(ii) Give a reason for your answer.

.....

.....

(2)

(b) (i) Write down the size of angle *AOD*.

..... °

(ii) Give a reason for your answer.

.....

.....

(2)

(Total for Question 14 is 4 marks)

15 Here is a trapezium.

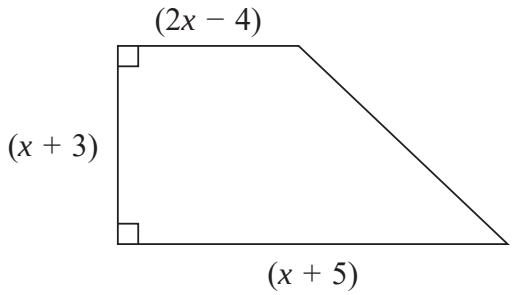


Diagram **NOT** accurately drawn

All measurements are in centimetres.

The area of the trapezium is 60 cm^2

(a) Show that $3x^2 + 10x - 117 = 0$

(3)

(b) Work out the value of x
Show your working clearly.
Give your answer correct to 3 significant figures.

.....

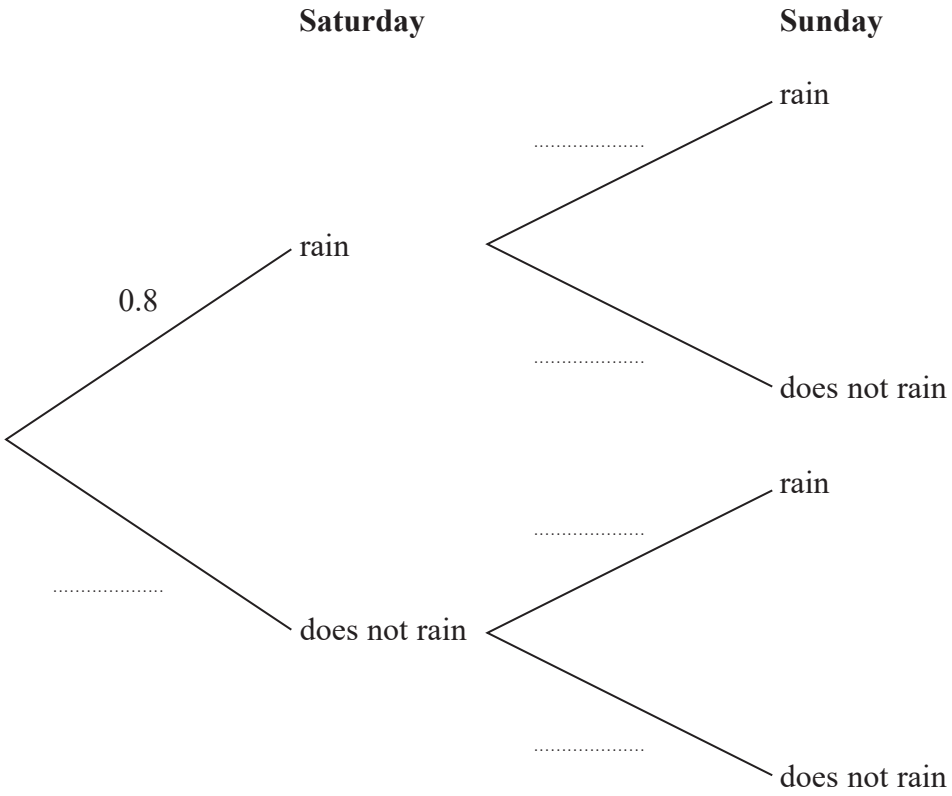
(3)

(Total for Question 15 is 6 marks)

16 The probability that it will rain on Saturday is 0.8

If it rains on Saturday, the probability that it will rain on Sunday is 0.65
If it does not rain on Saturday, the probability that it will rain on Sunday is 0.4

(a) Use this information to complete the probability tree diagram.



(2)

(b) Work out the probability that it will rain on just one of these two days.

.....

(3)

(Total for Question 16 is 5 marks)

17 Curve **C** has equation $y = 8x^3 - 3x^2 - 25x$

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

.....

(2)

(b) Find the x coordinates of the points on **C** where the gradient is 5
Show clear algebraic working.

.....

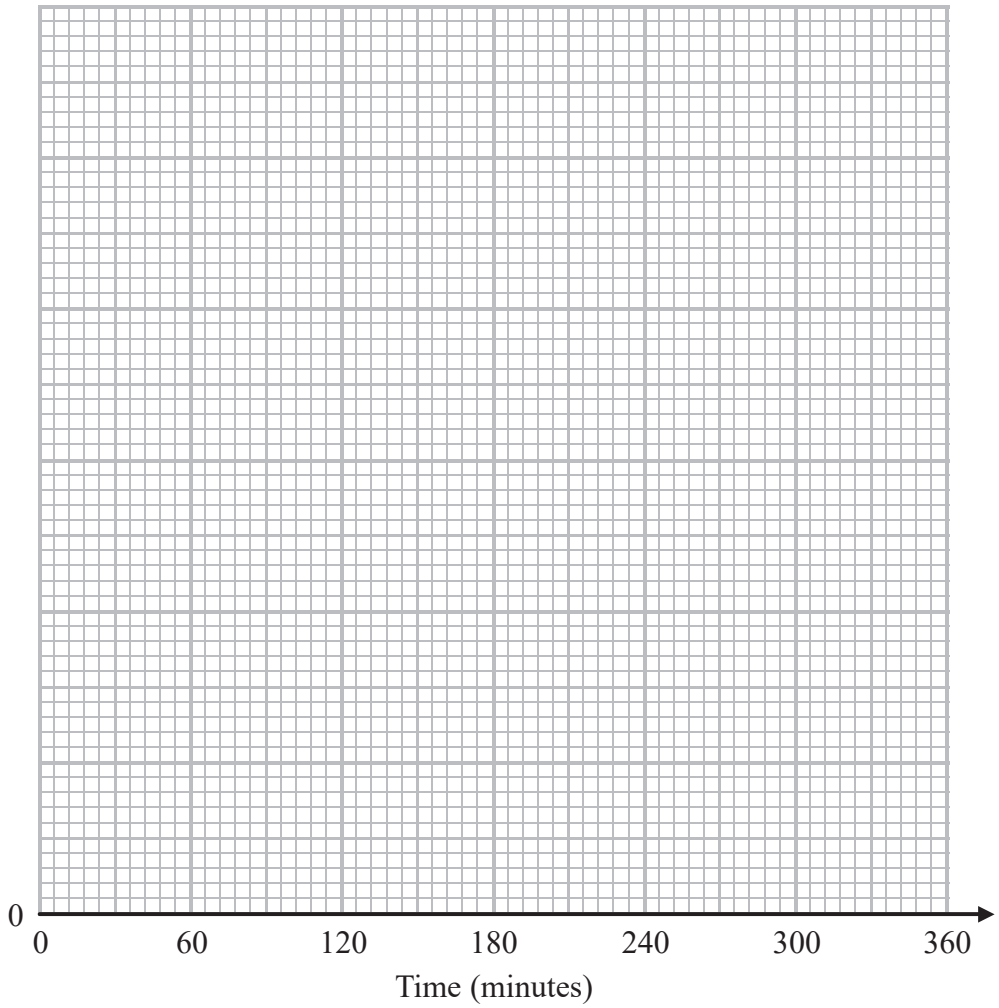
(4)

(Total for Question 17 is 6 marks)

18 The table gives information about the times, in minutes, some people waited in the accident and emergency department at a hospital.

Time (t minutes)	Frequency
$0 < t \leqslant 30$	60
$30 < t \leqslant 90$	270
$90 < t \leqslant 120$	150
$120 < t \leqslant 240$	156
$240 < t \leqslant 300$	24

On the grid, draw a histogram for this information.



(Total for Question 18 is 3 marks)

19 *ABCD* is a kite.

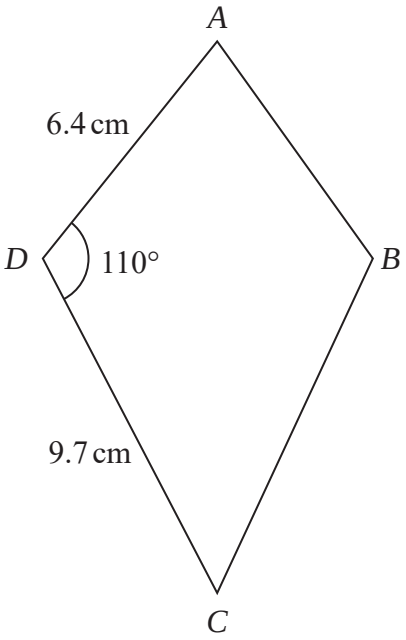


Diagram **NOT** accurately drawn

Work out the area of the kite.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 19 is 3 marks)

20 A car travels a distance of 63.5 km, correct to the nearest 0.5 km.
The car takes 45.8 minutes correct to 1 decimal place.

Work out the lower bound for the average speed of the car.
Show your working clearly.
Give your answer in km/h correct to 1 decimal place.

..... km/h

(Total for Question 20 is 4 marks)

21 *LMNP* is a quadrilateral.

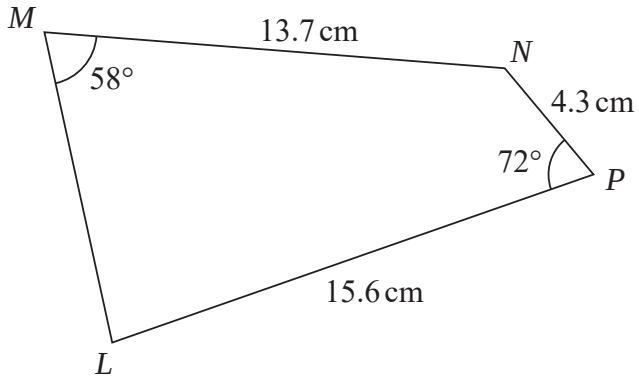


Diagram **NOT** accurately drawn

Work out the size of angle *MLP*.
Give your answer correct to 3 significant figures.

.....°

(Total for Question 21 is 6 marks)

22 $m = 8 \times 10^{9n}$ where n is an integer.

Express $m^{-\frac{1}{3}}$ in standard form.
Give your answer, in terms of n, as simply as possible.

.....

(Total for Question 22 is 3 marks)

23 The diagram shows a solid hemisphere.

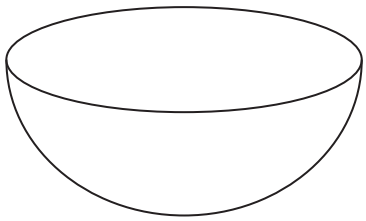


Diagram **NOT** accurately drawn

The hemisphere has a **total** surface area of $\frac{16}{3}\pi \text{cm}^2$

The hemisphere has a volume of $k\pi \text{cm}^3$

Find the value of k.

.....

(Total for Question 23 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

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