Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Mathematics A

Paper 4HR

Higher Tier

Monday 12 January 2015 – Afternoon
Time: 2 hours

Paper Reference
4MA0/4HR

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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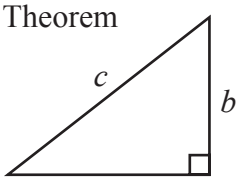
P 4 4 6 2 0 A 0 1 2 4

PEARSON

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

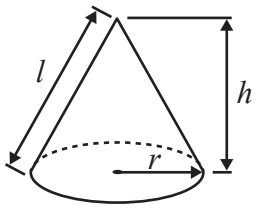
Pythagoras' Theorem



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

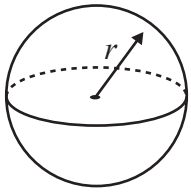
Volume of cone = $\frac{1}{3}\pi r^2 h$

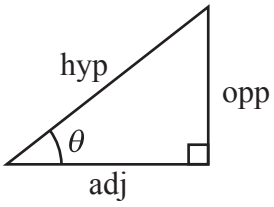
Curved surface area of cone = $\pi r l$



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

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





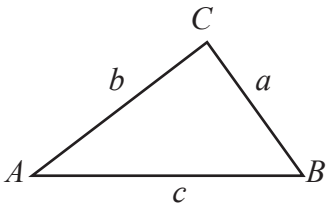
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

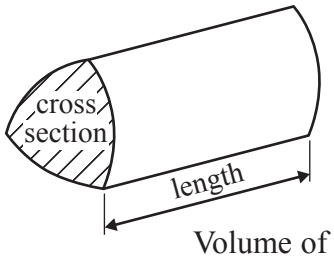
In any triangle ABC



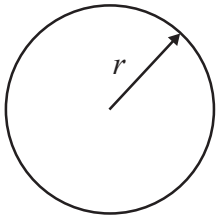
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



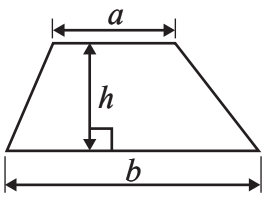
Volume of prism = area of cross section × length

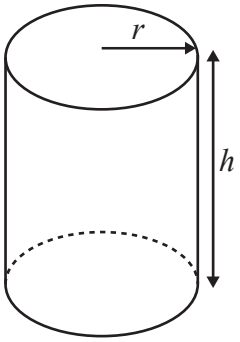


Circumference of circle = $2\pi r$

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 questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Eric travels from the UK to India every year.

In 2010, the exchange rate was £1 = 67.1 rupees.
In 2012, the exchange rate was £1 = 82.5 rupees.

In 2010 Eric changed £600 into rupees.

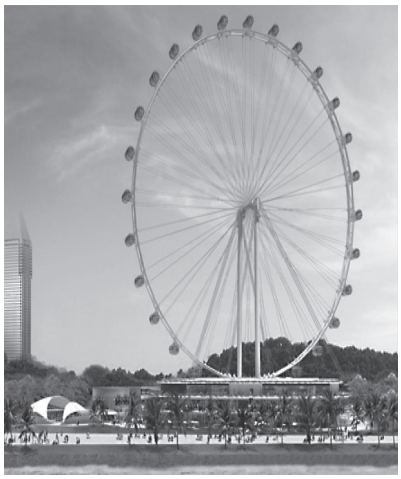
How many pounds (£) did Eric have to change to rupees in 2012 to get the same number of rupees as he did in 2010?

£ .....

(Total for Question 1 is 3 marks)

Do NOT write in this space.

2 The wheel of the Singapore Flyer is a circle with a diameter of 150 metres.



(a) Calculate the circumference of the wheel.
Give your answer correct to the nearest metre.

..... metres
(2)

The wheel takes 30 minutes to rotate once.

(b) Work out the average speed of a point on the circumference of the wheel as it rotates once.
Give your answer in metres per second correct to 3 significant figures.

..... metres per second
(3)

The diagram shows a giant wheel above horizontal ground.

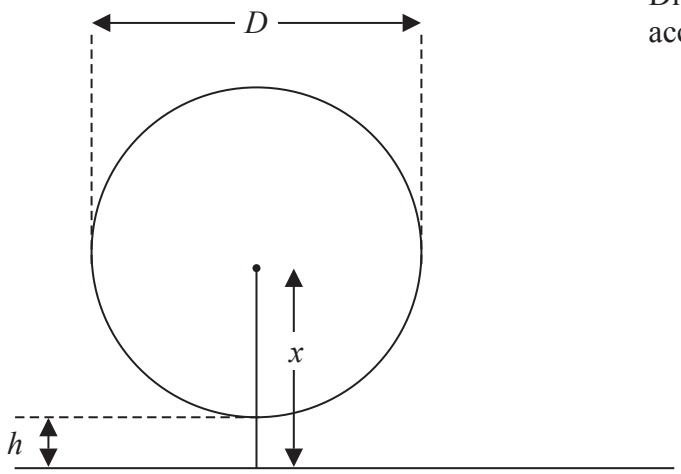


Diagram **NOT** accurately drawn

The wheel is a circle of diameter D metres.
The lowest point of the wheel is h metres above the ground.
The centre of the wheel is x metres above the ground.

(c) Express h in terms of D and x

.....

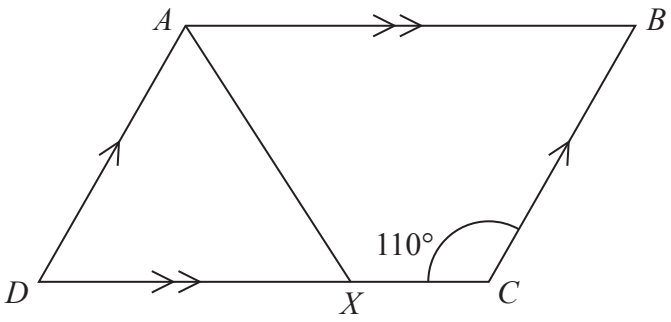
(2)

(Total for Question 2 is 7 marks)

Do NOT write in this space.

3

Diagram **NOT** accurately drawn



ABCD is a parallelogram.
Angle *DCB* = 110°
X is the point on *DC* such that *AX* bisects the angle *DAB*.

Calculate the size of angle *AXC*.

.....°

(Total for Question 3 is 4 marks)

Do NOT write in this space.

4 Solve $x + 2y = 3$

$x - y = 6$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 4 is 3 marks)

Do NOT write in this space.

5 Here are some rows of a number pattern.

Row number	Column 1	Column 2	Column 3
1	$1 \times 3 + 1$	4	2^2
2	$2 \times 4 + 1$	9	3^2
3	$3 \times 5 + 1$	16	4^2
⋮			
		676	
⋮			
n			

(a) Write down the Row number of the row that has 676 in Column 2

.....

(1)

(b) For Row number n,

(i) write down an expression, in terms of n, that should go in Column 1

.....

(ii) write down an expression, in terms of n, that should go in Column 3

.....

(2)

(Total for Question 5 is 3 marks)

6 The table gives information about the number of vehicles passing a point on a road in each of 70 intervals of equal length.

Number of vehicles	Frequency
1 to 5	8
6 to 10	10
11 to 15	18
16 to 20	20
21 to 25	10
26 to 30	4

(a) Write down the modal class interval.

.....

(1)

(b) Calculate an estimate for the mean.

.....

(4)

(Total for Question 6 is 5 marks)

Do NOT write in this space.

7 Here is a trapezium $ABCD$.

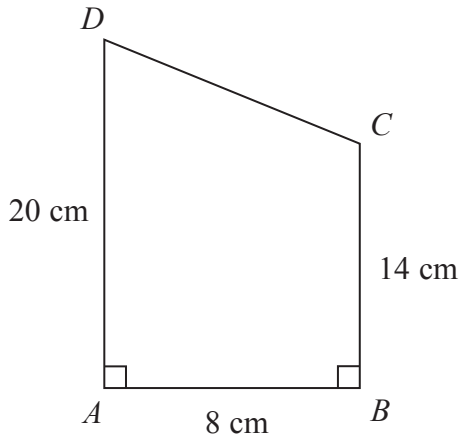


Diagram **NOT** accurately drawn

Angle DAB = angle ABC = 90°

AD = 20 cm
AB = 8 cm
BC = 14 cm

(a) Calculate the area of the trapezium $ABCD$.

..... cm^2

(2)

(b) Calculate the length of CD.

..... cm

(4)

(Total for Question 7 is 6 marks)

8 (a) Write 224 as a product of powers of its prime factors.
Show your working clearly.

.....

(3)

(b) Write down 3 **different** factors of 224 with a sum between 99 and 110

.....

(2)

(Total for Question 8 is 5 marks)

Do NOT write in this space.

9 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{\text{even numbers}\}$

$B = \{\text{multiples of } 3\}$

(a) List the members of set B.

.....

(1)

(b) Find $A \cup B$

.....

(1)

(c) Find $A \cap B$

.....

(1)

x is a member of $\mathscr{E}$

$x \in B$

$x \notin A$

(d) What are the possible values of x?

.....

(2)

(Total for Question 9 is 5 marks)

Do NOT write in this space.

10

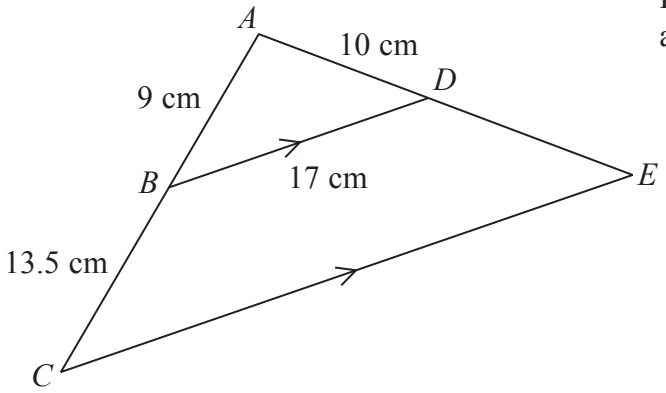


Diagram **NOT** accurately drawn

In the diagram ABC and ADE are straight lines.
BD is parallel to CE.

$AB = 9$ cm, $BC = 13.5$ cm, $AD = 10$ cm, $BD = 17$ cm

(a) Calculate the length of CE.

..... cm

(2)

(b) Calculate the length of DE.

..... cm

(2)

The area of triangle ABD is 36 cm^2

(c) Calculate the area of quadrilateral $BDEC$.

..... cm^2

(3)

(Total for Question 10 is 7 marks)

11 $t^n = \frac{1}{t^3}$

(a) Write down the value of n.

$n =$ .....

(1)

(b) Simplify $\frac{6xy^5}{3xy^2}$

.....

(2)

(c) Expand and simplify $(3x - 2y)(x + 2y)$

.....

(2)

(d) Factorise $4x^2 - 7x - 2$

.....

(2)

(Total for Question 11 is 7 marks)

Do NOT write in this space.

12 $I = kT^4$

$k = 5.67 \times 10^{-8}$

$T = 5800$

(a) Work out the value of I.
Give your answer in standard form correct to 3 significant figures.

$I =$ .....

(2)

(b) Rearrange the formula $I = kT^4$ to make T the subject.

.....

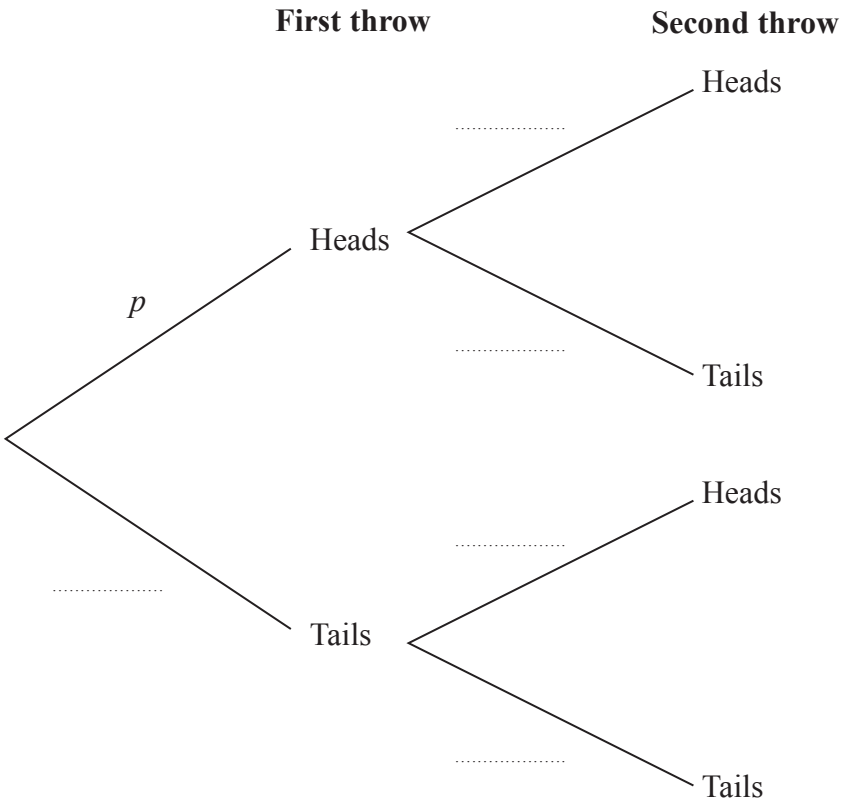
(2)

(Total for Question 12 is 4 marks)

Do NOT write in this space.

13 Jim has a biased coin.
The probability that Jim will throw Heads on any throw is p.
Jim throws the coin twice.

(a) Complete the probability tree diagram.
Give your probabilities in terms of p.



(2)

(b) Find an expression, in terms of p, for the probability that Jim will throw two Heads.

.....

(1)

Given that $p = 0.8$,

(c) work out the probability that Jim will throw exactly one Head.

.....

(3)

(Total for Question 13 is 6 marks)

14 (a) Solve $x^2 - 4x - 1 = 0$

Show your working clearly.
Give your solutions correct to 3 significant figures.

.....

(3)

Hence, or otherwise,

(b) solve $(x + 3)^2 - 4(x + 3) - 1 = 0$

giving your solutions correct to 3 significant figures.

.....

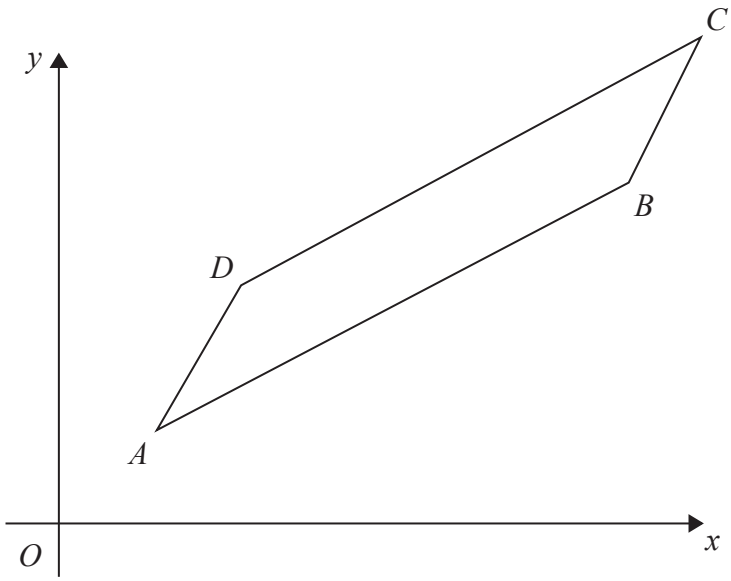
(1)

(Total for Question 14 is 4 marks)

Do NOT write in this space.

15 Here is the parallelogram $ABCD$.

Diagram **NOT** accurately drawn



$\overrightarrow{AD} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$, $\overrightarrow{AB} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$

(a) Find the magnitude of $\overrightarrow{AD}$.

Give your answer correct to 3 significant figures.

.....

(2)

The point A has coordinates (4, 2)

(b) Work out the coordinates of the point C.

.....

(3)

The diagonals of the parallelogram $ABCD$ cross at the point E.

(c) Find as a column vector, $\overrightarrow{OE}$.

.....

(3)

(Total for Question 15 is 8 marks)

Do NOT write in this space.

16

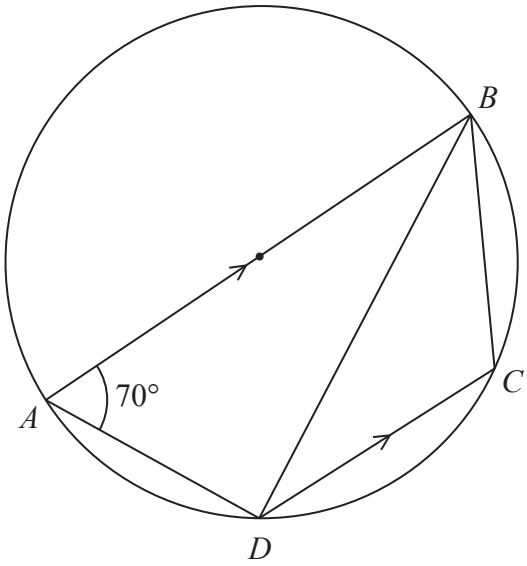


Diagram **NOT** accurately drawn

A, B, C and D are points on a circle.
AB is a diameter of the circle.
DC is parallel to AB.
Angle $BAD = 70°$

(a) Calculate the size of angle BDC.

.....°

(2)

The tangent to the circle at D meets the line BC extended at T.

(b) Calculate the size of angle BTD.

.....°

(3)

(Total for Question 16 is 5 marks)

17 (a) Show that $(3 + 2\sqrt{2})(4 - \sqrt{2}) = 8 + 5\sqrt{2}$

Show your working clearly.

(2)

(b) Rationalise the denominator and simplify fully $\dfrac{10 + 3\sqrt{2}}{\sqrt{2}}$

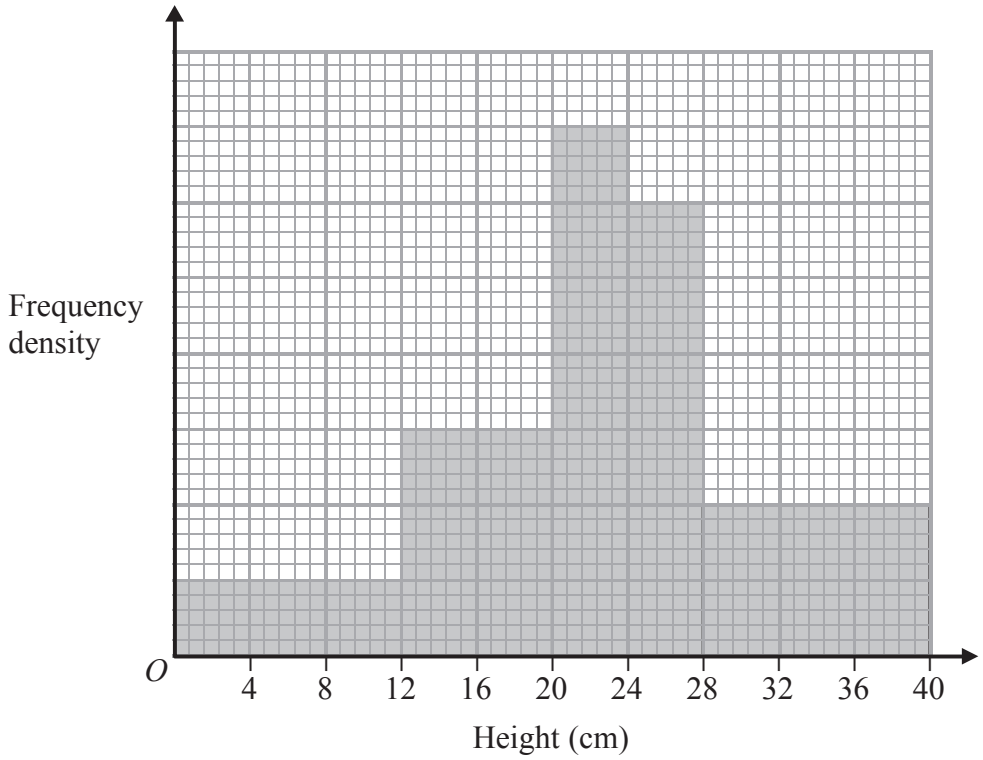
Show your working clearly.

(2)

(Total for Question 17 is 4 marks)

Do NOT write in this space.

18



The histogram gives information about the heights of some plants.

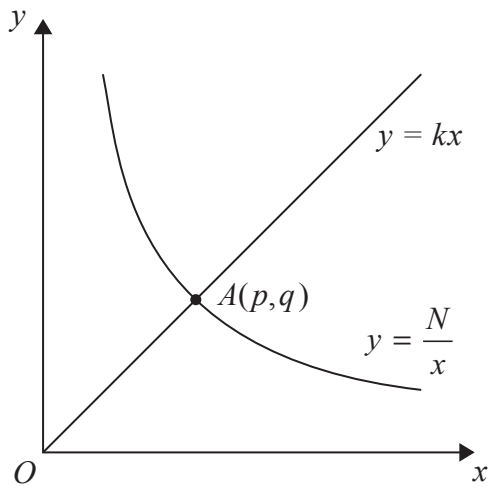
There are 360 plants with a height of 20 cm or less.

Work out the number of plants with a height of more than 20 cm.

.....

(Total for Question 18 is 3 marks)

19



The diagram shows the straight line with equation $y = kx$ intersecting the curve with equation $y = \frac{N}{x}$ at the point $A(p, q)$.

(a) Find p and find q.

Give each answer in its simplest form, in terms of k and N.

$p =$ .....

$q =$ .....

(3)

Given that $p = 2q$

(b) find the value of k.

$k =$ .....

(2)

(Total for Question 19 is 5 marks)

20 (a) Factorise $4x^2 - 1$

.....

(2)

(b) Solve $\dfrac{4}{2x+1} + \dfrac{1}{4x^2-1} = 3$

Show clear algebraic working.

.....

(4)

(Total for Question 20 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS