

**Paper Reference 1MA1/1H**  
**Pearson Edexcel**  
**Level 1/Level 2 GCSE (9–1)**

Total Marks
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**Mathematics**  
**PAPER 1 (Non-Calculator)**  
**Higher Tier**

**Friday 19 May 2023 – Morning**

**Time: 1 hour 30 minutes**

**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, Formulae Sheet (enclosed). Tracing paper may be used.**

**YOU WILL BE GIVEN**

**Diagram Booklet**

**Turn over**

# **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.**

**You must SHOW ALL YOUR WORKING.**

**Diagrams are NOT accurately drawn, unless otherwise indicated.**

**CALCULATORS MAY NOT BE USED.**

**Turn over**

## **INFORMATION**

**The total mark for this paper is 80**

**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.**

**You may be provided with models for Question 8, Question 16 and Question 22  
They are NOT accurate.**

**Turn over**

**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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**Turn over**

**Answer ALL questions.**

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

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

1. Work out

$$8.46 \div 0.15$$

(3 marks)

Answer space continues on the next page.

Turn over

**1. continued.**

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**(Total for Question 1 is 3 marks)**

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**Turn over**



**2. Work out**

$$7\frac{3}{8} - 2\frac{1}{2}$$

**Give your answer as a mixed number.**

**(3 marks)**

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

**Turn over**

**10**

**2. continued.**

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

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**Turn over**

- 3. A cube has a total surface area of  $150 \text{ cm}^2$**

**Work out the volume of the cube.**

**(4 marks)**

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

**Turn over**

**3. continued.**

\_\_\_\_\_ **cm<sup>3</sup>**

**(Total for Question 3 is 4 marks)**

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**Turn over**

4. The table shows information about the daily rainfall in a town for 60 days.

Rainfall (R mm)	Frequency
$0 \leq R < 5$	5
$5 \leq R < 10$	25
$10 \leq R < 15$	15
$15 \leq R < 20$	10
$20 \leq R < 25$	5

(continued on the next page)

Turn over

**4. continued.**

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

**It shows a blank grid.**

**On the grid, draw a frequency polygon for the information in the table on the previous page.**

**(Total for Question 4 is 2 marks)**

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**Turn over**

- 5. Look at the diagram for Question 5 in the Diagram Booklet.**

**It shows an incomplete Venn Diagram.**

$$\mathcal{U} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

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

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

- (a) Complete the Venn diagram in the Diagram Booklet for this information.**

**(3 marks)**

**(continued on the next page)**

**Turn over**

5. continued.

Remember:

$$\mathcal{U} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

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

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

A number is chosen at random from the universal set  $\mathcal{U}$

- (b) Find the probability that this number is in the set  $B'$   
(2 marks)

Answer space continues on the next page.

Turn over



**5. (b) continued.**

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

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**Turn over**

**6. Look at the diagram for Question 6 in the Diagram Booklet.**

**It shows a scatter graph with information about the ages and weights of some babies.**

**(continued on the next page)**

**6. continued.**

**(a) Describe the relationship  
between the age and the weight  
of the babies.**

**(1 mark)**

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**(continued on the next page)**

**Turn over**

**6. continued.**

**Another baby has a weight of  $6.0$  kg**

- (b) Using the scatter graph in the Diagram Booklet, find an estimate for the age of this baby.  
(2 marks)**

\_\_\_\_\_ months

**(Total for Question 6 is 3 marks)**

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**Turn over**

- 7. The price of a holiday increases by 20%**

**This 20% increase adds £240 to the price of the holiday.**

**Work out the price of the holiday before the increase.**

**(2 marks)**

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

**7. continued.**

£ \_\_\_\_\_

**(Total for Question 7 is 2 marks)**

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**Turn over**

- 8. Look at the diagram for Question 8 in the Diagram Booklet.**

**You may be provided with a model.**

**They show a solid cylinder on a horizontal floor.**

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

**The cylinder has a**

**volume of 1200 cm<sup>3</sup>**

**height of 40 cm**

**The cylinder exerts a force of 90 newtons on the floor.**

**(continued on the next page)**

**Turn over**

**8. continued.**

**Work out the pressure on the floor  
due to the cylinder.**

**(3 marks)**

**Answer space continues on the next  
two pages.**

**Turn over**



**8. continued.**

**Turn over**

8. continued.

\_\_\_\_\_ newtons/cm<sup>2</sup>

(Total for Question 8 is 3 marks)

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Turn over

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

It shows two intersecting straight lines on a grid.

Use the graphs to solve the simultaneous equations

$$2 - 2y = x$$

$$2y = 3x - 22$$

(1 mark)

Answer space continues on the next page.

Turn over

**9. continued.**

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

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

**(Total for Question 9 is 1 mark)**

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**Turn over**

10. Look at the diagram for Question 10 in the Diagram Booklet.

It shows a pentagon **ABCDE**

$$\text{Angle } \mathbf{EAB} = 120^\circ$$

$$\text{Angle } \mathbf{BCD} = 110^\circ$$

$$\text{Angle } \mathbf{CDE} = 135^\circ$$

$$\text{Angle } \mathbf{AED} = 4 \times \text{angle } \mathbf{ABC}$$

Work out the size of angle **AED**

You must show all your working.

(4 marks)

Answer space continues on the next two pages.

**10. continued.**

**Turn over**

10. continued.

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(Total for Question 10 is 4 marks)

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Turn over

11. Write

$$\frac{(6x^5y^3)^2}{3x^2y^7 \times 4xy^{-3}}$$
 in the form

$ax^b y^c$  where **a**, **b** and **c** are integers.

(3 marks)

Answer space continues on the next page.

Turn over



**11. continued.**

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

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**Turn over**

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

**It shows a probability tree diagram.**

**Martha plays a game twice.**

**The probability tree diagram shows the probabilities that Martha will win or lose each game.**

**Find the probability that Martha will lose at least one game.**

**(3 marks)**

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

**Turn over**

**12. continued.**

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

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**Turn over**

13.  **$y$  is directly proportional to  $x$**

**$y = 24$  when  $x = 1.5$**

**Work out the value of  $y$  when  $x = 5$   
(3 marks)**

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

**13. continued.**

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

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

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**Turn over**

14. (a) Write  $\frac{1}{16}$  in the form  $4^n$  where  $n$  is an integer.  
(1 mark)
- 

(continued on the next page)

**14. continued.**

**(b) Work out the value of**

$$8^{\frac{5}{3}} - 9^{\frac{3}{2}}$$

**(3 marks)**

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

**Turn over**

14. (b) continued.

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

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**Turn over**



15. The equation of line  $L_1$  is

$$y = 2x - 5$$

The equation of line  $L_2$  is

$$6y + kx - 12 = 0$$

$L_1$  is perpendicular to  $L_2$

Find the value of  $k$

You must show all your working.

(3 marks)

Answer space continues on the next page.

**15. continued.**

**k = \_\_\_\_\_**

**(Total for Question 15 is 3 marks)**

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**Turn over**

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

**You may be provided with two models.**

**Model 1 is a sphere.**

**Model 2 is made from two hemispheres showing the radius  $r$**   
**The diagram shows a sphere.**

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

**The radius of the sphere is marked  $r$**

**$\frac{3}{8}$  of the surface area of this sphere  
is  $75\pi \text{ cm}^2$**

**(continued on the next page)**

**Turn over**

**16. continued.**

**Find the diameter of the sphere.**

**Give your answer in the form  $a\sqrt{b}$**

**where  $a$  is an integer and  $b$  is a prime number.**

**(4 marks)**

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

**Turn over**

**16. continued.**

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

**(Total for Question 16 is 4 marks)**

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**Turn over**

17. Make  $y$  the subject of the formula

$$x = \frac{4(2y - 7)}{5y + 3}$$

(4 marks)

Answer space continues on the next page.

**17. continued.**

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**(Total for Question 17 is 4 marks)**

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**Turn over**

18. **7 kg** of carrots and **5 kg** of tomatoes cost a total of **480** pence

cost of **1 kg** of carrots : cost of **1 kg** of tomatoes = **5 : 9**

Work out the cost of **1 kg** of carrots and the cost of **1 kg** of tomatoes.

(4 marks)

Answer space continues on the next two pages.



**18. continued.**

**Turn over**

**18. continued.**

**carrots \_\_\_\_\_ pence**

**tomatoes \_\_\_\_\_ pence**

**(Total for Question 18 is 4 marks)**

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**Turn over**

- 19. The menu in a restaurant has starters, main courses and desserts.**

**There are 5 starters.**

**There are 12 main courses.**

**There are  $X$  desserts.**

**There are 420 different ways to choose one starter, one main course and one dessert.**

**Work out the value of  $X$   
(2 marks)**

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

**Turn over**

**19. continued.**

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

**(Total for Question 19 is 2 marks)**

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**Turn over**

20. For  $x \geq 0$ , the functions  $f$  and  $g$  are such that

$$f(x) = 3x + 4$$

$$g(x) = \frac{\sqrt{x} + 2}{5}$$

- (a) Find  $g^{-1}(x)$   
(2 marks)

Answer space continues on the next page.

20. (a) continued.

$$g^{-1}(x) = \underline{\hspace{2cm}}$$

(continued on the next page)

Turn over

**20. continued.**

**Remember:**

$$\mathbf{f(x) = 3x + 4}$$

$$\mathbf{g(x) = \frac{\sqrt{x} + 2}{5}}$$

**(b) Solve  $gf(x) = 3$**

**(3 marks)**

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

**Turn over**

**20. (b) continued.**

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

**(Total for Question 20 is 5 marks)**

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**Turn over**



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

**A, B and D are points on a circle with centre O**

**CDE is the tangent to the circle at D**

**Angle ABO =  $51^\circ$**

**Angle BOD =  $64^\circ$**

**Work out the size of angle ADC**

**Write down any circle theorems you use.**

**(4 marks)**

**Answer space continues on the next two pages.**

**Turn over**

**21. continued.**

**Turn over**

**21. continued.**

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**(Total for Question 21 is 4 marks)**

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**Turn over**

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

**You may be provided with a model.**

**They show a cuboid  $ABCDEFGH$**

$$\mathbf{AF = 6.8 \text{ cm}}$$

$$\mathbf{FC = 13.6 \text{ cm}}$$

**Work out the size of the angle  
between  $FC$  and the plane  $ABCD$   
(2 marks)**

**Answer space continues on the next  
two pages.**

**Turn over**

**22. continued.**

**Turn over**

**22. continued.**

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**(Total for Question 22 is 2 marks)**

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**Turn over**

23. Write

$$\frac{3\sqrt{3}}{4 - \sqrt{3}} - \frac{2}{\sqrt{3}} \text{ in the form}$$

$$\frac{a\sqrt{3} + b}{c} \text{ where } a, b \text{ and } c \text{ are integers.}$$

(4 marks)

Answer space continues on the next two pages.

Turn over

**23. continued.**

**Turn over**



**23. continued.**

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**(Total for Question 23 is 4 marks)**

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**Turn over**

24. Find the set of possible values of  $x$  for which

$$4x^2 - 25 < 0 \quad \text{AND}$$

$$12 - 5x - 3x^2 > 0$$

You must show all your working.

(5 marks)

Answer space continues on the next three pages.

Turn over

**24. continued.**

**Turn over**

**24. continued.**

**Turn over**

**24. continued.**

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

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**TOTAL FOR PAPER IS 80 MARKS**

**END OF PAPER**

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