Write your name here

Surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Mathematics A

Paper 4HR

Higher Tier

Thursday 8 June 2017 – Morning
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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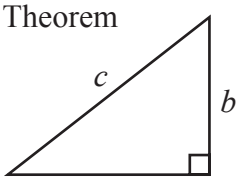
Pearson

International GCSE MATHEMATICS
FORMULAE SHEET – HIGHER TIER

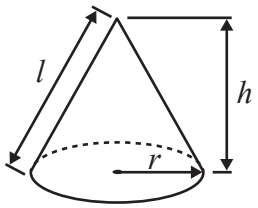
Pythagoras' Theorem



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

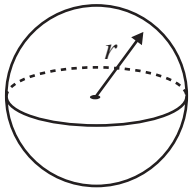
Volume of cone = $\frac{1}{3}\pi r^2 h$

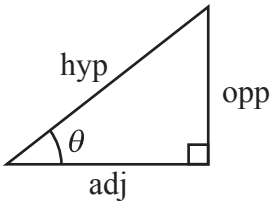
Curved surface area of cone = $\pi r l$



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

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





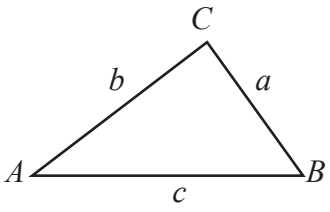
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

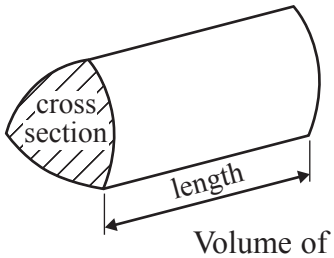
In any triangle ABC



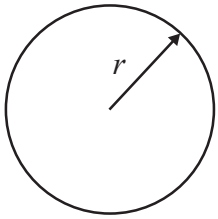
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



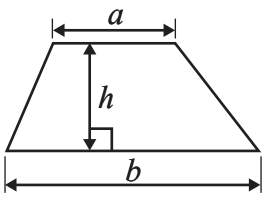
Volume of prism = area of cross section × length

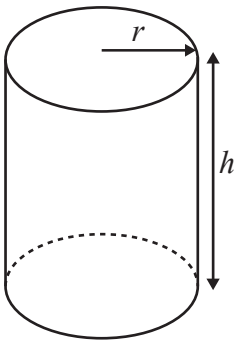


Circumference of circle = $2\pi r$

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 FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Here is a list of ingredients to make 12 chocolate cupcakes.

Chocolate cupcakes

Ingredients for **12** cupcakes

110 g butter
100 g sugar
75 g flour
25 g cocoa
2 eggs

James wants to make exactly 30 cupcakes.

(a) How much butter does James need?

..... g

(2)

Sophie made some chocolate cupcakes for a party.
She used 375 g of sugar.

(b) How many cupcakes did Sophie make?

.....

(2)

(Total for Question 1 is 4 marks)

2 $\mathscr{E} = \{4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$

$A = \{\text{multiples of 5}\}$

$B = \{\text{odd numbers}\}$

(a) List the members of the set

(i) $A \cap B$

.....

(ii) $A \cup B$

.....

(2)

The set C has 6 members and $B \cap C = \varnothing$

(b) List the members of set C.

.....

(2)

(Total for Question 2 is 4 marks)

3 (a) Work out the value of $\dfrac{17.7 \times 5.8}{\sqrt{3.4} + 5.3}$

Write down all the figures on your calculator display.

.....

(2)

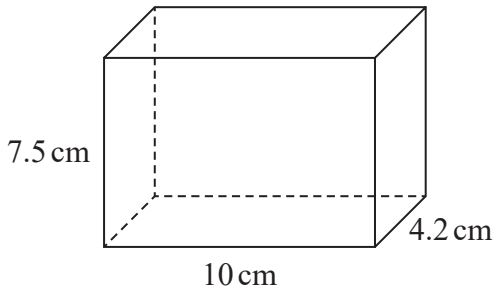
(b) Give your answer to part (a) correct to 3 significant figures.

.....

(1)

(Total for Question 3 is 3 marks)

4 The diagram shows a cuboid and a triangular prism.



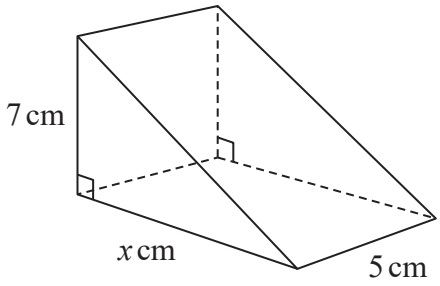


Diagram **NOT** accurately drawn

The volume of the cuboid is equal to the volume of the triangular prism.

Work out the value of x.

.....

(Total for Question 4 is 4 marks)

5 (a) Expand $4(3 - 7c)$

.....

(1)

(b) Factorise $y^2 + 8y$

.....

(1)

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

.....

(2)

(d) Solve $5p - 9 = 3p$

$p =$ .....

(2)

(e) Simplify $y^7 \times y^4$

.....

(1)

(f) Simplify $h^{12} \div h^4$

.....

(1)

(g) Simplify $(e^5)^3$

.....

(1)

(Total for Question 5 is 9 marks)

6 The frequency table shows information about the distances 60 office workers travel to work each day.

Distance travelled (d km)	Frequency
$0 < d \leqslant 10$	5
$10 < d \leqslant 20$	12
$20 < d \leqslant 30$	17
$30 < d \leqslant 40$	20
$40 < d \leqslant 50$	6

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean distance travelled to work by these office workers. Give your answer correct to 1 decimal place.

..... km

(4)

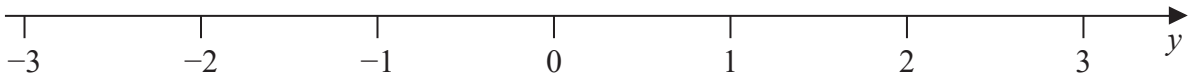
(Total for Question 6 is 5 marks)

7 (a) Solve the inequality $4x + 13 \geqslant 27$

.....

(2)

(b) On the number line, represent the inequality $y \geqslant -1$



(1)

n is an integer.

(c) Write down all the values of n that satisfy $-3 < n \leqslant 2$

.....

(2)

(Total for Question 7 is 5 marks)

8

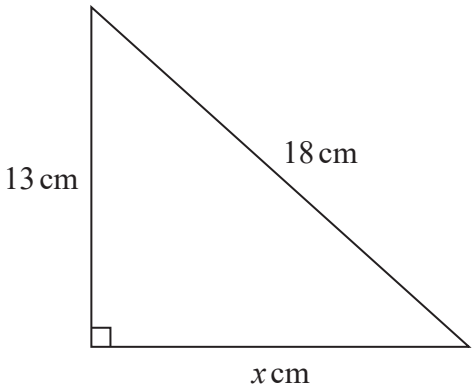


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 3 significant figures.

.....

(Total for Question 8 is 3 marks)

DO NOT WRITE IN THIS AREA

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9 Solve the simultaneous equations.

$$5x - 2y = 9.5$$

$$4x + 2y = 13$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 9 is 3 marks)

10 2.2×10^7 passengers passed through Beijing Capital International Airport in 2014.

(a) Write 2.2×10^7 as an ordinary number.

.....

(1)

950 000 tonnes of cargo traffic passed through Tokyo International Airport in 2014.

(b) Write 950 000 as a number in standard form.

.....

(1)

(Total for Question 10 is 2 marks)

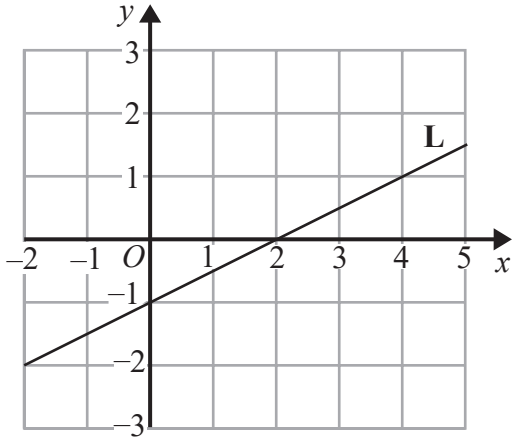
11 Mabintou invested $7500 for 3 years at 4% per year compound interest.

Calculate the value of her investment at the end of 3 years.

$ .....

(Total for Question 11 is 3 marks)

12 The straight line **L** is shown on the grid.



(a) Find an equation of **L**.

.....

(2)

(b) Find an equation of the line that is parallel to **L** and passes through the point (5, 4)

.....

(2)

(Total for Question 12 is 4 marks)

13 The diagram shows triangle ABC.

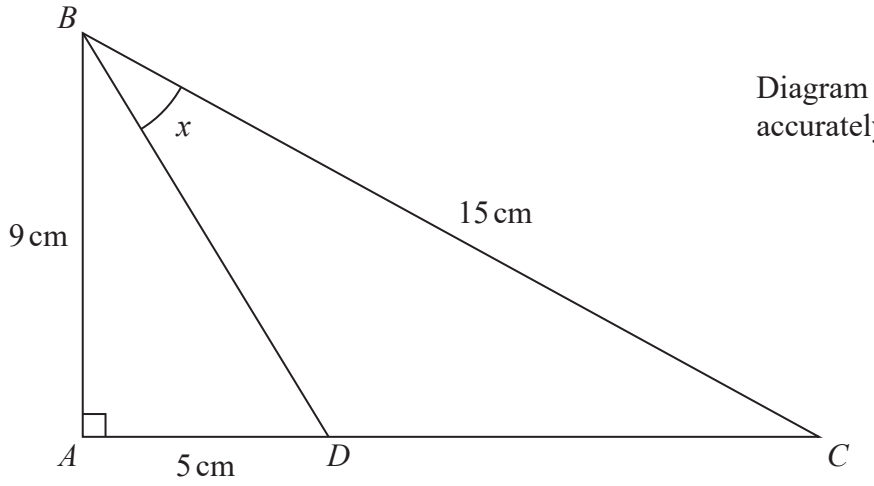


Diagram **NOT** accurately drawn

$AB = 9\,\text{cm}$ $BC = 15\,\text{cm}$
D is the point on AC such that $AD = 5\,\text{cm}$.
Angle $BAC = 90°$

Calculate the size of angle x.
Give your answer to the nearest degree.

.....°

(Total for Question 13 is 4 marks)

14 Solve $\frac{5-x}{2} - \frac{x-1}{3} = 1$

Show clear algebraic working.

.....

(Total for Question 14 is 4 marks)

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15

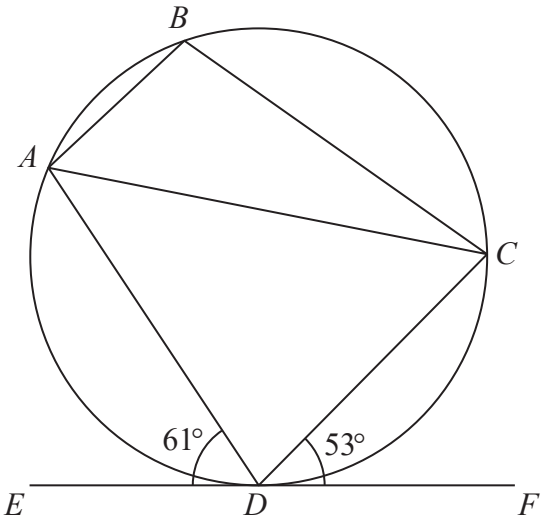


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle.
EDF is the tangent to the circle at *D*.

Angle *ADE* = 61° and angle *CDF* = 53°

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

.....°

(ii) Give a reason for your answer.

.....

(2)

(b) Work out the size of angle *ABC*.

.....°

(2)

(Total for Question 15 is 4 marks)

16 Here are six cards.
Each card has a number on it.

1	3	3	3	4	4

The cards are turned over to hide their numbers and are then mixed up.
Malachi takes at random two of the cards and turns them over to show their numbers.

(a) Calculate the probability that the number 4 is on both of the cards Malachi takes.

.....

(2)

(b) Calculate the probability that the sum of the numbers on the two cards Malachi takes is an even number.

.....

(3)

(Total for Question 16 is 5 marks)

17 Solve $11x^2 - 3x - 5 = 0$

Show your working clearly.

Give your solutions correct to 2 decimal places.

.....

(Total for Question 17 is 3 marks)

18 A is directly proportional to x^2

$A = 480$ when $x = 5$

Find the value of A when $x = 1.5$

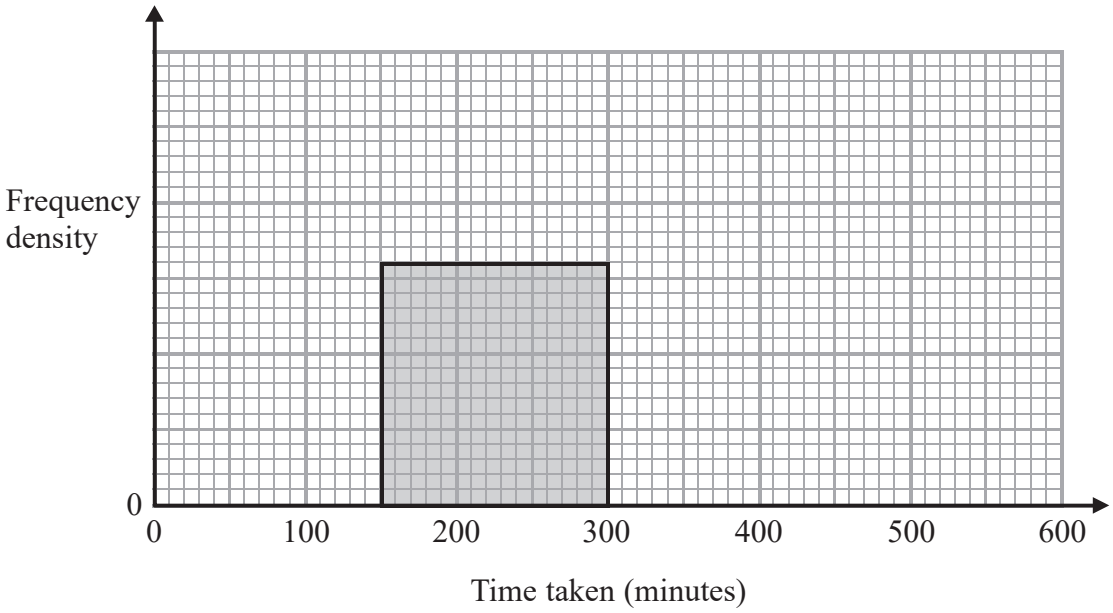
.....

(Total for Question 18 is 3 marks)

19 The table gives information about the time taken by each of 600 people to reach their holiday destination.

Time taken (t minutes)	Frequency
$0 < t \leqslant 100$	120
$100 < t \leqslant 150$	140
$150 < t \leqslant 300$	240
$300 < t \leqslant 500$	80
$500 < t \leqslant 600$	20

(a) Use the information in the table to complete the histogram.



(3)

(b) Work out an estimate for the number of people who took more than 200 minutes to reach their holiday destination.

.....

(2)

(Total for Question 19 is 5 marks)

20 The functions f and g are such that

$$f(x) = \frac{1}{x+5} \quad \text{and} \quad g(x) = 2x + 3$$

(a) State which value of x must be excluded from any domain of f.

.....

(1)

(b) Find g(10)

.....

(1)

(c) Calculate gf(−7)

.....

(2)

(d) Express the inverse function g^{-1} in the form $g^{-1}(x) = \ldots$

$g^{-1}(x) =$ .....

(2)

(Total for Question 20 is 6 marks)

21

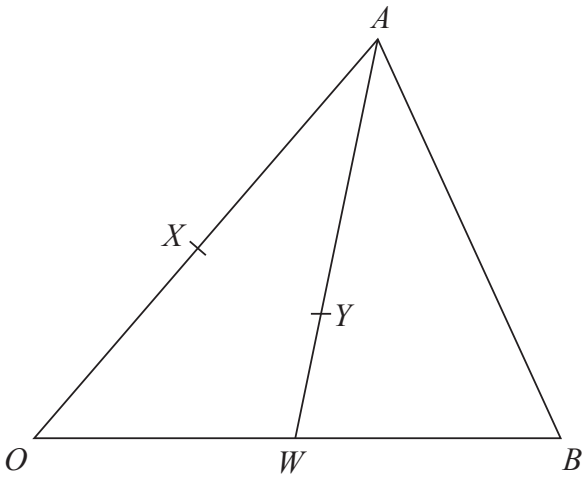


Diagram **NOT** accurately drawn

OAB is a triangle.

X is the midpoint of OA and W is the midpoint of OB.

Y is the point on AW such that $AY : YW = 2 : 1$

$\overrightarrow{OX} = 3\mathbf{a}$ and $\overrightarrow{OW} = 3\mathbf{b}$

(a) Express in terms of **a** and **b**

(i) $\overrightarrow{AW}$

.....

(ii) $\overrightarrow{AY}$

.....

(iii) $\overrightarrow{XB}$

.....

(3)

(b) Show by a vector method that XYB is a straight line.

(2)

(Total for Question 21 is 5 marks)

22 *ABCDEFGH* is a cuboid.

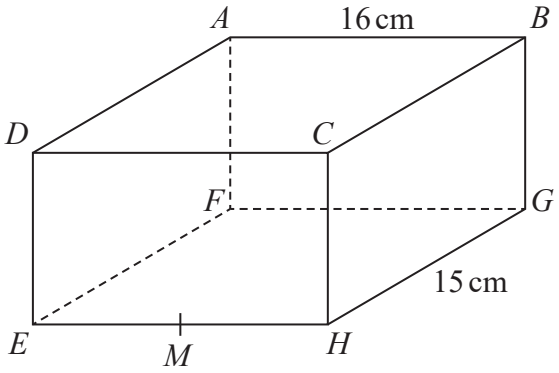


Diagram **NOT** accurately drawn

$AB = 16$ cm and $HG = 15$ cm.
M is the midpoint of EH.

BM makes an angle of 24° with the base $EFGH$.

Calculate the height, BG, of the cuboid.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 22 is 4 marks)

23 $t = \dfrac{v - u}{a}$

$v = 27.3$ correct to 3 significant figures.
$u = 18$ correct to 2 significant figures.
$a = 9.81$ correct to 3 significant figures.

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

.....

(Total for Question 23 is 3 marks)

24 The diagram shows triangle *KLM*.

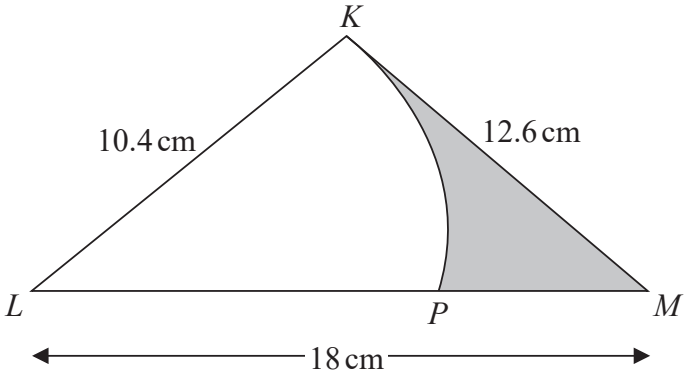


Diagram **NOT** accurately drawn

KLP is a sector of a circle with centre *L* and radius 10.4 cm.
The region of the triangle outside the sector is shown shaded in the diagram.

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 24 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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