

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Pearson Edexcel
International GCSE**

Mathematics A

Paper 3HR



Higher Tier

Thursday 24 May 2018 – Morning

Time: 2 hours

Paper Reference

4MA0/3HR

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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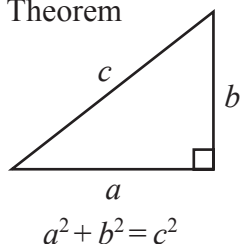
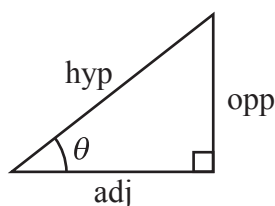
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International GCSE MATHEMATICS FORMULAE SHEET – HIGHER TIER

Pythagoras' Theorem

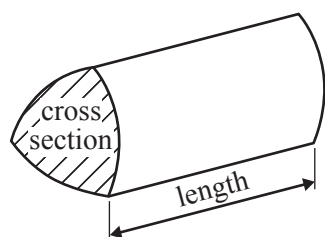


$$\begin{aligned}\text{adj} &= \text{hyp} \times \cos \theta \\ \text{opp} &= \text{hyp} \times \sin \theta \\ \text{opp} &= \text{adj} \times \tan \theta\end{aligned}$$

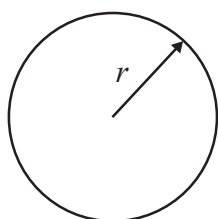
$$\text{or} \quad \sin \theta = \frac{\text{opp}}{\text{hyp}}$$

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

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

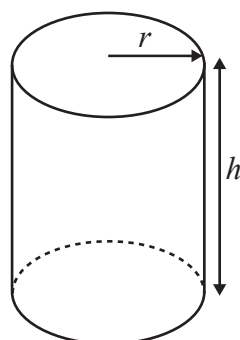


$$\text{Volume of prism} = \text{area of cross section} \times \text{length}$$



$$\text{Circumference of circle} = 2\pi r$$

$$\text{Area of circle} = \pi r^2$$

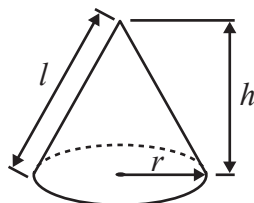


$$\text{Volume of cylinder} = \pi r^2 h$$

$$\text{Curved surface area of cylinder} = 2\pi r h$$

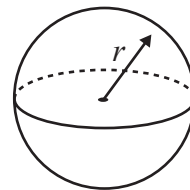
$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Curved surface area of cone} = \pi r l$$

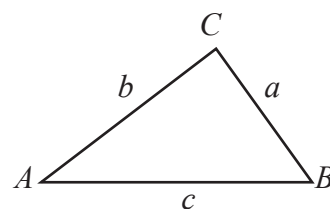


$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

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



In any triangle ABC

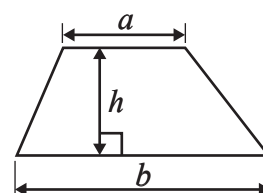


$$\text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

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



The Quadratic Equation

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

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

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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 (a) Work out the value of $\left(\frac{125.6}{4.7}\right)^2$

Write down all the figures on your calculator display.

.....
(2)

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

.....
(1)

(Total for Question 1 is 3 marks)

- 2 Helga has played a game many times.

She scored 9 or more in $\frac{5}{6}$ of these games.

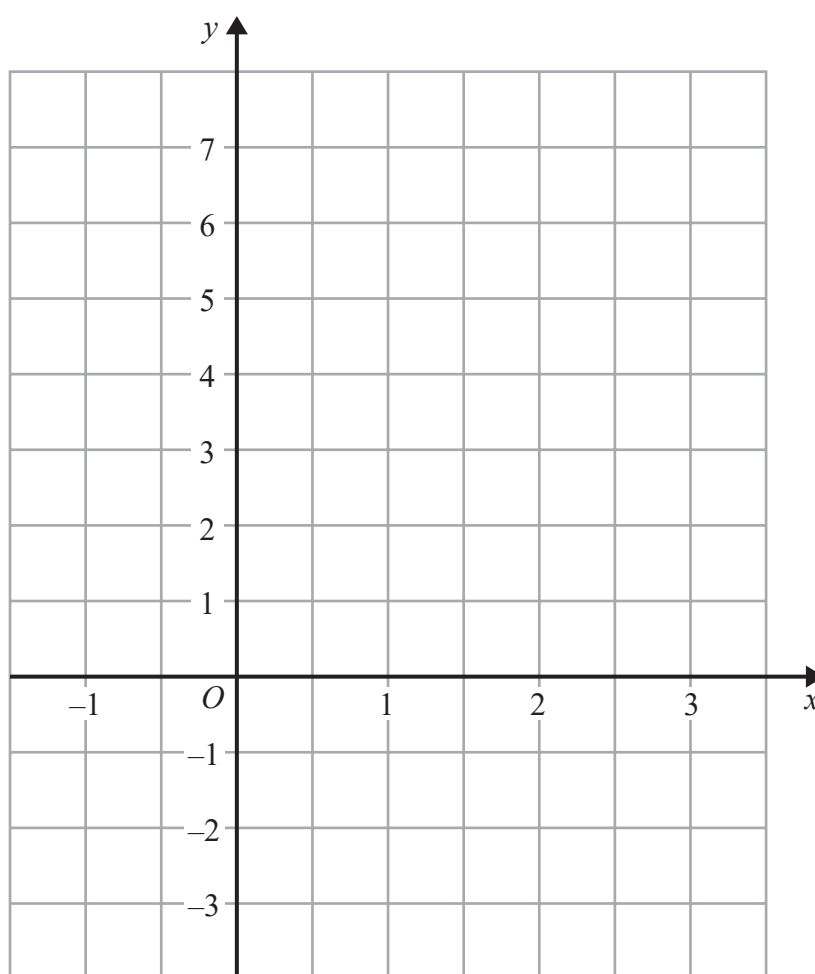
Helga is going to play the game another 60 times.

Work out an estimate for the number of times she will score 9 or more in these 60 games.

.....
(Total for Question 2 is 2 marks)



- 3 (a) On the grid, draw the graph of $y = 4 - 2x$ for values of x from -1 to 3



(3)

- (b) Write down the coordinates of the point where the graph of $y = 4 - 2x$ crosses the line $y = 1$

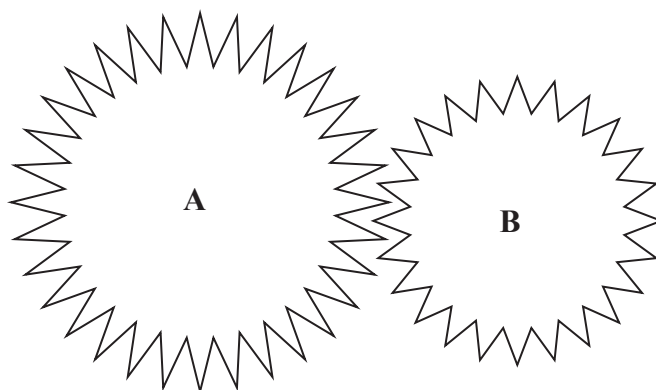
(.....,)

(1)

(Total for Question 3 is 4 marks)



- 4 The diagram shows two cogs, **A** and **B**.



There are 32 teeth on cog **A**.

There are 24 teeth on cog **B**.

The two cogs both rotate.

Cog **A** completes 12 full turns while cog **B** completes 16 full turns.

Work out the number of full turns that cog **A** completes while cog **B** completes 60 full turns.

(Total for Question 4 is 2 marks)



5 The size of each exterior angle of a regular polygon is 24°

(a) Work out the number of sides of the polygon.

.....
(2)

Here is a pentagon.

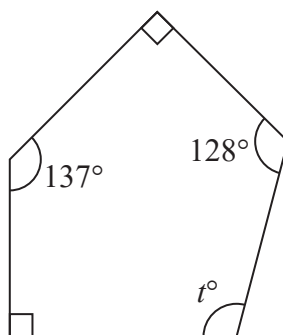


Diagram **NOT**
accurately drawn

(b) Work out the value of t .

.....
(3)

(Total for Question 5 is 5 marks)



- 6 $\mathcal{E} = \{\text{fish in Jake's lake}\}$
 $A = \{\text{fish of length greater than 20 cm}\}$
 $B = \{\text{fish that weigh more than 1 kg}\}$
 $C = \{\text{fish less than 1 year old}\}$

A fish in Jake's lake is caught.

The fish is 2 years old, weighs 1.2 kg and is 19 cm in length.

- (a) Write down the set, A or B or C , of which this fish is a member.

.....
(1)

- (b) Describe in words fish that are members of the set $A \cup B$

.....
.....
(2)

$$B \cap C = \emptyset$$

- (c) Explain what this statement tells us about the fish in Jake's lake.

.....
.....
(1)

(Total for Question 6 is 4 marks)



- 7 The diagram shows a rectangle and an isosceles triangle.
All measurements are in centimetres.

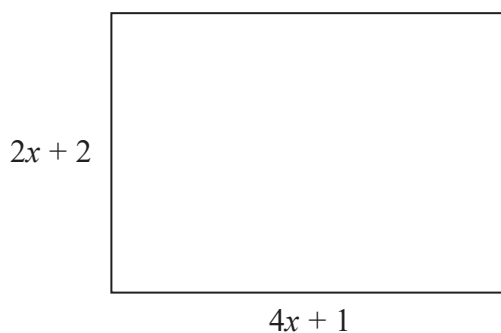
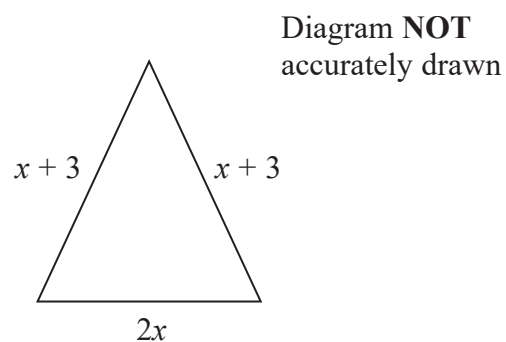


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accurately drawn

- (a) Write down an expression in terms of x for

- (i) the perimeter of the rectangle,

.....cm

- (ii) the perimeter of the triangle.

.....cm

(2)

The perimeter of the rectangle is equal to 2 times the perimeter of the triangle.

- (b) Work out the value of x .
Show clear algebraic working.

(4)

(Total for Question 7 is 6 marks)



8 Marta breeds dogs.

32 dogs give birth to puppies.

The table shows information about the number of puppies born to each dog.

Number of puppies	Frequency
1 – 3	5
4 – 6	12
7 – 9	10
10 – 12	4
13 – 15	1

(a) Write down the modal class.

.....
(1)

(b) Work out an estimate for the mean number of puppies born to each dog.

.....
(4)

(Total for Question 8 is 5 marks)



9 Show that $3\frac{3}{8} \div 2\frac{1}{4} = 1\frac{1}{2}$

(Total for Question 9 is 3 marks)

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10

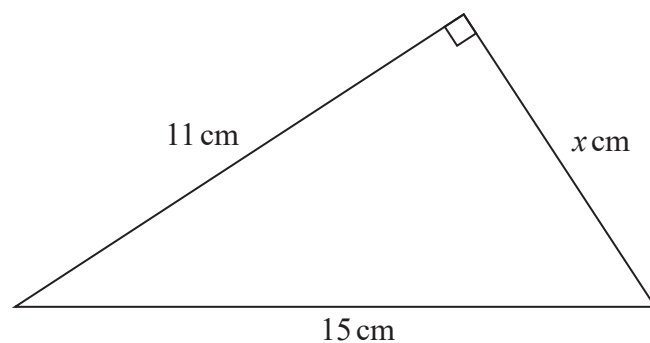


Diagram **NOT**
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Work out the value of x .
Give your answer correct to 3 significant figures.

(Total for Question 10 is 3 marks)



11 The line **L** has equation $4x + 5y = 20$

(a) Work out the gradient of **L**.

.....
(2)

The line **M** has gradient 2

L and **M** both cross the y -axis at the same point.

(b) Find an equation for **M**.

.....
(2)

(Total for Question 11 is 4 marks)



12

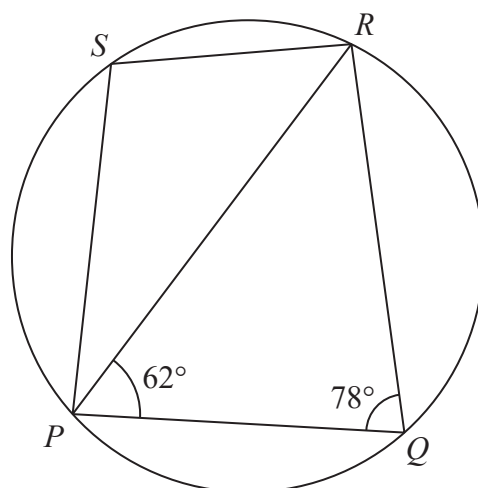


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P , Q , R and S are points on a circle.
Angle $RPQ = 62^\circ$ and angle $PQR = 78^\circ$

(a) (i) Find the size of angle PSR .

○

(ii) Give a reason for your answer.

(2)

(b) Work out the size of angle PSQ .

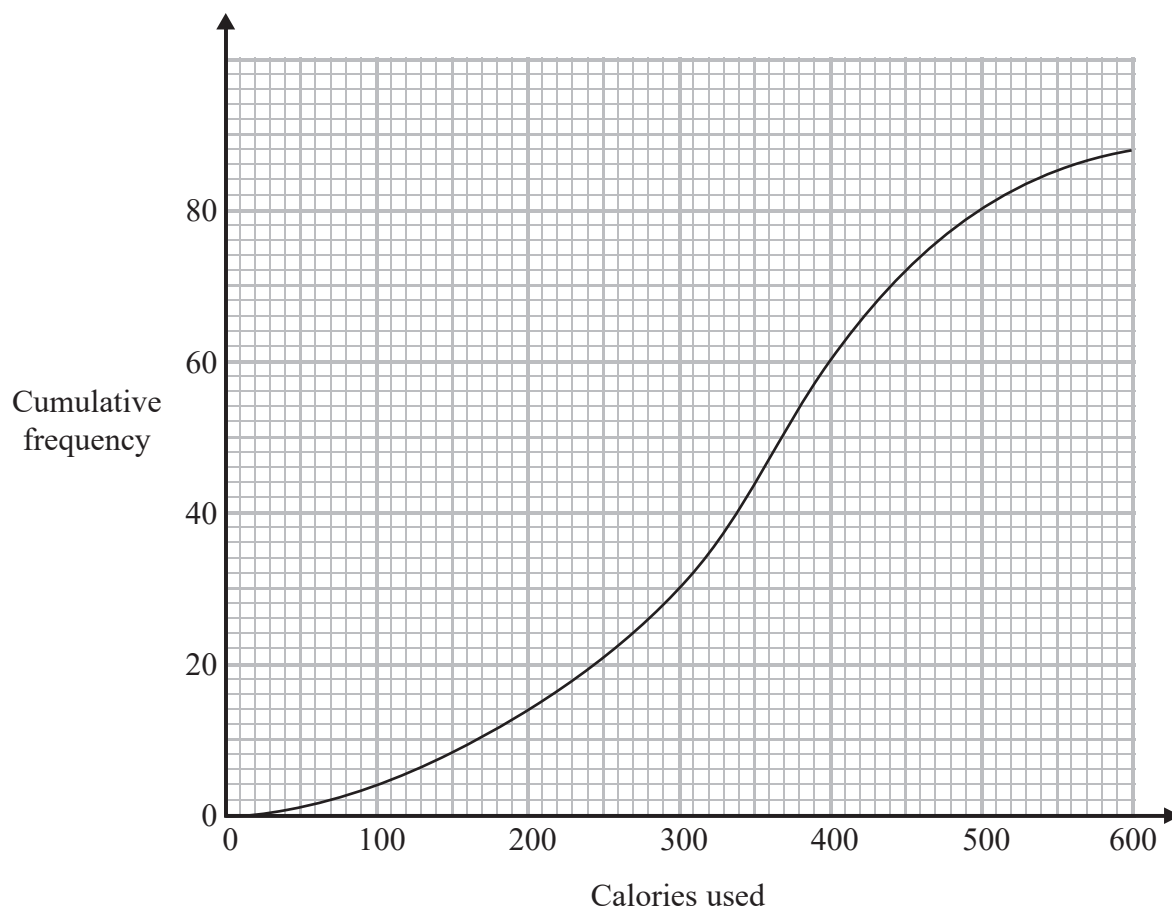
○

(2)

(Total for Question 12 is 4 marks)



- 13 The cumulative frequency graph shows information about the number of calories used by 88 people during their exercise programme at a sports centre.



- (a) Use the graph to find an estimate for the median number of calories used.

..... calories
(2)

- (b) Use the graph to find an estimate for the number of these 88 people who used more than 500 calories.

.....
(2)

(Total for Question 13 is 4 marks)



14 (a) Solve the inequality $\frac{1}{4}p < 7$

.....
(1)

(b) Solve the inequality $16q^2 > 9$

.....
(3)

(Total for Question 14 is 4 marks)



15 Cylinder A has height 12 cm and diameter 8 cm.

- (a) Work out the volume of cylinder A.
Give your answer correct to 3 significant figures.

..... cm³
(2)

Cylinder B is similar to cylinder A.
The height of cylinder B is 21 cm.

- (b) Work out the diameter of cylinder B.

..... cm
(2)

Cylinder C is similar to cylinder A.
The volume of cylinder C is 64 times the volume of cylinder A.

- (c) Work out the height of cylinder C.

..... cm
(3)

(Total for Question 15 is 7 marks)



16 Daniel buys a new car.

In the first year, the value of the car decreases by 24% of its original value.

The value of the car at the end of the first year is \$13 300

- (a) Work out the original value of the car.

\$
(3)

The value of the car at the end of the first year is \$13 300

In each of the second year, the third year and the fourth year, the value of the car decreases by $x\%$ of its value at the beginning of each year.

The value of the car at the end of the fourth year is \$6500

- (b) Work out the value of x .

Give your answer correct to 3 significant figures.

$x =$
(3)

(Total for Question 16 is 6 marks)



17 The curve **C** has equation $y = 2x^3 - 6x$

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

$$\frac{dy}{dx} = \dots\dots\dots (2)$$

(b) Work out the gradient of **C** at the point (2, 4)

.....
(1)

(c) Find the x coordinates of the points on **C** where the gradient of the curve is $7\frac{1}{2}$
Show clear algebraic working.

.....
(3)

(Total for Question 17 is 6 marks)



18 Two fair 6-sided dice are thrown.

The total is the sum of the numbers that each dice lands on.

(a) Work out the probability that the total is 4

.....
(2)

Three people each throw the two dice.

(b) Work out the probability that none of the three people get a total of 4

.....
(2)

(Total for Question 18 is 4 marks)



19 Solve the simultaneous equations

$$y = 5x^2$$

$$y - 4 = 3x$$

Show your working clearly.

Give your solutions correct to 2 decimal places.

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(Total for Question 19 is 4 marks)



- 20 Show that $\frac{\sqrt{50} - \sqrt{18}}{4}$ can be written in the form $\frac{1}{\sqrt{k}}$ where k is an integer.

Show your working clearly.

(Total for Question 20 is 3 marks)



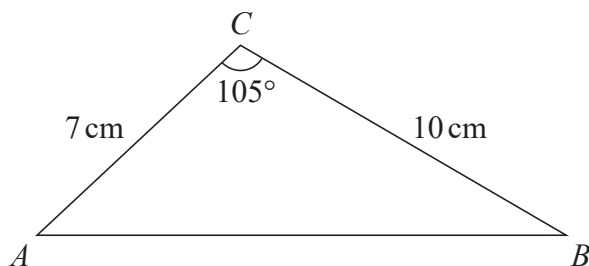


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- (a) Work out the area of triangle ABC .
Give your answer correct to 3 significant figures.

..... cm^2
(2)

- (b) Work out the size of angle BAC .
Give your answer correct to 1 decimal place.



(5)

(Total for Question 21 is 7 marks)

22 Simplify fully $\frac{12x^2 - 3}{6x^2 + 5x - 4}$

(Total for Question 22 is 3 marks)



23 f is the function such that $f(x) = \sqrt{4-x}$ and $f(x) \geq 0$

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

.....
(1)

The inverse function f^{-1} has domain $x \geq 0$

(b) Find $f^{-1}(x)$

$f^{-1}(x) =$
(2)

g is the function such that $g(x) = (5-x)(x-1)$
The composite function fg has domain $x \geq 3$

(c) Find $fg(x)$

Give your answer in its simplest form.

$fg(x) =$
(4)

(Total for Question 23 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS

