

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.

Surname					
Other names					
Centre Number					
Candidate Number					

**YOU MUST HAVE**

**Ruler, protractor, compasses, writing and drawing equipment, Formulae Sheet (enclosed). Tracing paper may be used.**

**YOU WILL BE GIVEN**

**Diagram Booklet**

**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.**

## **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.**

## **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 questions.**

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

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

1. Work out

$$8.46 \div 0.15$$

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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.

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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.

3. continued.

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

(Total for Question 3 is 4 marks)

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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

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.

(Total for Question 4 is 2 marks)

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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)

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)

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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.**

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

**(1 mark)**

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**(continued on the next page)**

6. continued.

Another baby has a weight of  $6.0 \text{ kg}$

(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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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.

£ \_\_\_\_\_

(Total for Question 7 is 2 marks)

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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  $1200 \text{ cm}^3$

height of  $40 \text{ cm}$

The cylinder exerts a force of  $90 \text{ newtons}$  on the floor.

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

(3 marks)

Answer space continues on the next two pages.

8. continued.



8. continued.

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

(Total for Question 8 is 3 marks)

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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

$$2 - 2y = x$$

$$2y = 3x - 22$$

$$x = \underline{\hspace{4cm}}$$

$$y = \underline{\hspace{4cm}}$$

(Total for Question 9 is 1 mark)

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

It shows a pentagon **ABCDE**

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

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

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

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

Work out the size of angle **AED**

You must show all your working.

(4 marks)

Answer space continues on the next page.

10. continued.

\_\_\_\_\_o

(Total for Question 10 is 4 marks)

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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.

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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.**

12. continued.

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(Total for Question 12 is 3 marks)

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

$$y = 24 \text{ when } x = 1.5$$

Work out the value of  $y$  when  $x = 5$

$$y = \underline{\hspace{4cm}}$$

(Total for Question 13 is 3 marks)

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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)

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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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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.

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

The radius of the sphere is marked  $r$

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

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.

16. continued.

\_\_\_\_\_ cm

(Total for Question 16 is 4 marks)

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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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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 page.**

18. continued.

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

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

(Total for Question 18 is 4 marks)

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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  $x$

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

(Total for Question 19 is 2 marks)

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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)

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

(continued on the next page)

20. continued.

Remember:

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

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

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

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

(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 page.

21. continued.

\_\_\_\_\_o

(Total for Question 21 is 4 marks)

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

You may be provided with a model.

They show a cuboid **ABCDEFGH**

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

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

Work out the size of the angle between **FC** and the plane **ABCD**

(2 marks)

Answer space continues on the next page.



**22. continued.**

\_\_\_\_\_ o

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

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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 page.

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 two pages.

24. continued.

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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