

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

Total Marks
-------------

**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.**

---

**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)



(continued on the next page)

1. continued.

(b) Factorise fully

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

(2 marks)

---

**(Total for Question 1 is 4 marks)**

---

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)**

---

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)

---

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)

---

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)

---

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.

---

**(Total for Question 6 is 5 marks)**

---

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.

---

**(Total for Question 7 is 3 marks)**

---

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)**

---

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)**

---

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)

---

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)

---

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.

---

**(Total for Question 12 is 3 marks)**

---

**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.

---

---

---

**(Total for Question 13 is 3 marks)**

---

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.

$$CD = 2.6 \text{ metres}$$

$$BD = 12 \text{ metres}$$

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)

---

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)

---

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)

---

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)**

---

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)**

---

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.

$$\mathbf{TQ = 3\text{ cm}}$$

$$\mathbf{ST = 4\text{ cm}}$$

$$\mathbf{TR = 12\text{ cm}}$$

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)

---

**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.

---

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

---

**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)**

---

**(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)

---

(Total for Question 21 is 5 marks)

---

**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.

---

(Total for Question 22 is 5 marks)

---

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)

---

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)

---

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)

---

(Total for Question 25 is 5 marks)

---

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)

---

**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**

---