

**Paper Reference 4MA1/2H**  
**Pearson Edexcel**  
**International GCSE**

<b>Total Marks</b>
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**Mathematics A**  
**PAPER 2H**  
**Higher Tier**  
**(Calculator)**

**Time: 2 hours plus your additional time allowance**

**In the boxes below, write your name, centre number and candidate number.**

<b>Surname</b>					
<b>Other names</b>					
<b>Centre Number</b>					
<b>Candidate Number</b>					

**YOU MUST HAVE**

**Ruler, protractor, compasses, writing and drawing equipment, calculator. Tracing paper may be used.**

**YOU WILL BE GIVEN**

**Diagram Booklet  
Formulae Pages**

**INSTRUCTIONS**

**Answer ALL questions.**

**Without sufficient working, correct answers may be awarded no marks.**

**Answer the questions in the spaces provided in this Question Paper or on the separate diagrams – there may be more space than you need.**

**CALCULATORS MAY BE USED.**

**You must NOT write anything on the Formulae Pages. Anything you write on the Formulae Pages 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.**

**There may be spare copies of some diagrams in case  
you need them.**

**ADVICE**

**Read each question carefully before you start to  
answer it.**

**Check your answers if you have time at the end.**

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**Answer ALL TWENTY SIX questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

1. (a) Expand and simplify  
 $(y + 4)(2 - y)$   
(2 marks)

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(continued on the next page)

1. continued.

(b) Factorise fully

$$15p^5q - 35p^3q^9$$

(2 marks)

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(Total for Question 1 is 4 marks)

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2. Show that

$$6\frac{3}{4} \div 2\frac{4}{7} = 2\frac{5}{8}$$

(3 marks)

Answer space continues on the next page.

**2. continued.**

**(Total for Question 2 is 3 marks)**

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3. Look at the diagram for Question 3 in the Diagram Booklet.

It is NOT accurately drawn.

It shows triangle **ABC** and triangle **PQR**

Triangle **ABC** is similar to triangle **PQR**

$$AB = 4 \text{ cm}$$

$$PQ = 12 \text{ cm}$$

$$RQ = 16.5 \text{ cm}$$

$$AC = x \text{ cm}$$

$$PR = y \text{ cm}$$

$$\text{angle } BAC = \text{angle } QPR$$

$$\text{angle } ACB = \text{angle } PRQ$$

(continued on the next page)

**3. continued.**

- (a) Calculate the length of BC**  
**(2 marks)**

\_\_\_\_\_ **cm**

**(continued on the next page)**

**3. continued.**

**(b) Write down an expression for  $y$  in terms of  $x$**   
**(1 mark)**

**$y =$  \_\_\_\_\_**

**(Total for Question 3 is 3 marks)**

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4. Look at the diagram for Question 4 in the Diagram Booklet.

It is NOT accurately drawn.

It shows a regular octagon.

Each side of the regular octagon has a length of 18 mm, correct to the nearest 0.5 mm

- (a) Write down the lower bound of the length of each side of the octagon.

(1 mark)

\_\_\_\_\_ mm

(continued on the next page)

4. continued.

(b) Write down the upper bound of the length of each side of the octagon.

(1 mark)

\_\_\_\_\_ mm

(Total for Question 4 is 2 marks)

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5. Look at the scale diagram for Question 5 in the Diagram Booklet.

It shows the position on a map of a house, **A**

House **C** is on a bearing of  $110^\circ$  from **A**

The distance from **A** to **C** is 900 metres.

- (a) Mark the position of **C** on the diagram in the Diagram Booklet.

(3 marks)

(continued on the next page)

5. continued.

(b) Write the scale of the map in the form 1:n  
(1 mark)

1: \_\_\_\_\_

(Total for Question 5 is 4 marks)

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6. Look at the table for Question 6 in the Diagram Booklet.

A bag contains only pink sweets, white sweets, green sweets and red sweets.

The table in the Diagram Booklet gives each of the probabilities that, when a sweet is taken at random from the bag, the sweet will be green or the sweet will be red.

The ratio

number of pink sweets : number of white sweets =  
2 : 1

There are 28 red sweets in the bag.

Work out the number of white sweets in the bag.

(5 marks)

Answer space continues on the next two pages.

6. continued.

6. continued.

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(Total for Question 6 is 5 marks)

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7. Find the lowest common multiple (LCM) of  
28, 42 and 63

Show your working clearly.

(3 marks)

Answer space continues on the next page.

7. continued.

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(Total for Question 7 is 3 marks)

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8. Look at the table for Question 8 in the Diagram Booklet.

It gives information about the average house price in England in **2018** and in **2019**

- (a) Work out the percentage increase in the average house price from **2018** to **2019**  
Give your answer correct to one decimal place.  
(2 marks)

\_\_\_\_\_ %

(continued on the next page)

Turn over

8. continued.

The average house price in **2019** was  
**7.7%** greater than the average house price in  
**2017**

(b) Work out the average house price in **2017**

Give your answer correct to

**3** significant figures.

(3 marks)

Answer space continues on the next page.

8. (b) continued.

£ \_\_\_\_\_

(Total for Question 8 is 5 marks)

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9. Look at the frequency table for Question 9 in the Diagram Booklet.

It gives information about the number of points scored by a player.

The mean number of points scored is 2

Work out the value of  $x$

(4 marks)

Answer space continues on the next page.

9. continued.

**X =** \_\_\_\_\_

**(Total for Question 9 is 4 marks)**

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10. Solve the simultaneous equations

$$3x + 5y = 3 \cdot 1$$

$$6x + 3y = 3 \cdot 75$$

Show clear algebraic working.

(3 marks)

Answer space continues on the next page.

10. continued.

$x =$  \_\_\_\_\_

$y =$  \_\_\_\_\_

(Total for Question 10 is 3 marks)

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Turn over

11. Look at the diagram for Question 11 in the Diagram Booklet.

It is NOT accurately drawn.

It shows a regular 10-sided polygon,

**ABCDEFGHIJ**

angle **JAG** =  $x^\circ$

angle **GAD** =  $y^\circ$

Show that  **$x = y$**

(4 marks)

Answer space continues on the next page.

11. continued.

(Total for Question 11 is 4 marks)

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12.  $n = 6 \times 10^{40}$

Work out the value of  $n^3$

Give your answer in standard form.

(3 marks)

Answer space continues on the next page.

12. continued.

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(Total for Question 12 is 3 marks)

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- 13. Look at the diagram for Question 13 in the Diagram Booklet.**

**The shaded region in the diagram is bounded by three lines.**

**The equation of one of the lines is given as**

$$\mathbf{x + 2y = 8}$$

**Write down three inequalities that define the shaded region.**

**(3 marks)**

**Answer space continues on the next page.**

13. continued.

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(Total for Question 13 is 3 marks)

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**14. Look at the diagram for Question 14 in the Diagram Booklet.**

**It is NOT accurately drawn.**

**A zip wire is shown as the dashed line  $AC$  in the diagram.**

**The zip wire is supported by two vertical posts  $AB$  and  $CD$  standing on horizontal ground.**

**$CD = 2.6$  metres**

**$BD = 12$  metres**

**The zip wire makes an angle  $x$  with the horizontal, as shown in the diagram.**

**The design of the zip wire requires the angle  $x$  to be at least  $5^\circ$**

**Work out the least possible height of the post  $AB$**

**Give your answer correct to 3 significant figures.**

**(3 marks)**

**Answer space continues on the next page.**

14. continued.

\_\_\_\_\_ metres

(Total for Question 14 is 3 marks)

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Turn over

15. Diyar recorded the distance, in kilometres, that he cycled each day for 11 days.

Here are his results.

8	10	12	13	5	23
21	7	5	16	14	

Find the interquartile range of his results.

(3 marks)

Answer space continues on the next page.

15. continued.

\_\_\_\_\_ km

(Total for Question 15 is 3 marks)

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**16. Look at the diagram for Question 16 in the Diagram Booklet.**

**It is NOT accurately drawn.**

**D, E, F and G are points on a circle, centre O  
DG, GF, FE, ED and DF are straight lines.**

**EOG is a diameter of the circle.**

**Angle EGD =  $42^\circ$**

**Calculate the size of angle DFG**

**Give a reason for each stage of your working.**

**(4 marks)**

**Answer space continues on the next page.**

16. continued.

Angle DFG = \_\_\_\_\_°

(Total for Question 16 is 4 marks)

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17. Show that  $\frac{\sqrt{12}}{\sqrt{3} + 2}$

can be written in the form  $a + \sqrt{b}$  where  $a$  and  $b$  are integers.

(3 marks)

Answer space continues on the next page.

17. continued.

(Total for Question 17 is 3 marks)

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- 18. Prove that when the sum of the squares of any two consecutive odd numbers is divided by 8, the remainder is always 2**

**Show clear algebraic working.**

**(3 marks)**

**Answer space continues on the next page.**

18. continued.

(Total for Question 18 is 3 marks)

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**19. Look at the diagram for Question 19 in the Diagram Booklet.**

**It is NOT accurately drawn.**

**It shows the points **P**, **Q**, **R** and **S** on a circle.**

**PTQ is a diameter of the circle.**

**RTS is a chord of the circle.**

**TQ = 3 cm**

**ST = 4 cm**

**TR = 12 cm**

**Calculate the radius of the circle.**

**(3 marks)**

**Answer space continues on the next page.**

19. continued.

\_\_\_\_\_ cm

(Total for Question 19 is 3 marks)

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**20. Look at the diagram for Question 20 in the Diagram Booklet.**

**It shows a histogram which gives information about the heights,  $h$  cm, of some tomato plants.**

**There are 12 tomato plants for which  $75 < h \leq 85$**

**One of the tomato plants is selected at random.**

**Find an estimate for the probability that this tomato plant has a height greater than  $82.5$  cm**

**(4 marks)**

**Answer space continues on the next page.**

20. continued.

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**(Total for Question 20 is 4 marks)**

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**21. Look at the diagram for Question 21 in the Diagram Booklet.**

**It shows part of the graph of  $y = 2x^2 - 4x - 1$  on a grid.**

- (a) Use the graph to find estimates for the solutions of the equation  $2x^2 - 4x - 1 = 0$**   
**Give your solutions correct to one decimal place.**

**(2 marks)**

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**(continued on the next page)**

**21. continued.**

- (b) By drawing a suitable straight line on the grid in the Diagram Booklet, find estimates for the solutions of the equation  $x^2 - x - 1 = 0$**

**Show your working clearly.**

**Give your solutions correct to one decimal place.**

**(3 marks)**

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**(Total for Question 21 is 5 marks)**

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**22. Look at the diagram for Question 22 in the Diagram Booklet.**

**It is NOT accurately drawn.**

**It shows a rectangle.**

**It has the length  $(2y + 3)$  cm and width  $(y - 1)$  cm**

**Given that the area of the rectangle is less than  $75\text{cm}^2$**

**find the range of possible values of  $y$**

**(5 marks)**

**Answer space continues on the next page.**

**22. continued.**

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**(Total for Question 22 is 5 marks)**

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**Turn over**

23. Look at the diagram for Question 23 in the Diagram Booklet.

It is NOT accurately drawn.

It shows triangle **PQR**

$$PQ = 1.6 \text{ cm}$$

$$PR = 4.2 \text{ cm}$$

$$\text{Angle } PRQ = 18^\circ$$

Given that angle **PQR** is obtuse,

work out the area of triangle **PQR**

Give your answer correct to 3 significant figures.

(6 marks)

Answer space continues on the next page.

23. continued.

\_\_\_\_\_  $\text{cm}^2$

(Total for Question 23 is 6 marks)

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Turn over

24. A particle **P** moves along a straight line that passes through the fixed point **O**

The displacement, **x** metres, of **P** from **O** at time **t** seconds, where  $t \geq 0$ , is given by

$$x = 4t^3 - 27t + 8$$

The direction of motion of **P** reverses when **P** is at the point **A** on the line.

The acceleration of **P** at the instant when **P** is at **A** is  $a \text{ m/s}^2$

Find the value of **a**

(5 marks)

Answer space continues on the next two pages.

24. continued.

24. continued.

**a =** \_\_\_\_\_

**(Total for Question 24 is 5 marks)**

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25. The function  $g$  is defined as

$$g : x \mapsto 5 + 6x - x^2 \text{ with domain } \{x : x \geq 3\}$$

(a) Express the inverse function  $g^{-1}$  in the form  
 $g^{-1} : x \mapsto \dots$

(4 marks)

Answer space continues on the next page.

25. (a) continued.

$$g^{-1}: x \mapsto \underline{\hspace{10em}}$$

(continued on the next page)

Turn over

25. continued.

- (b) State the domain of  $g^{-1}$   
(1 mark)

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(Total for Question 25 is 5 marks)

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26. An arithmetic series has first term  $a$  and common difference  $d$ , where  $d$  is a prime number.

The sum of the first  $n$  terms of the series is  $S_n$  and

$$S_m = 39$$

$$S_{2m} = 320$$

Find the value of  $d$  and the value of  $m$

Show clear algebraic working.

(5 marks)

Answer space continues on the next two pages.

26. continued.

26. continued.

d = \_\_\_\_\_

m = \_\_\_\_\_

(Total for Question 26 is 5 marks)

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**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**

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