

**Paper Reference 4MA1/1H  
Pearson Edexcel  
International GCSE**

Total Marks

**Mathematics A  
PAPER 1H  
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.**

**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.**

**You may be provided with a model for Question 21**

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

## **ADVICE**

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

**Try to answer every question.**

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

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**Answer ALL TWENTY FOUR questions.**

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

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

1. (a) Simplify

$$m^7 \times m^4$$

(1 mark)

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(b) Simplify

$$w^{15} \div w^3$$

(1 mark)

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(continued on the next page)

Turn over

1. continued.

(c) Simplify

$$(8x^5y^3)^2$$

(2 marks)

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(continued on the next page)

1. continued.

(d) Make  $t$  the subject of

$$n = t^3 - 8v$$

(2 marks)

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(Total for Question 1 is 6 marks)

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2. Danil, Gabriel and Hadley share some money in the ratios **3 : 5 : 9**

The difference between the amount of money that Gabriel receives and the amount of money that Hadley receives is **196** euros.

Work out the amount of money that Danil receives.  
(3 marks)

Answer space continues on the next page.

2. continued.

\_\_\_\_\_ euros

**(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**

$$AC = 8.4 \text{ cm}$$

$$\text{angle } ACB = 65^\circ$$

angle **ABC** is a right angle.

Work out the length of the side **AB**

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

(3 marks)

Answer space continues on the next page.

3. continued.

\_\_\_\_\_ cm

(Total for Question 3 is 3 marks)

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

It shows a price list.

Sarah makes and sells mugs.

One day she makes **150** mugs.

Her total cost for making these mugs is **£1140**

Of these mugs

$\frac{2}{5}$  are small mugs

**32%** are medium mugs

and the rest are large mugs

Sarah's price list for selling each mug is shown in the Diagram Booklet.

Sarah sells all **150** mugs.

Work out her percentage profit.

Give your answer correct to the nearest whole number.

(5 marks)

Answer space is on the next page.

4. continued.

\_\_\_\_\_ %

(Total for Question 4 is 5 marks)

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Turn over

5. Look at the diagram for Question 5(a) in the Diagram Booklet.

It shows Jenny's six cards.

Each card has a whole number written on it so that

the smallest number is **5**

the largest number is **24**

the median of the six numbers is **14**

the mode of the six numbers is **8**

Jenny arranges her six cards so that the numbers are in order of size.

- (a) For the remaining four cards in the Diagram Booklet, write on each line a number that could be on the card.

(3 marks)

Space for working continues on the next page.

5. (a) continued.

(continued on the next page)

5. continued.

A basketball team plays 6 games.

After playing 5 games, the team has a mean score of 21 points per game.

After playing 6 games, the team has a mean score of 23 points per game.

(b) Work out the number of points the team scored in its 6th game.

(3 marks)

Answer space continues on the next page.

5. (b) continued.

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

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6. (a) Solve the inequality

$$5x - 7 \leq 2$$

(2 marks)

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(continued on the next page)

6. continued.

(b) (i) Factorise

$$y^2 - 2y - 35$$

(2 marks)

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(continued on the next page)

6. (b) continued.

(ii) Hence, solve

$$y^2 - 2y - 35 = 0$$

(1 mark)

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

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7. Look at the diagram for Question 7 in the Diagram Booklet.

It shows an incomplete Venn diagram.

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

$$A \cap B = \{5, 10, 15\}$$

$$B' = \{7, 8, 9, 11, 12, 13, 14\}$$

$$A' = \{4, 6, 7, 8, 14\}$$

Complete the Venn diagram in the Diagram Booklet for this information.

(Total for Question 7 is 3 marks)

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8.  $t = 4.2 \times 10^{-24}$   
 $u = 3 \times 10^{145}$

Work out the value of  $t \times u$

Give your answer in standard form.

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(Total for Question 8 is 2 marks)

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9. Look at the diagram for Question 9 in the Diagram Booklet.

It is NOT accurately drawn.

It shows isosceles triangle **ABC**

$$AB = AC = 17.5 \text{ cm}$$

$$BC = 28 \text{ cm}$$

Calculate the area of triangle **ABC**

(4 marks)

Answer space continues on the next page.

9. continued.

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

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

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**Turn over**

10. The straight line **L** has equation  
 $2y + 7x = 10$

(a) Find the gradient of **L**  
(2 marks)

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(continued on the next page)

10. continued.

(b) Find the coordinates of the point where **L** crosses the **y**-axis.

(1 mark)

( \_\_\_\_\_ , \_\_\_\_\_ )

(Total for Question 10 is 3 marks)

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11. Himari invests **200 000** yen for **3** years in a savings account paying compound interest.

The rate of interest is **1.8%** for the first year and **x%** for each of the second year and the third year.

The value of the investment at the end of the third year is **209 754** yen.

Work out the value of **x**

Give your answer correct to one decimal place.

(3 marks)

Answer space continues on the next page.

11. continued.

**x =** \_\_\_\_\_

**(Total for Question 11 is 3 marks)**

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12. Look at the table for Question 12 in the Diagram Booklet.

It gives information about the times, in minutes, taken by 80 customers to do their shopping in a supermarket.

(a) Complete the cumulative frequency table below.  
There are six spaces to fill.

(1 mark)

Time taken (t minutes)	Cumulative frequency
$0 < t \leq 10$	
$0 < t \leq 20$	
$0 < t \leq 30$	
$0 < t \leq 40$	
$0 < t \leq 50$	
$0 < t \leq 60$	

(continued on the next page)

Turn over

**12. continued.**

**(b) Look at the diagram for Question 12(b) in the Diagram Booklet.**

**It shows a grid.**

**Draw a cumulative frequency graph for your table on the grid in the Diagram Booklet.**

**(2 marks)**

**(c) Use your graph in the Diagram Booklet to find an estimate for the median time taken.**

**(1 mark)**

\_\_\_\_\_ **minutes**

**(continued on the next page)**

12. continued.

One of the **80** customers is chosen at random.

(d) Use your graph to find an estimate for the probability that the time taken by this customer was more than **40** minutes.

(2 marks)

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(Total for Question 12 is 6 marks)

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13. (a) Expand and simplify  
 $5n(n + 2)(3n - 4)$   
(3 marks)

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(continued on the next page)

13. continued.

(b) Simplify completely

$$\left(\frac{16w^8}{y^{20}}\right)^{-\frac{3}{4}}$$

(3 marks)

---

(Total for Question 13 is 6 marks)

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Turn over

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

**It shows an incomplete probability tree diagram.**

**Aika has 2 packets of seeds, packet **A** and packet **B****

**There are 12 seeds in packet **A** and 7 of these are sunflower seeds.**

**There are 15 seeds in packet **B** and 8 of these are sunflower seeds.**

**Aika is going to take at random a seed from packet **A** and a seed from packet **B****

**(a) Complete the probability tree diagram in the Diagram Booklet.**

**There are five spaces to fill.**

**(2 marks)**

**(continued on the next page)**

14. continued.

(b) Calculate the probability that Aika will take two sunflower seeds.

(2 marks)

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**(Total for Question 14 is 4 marks)**

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15.  $R$  is inversely proportional to  $T^2$

$$R = 40 \text{ when } T = 1.5$$

Calculate the value of  $T$  when  $R = 1000$

(3 marks)

Answer space continues on the next page.

15. continued.

T = \_\_\_\_\_

(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.

It shows a circle with centre **O**

**A**, **B** and **C** are points on the circle so that the length of the arc **ABC** is 5 cm

Given that angle **AOC** =  $55^\circ$

work out the area of the circle.

Give your answer correct to one decimal place.

(4 marks)

Answer space continues on the next page.

16. continued.

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

(Total for Question 16 is 4 marks)

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Turn over

17. Look at the diagram for Question 17 in the Diagram Booklet.

It is NOT accurately drawn.

It shows two similar vases, **A** and **B**

Vase **A** has height **10 cm**

Vase **B** has height **15 cm**

The difference between the volume of vase **A** and the volume of vase **B** is **1197 cm<sup>3</sup>**

Calculate the volume of vase **A**

(4 marks)

Answer space continues on the next page.

17. continued.

\_\_\_\_\_  $\text{cm}^3$

(Total for Question 17 is 4 marks)

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18.  $R = w - \frac{x^2}{y}$

$w = 3.45$  correct to 2 decimal places.

$x = 1.9$  correct to 1 decimal place.

$y = 5$  correct to the nearest whole number.

Work out the lower bound of the value of  $R$

Show your working clearly.

(3 marks)

Answer space continues on the next page.

18. continued.

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**(Total for Question 18 is 3 marks)**

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19. Solve the simultaneous equations

$$3x^2 + y^2 - xy = 5$$

$$y = 2x - 3$$

Show clear algebraic working.

(5 marks)

Answer space continues on the next two pages.

19. continued.

19. continued.



**(Total for Question 19 is 5 marks)**

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20. (a) Express  $7 + 12x - 3x^2$  in the form  $a + b(x + c)^2$  where  $a$ ,  $b$  and  $c$  are integers.  
(3 marks)

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(continued on the next page)

Turn over

20. continued.

**C** is the curve with equation  $y = 7 + 12x - 3x^2$

The point **R** is the maximum point on **C**

(b) Use your answer to part (a) to write down the coordinates of **R**

(1 mark)

( \_\_\_\_\_ , \_\_\_\_\_ )

(Total for Question 20 is 4 marks)

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21. Look at Diagram 1 and Diagram 2 for Question 21 in the Diagram Booklet.

You may be provided with a model.

They are NOT accurate.

Diagram 1 and the model show the prism **ABCDEFGHJK** with horizontal base **AEFG**

**ABCDE** is a cross section of the prism where

**ABDE** is a square

**BCD** is an equilateral triangle

Diagram 2 shows **GHJKF** which is also a cross section of the prism.

$$EF = 2 \times AE$$

**M** is the midpoint of **GF** so that **JM** is vertical.

$$\text{Angle } MAJ = y^\circ$$

(continued on the next page)

21. continued.

Given that

$$\tan y^\circ = T$$

find the value of  $T$ , giving your answer in the form

$$\frac{\sqrt{p} + \sqrt{q}}{17} \text{ where } p \text{ and } q \text{ are integers.}$$

(5 marks)

Answer space continues on the next two pages.

21. continued.

21. continued.

T = \_\_\_\_\_

(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 triangle **OAB**

$$\vec{OA} = 8\underline{a}$$

$$\vec{OB} = 6\underline{b}$$

**M** is the point on **OB** such that **OM : MB = 1 : 2**

**N** is the midpoint of **AB**

**P** is the point of intersection of **ON** and **AM**

Using a vector method, find  $\vec{OP}$  as a simplified expression in terms of  $\underline{a}$  and  $\underline{b}$

Show your working clearly.

(5 marks)

Answer space continues on the next three pages.

22. continued.

22. continued.

22. continued.

$$\vec{OP} = \underline{\hspace{10em}}$$

(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 shows a sketch of the curve with equation  $y = f(x)$

There is only one maximum point on the curve.

The coordinates of this maximum point are  $(5, 7)$

Write down the coordinates of the maximum point on the curve with equation

(i)  $y = f(x + 9)$

( \_\_\_\_\_ , \_\_\_\_\_ )

(ii)  $y = f(x) + 3$

( \_\_\_\_\_ , \_\_\_\_\_ )

(Total for Question 23 is 2 marks)

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24. The curve **C** has equation  
 $y = ax^3 + bx^2 - 12x + 6$  where **a** and **b** are  
constants.

The point **R** with coordinates  $(2, -6)$  lies on **C**

The gradient of the curve at **R** is **16**

Find the **y** coordinate of the point on the curve  
whose **x** coordinate is **3**

Show clear algebraic working.

(6 marks)

Answer space continues on the next two pages.

24. continued.

24. continued.

$$y = \underline{\hspace{10em}}$$

(Total for Question 24 is 6 marks)

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**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**

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