

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

Total Marks
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Mathematics  
PAPER 2 (Calculator)  
Higher Tier

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, calculator, Formulae Sheet. 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 BE USED.**

**If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be  $3.142$  unless the question instructs otherwise.**

**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 to use them.**

**You may be provided with models for Question 2,  
Question 17 and Question 20  
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. Look at the diagram for Question 1 in the Diagram Booklet.

The scatter graph shows information about the amount of rainfall, in mm, and the number of hours of sunshine for each of ten English towns on the same day.

One of the points is an outlier.

- (a) Write down the coordinates of this point.  
(1 mark)

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

(continued on the next page)

1. continued.

(b) Ignoring the outlier, describe the relationship between the amount of rainfall and the number of hours of sunshine.

(1 mark)

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On the same day in another English town there were 7 hours of sunshine.

(c) Using the scatter graph, estimate the amount of rainfall in this town on this day.

(2 marks)

\_\_\_\_\_ mm

(Total for Question 1 is 4 marks)

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Turn over

- 2. Look at the diagram for Question 2 in the Diagram Booklet.**

**It shows a grid with five shapes.**

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

**The front elevation and the plan of a solid are shown in the Diagram Booklet.**

**Choose which of the shapes **A** to **C** shows the side elevation of the solid from the direction of the arrow.**

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

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3. Below are the first five terms of an arithmetic sequence.

7                  13                  19                  25                  31

- (a) Find an expression, in terms of  $n$ , for the  $n$ th term of this sequence.  
(2 marks)

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(continued on the next page)



**3. continued.**

**The  $n$ th term of a different sequence is  $8 - 6n$**

**(b) Is  $-58$  a term of this sequence?**

**You must show how you get your answer.**

**(2 marks)**

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

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

The diagram shows a plan of Jason's garden.

**ABCO** and **DEFO** are rectangles.

**CDO** is a right-angled triangle.

**AFO** is a sector of a circle with centre **O** and angle **AOF** =  $90^\circ$

All the marked angles are right angles.

**AB** = 11 metres

**BC** = 7 metres

**DE** = 7 metres

**EF** = 9 metres

Jason is going to cover his garden with grass seed.

Each bag of grass seed covers  $14\text{m}^2$  of garden.

Each bag of grass seed costs £10.95

(continued on the next page)

Turn over

**4. continued.**

**Work out how much it will cost Jason to buy all the bags of grass seed he needs.**

**(5 marks)**

**Answer space continues 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 in the Diagram Booklet.

It shows shape **ABC**

**ABC** is the right angle

**AC = 14.5 cm**

**BC = x cm**

angle **ACB = 53°**

Work out the value of **x**

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

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

(Total for Question 5 is 2 marks)

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6. Ella invests **£7000** for **2** years in an account paying compound interest.

In the first year, the rate of interest is **3%**

In the second year, the rate of interest is **1.5%**

Work out the value of Ella's investment at the end of **2** years.

£ \_\_\_\_\_

(Total for Question 6 is 3 marks)

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

It shows the graph of  $y = x^2 - 6x + 4$

- (a) Write down the  $y$  intercept of the graph of

$$y = x^2 - 6x + 4$$

(1 mark)

\_\_\_\_\_

- (b) Write down the coordinates of the turning point of the graph of

$$y = x^2 - 6x + 4$$

(1 mark)

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

(continued on the next page)

7. continued.

(c) Use the graph to find estimates for the roots of

$$x^2 - 6x + 4 = 0$$

(2 marks)

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(Total for Question 7 is 4 marks)

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8. Chanda buys a necklace for £120  
She sells the necklace for £135

Work out her percentage profit.

\_\_\_\_\_ %

(Total for Question 8 is 3 marks)

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9. Here are the equations of two straight lines.

$$y = \frac{1}{2}x - 6$$

$$6y = 3x + 7$$

Oscar says that these lines are parallel.

Is Oscar correct?

You must give a reason for your answer.

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(Total for Question 9 is 2 marks)

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Turn over

**10. Aaliyah bought a car.**

**In the first year after she bought the car, its value depreciated at a rate of 23% per annum.**

**In the second year after she bought the car, its value depreciated at a rate of 19% per annum.**

**At the end of the second year the car was worth £10914.75**

**What was the value of the car when Aaliyah bought it?**

**(3 marks)**

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

10. continued.

£ \_\_\_\_\_

(Total for Question 10 is 3 marks)

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**11. Look at Diagram 1 and Diagram 2 for Question 11 in the Diagram Booklet.**

**In an experiment, 60 students each completed a puzzle.**

**The cumulative frequency graph in Diagram 1 of the Diagram Booklet shows information about the times taken for the 60 students to complete the puzzle.**

**For these 60 students,**

**the least time taken was 20 seconds**

**the greatest time taken was 90 seconds.**

**On the grid in Diagram 2 of the Diagram Booklet, draw a box plot for the distribution of the times taken by the students.**

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

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12. The number of insects in a population at the start of the year  $n$  is  $P_n$

The number of insects in the population at the start of year  $(n + 1)$  is  $P_{n+1}$  where

$$P_{n+1} = kP_n$$

Given that  $k$  has a constant value of  $1.13$

- (a) find out how many years it takes for the number of insects in the population to double.

You must show how you get your answer.

(2 marks)

Answer space continues on the next page.

12. (a) continued.

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(continued on the next page)

Turn over

**12. continued.**

**The value of  $k$  actually increases year on year from its value of  $1.13$  in year 1**

**(b) How does this affect your answer to part (a)?  
(1 mark)**

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

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13. **A** and **B** are points on a centimetre grid.

**A** is the point with coordinates  $(-7, 6)$

**B** is the point with coordinates  $(8, -5)$

Work out the length of **AB**

Give your answer correct to 1 decimal place.

\_\_\_\_\_ cm

(Total for Question 13 is 2 marks)

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14. Using algebra, prove that  $1.\overline{062}$  can be written as

$$1\frac{14}{225}$$

(3 marks)

Answer space continues on the next page.

14. continued.

(Total for Question 14 is 3 marks)

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15. Faiza is studying the population of rabbits in a park. She wants to estimate the number of rabbits in the park.

On Monday she catches a random sample of **20** rabbits in the park, marks each rabbit with a tag and releases them back into the park.

On Tuesday she catches a random sample of **42** rabbits in the park.

**12** of the rabbits are marked with a tag.

(continued on the next page)

**15. continued.**

**(a) Find an estimate for the number of rabbits in the park.**

**(3 marks)**

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**(continued on the next page)**

**Turn over**

**15. continued.**

**Albie is studying the population of rabbits in a wood.**

**One day, he catches 55 rabbits and finds that 40 of these rabbits are marked with a tag.**

**Albie estimates there are 50 rabbits in the wood.**

**(b) Explain why Albie's estimate cannot be correct.  
(1 mark)**

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**(Total for Question 15 is 4 marks)**

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

**The shaded region shown on the grid in the Diagram Booklet is bounded by four straight lines.**

**Find the four inequalities that define the shaded region.**

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**(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.

You may be provided with models.

They are NOT accurate.

The diagram and the models show two similar solid triangular prisms, **A** and **B**

The volume of prism **A** is  $58 \cdot 806 \text{ cm}^3$

The volume of prism **B** is  $1587 \cdot 762 \text{ cm}^3$

The cross section of each prism is a right-angled triangle.

For prism **B**

the length of the base of the triangle is  $8 \cdot 1 \text{ cm}$

the area of the triangle is  $43 \cdot 74 \text{ cm}^2$

The height of the triangle for prism **A** is  $h \text{ cm}$

Work out the value of  $h$

(4 marks)

Answer space is on the next page.

Turn over



17. continued.

$h =$  \_\_\_\_\_

(Total for Question 17 is 4 marks)

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Turn over

18. Look at the diagram for Question 18 in the Diagram Booklet.

It shows a triangle.

$$AB = 11.2 \text{ cm}$$

$$BC = 4.3 \text{ cm}$$

$$\text{Angle } ABC = 118^\circ$$

Work out the area of the triangle.

Give your answer correct to 3 significant figures.

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

(Total for Question 18 is 2 marks)

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Turn over

19. Solve

$$6x^2 + 5x - 6 = 0$$

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(Total for Question 19 is 3 marks)

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Turn over

20. Look at Diagram 1, Diagram 2 and Diagram 3 for Question 20 in the Diagram Booklet.

You may be provided with a model.

It is NOT accurate.

**ABCDEFGH** is a cuboid.

$$AD = 9 \text{ cm}$$

$$FD = 13 \text{ cm}$$

$$\text{Angle } GHF = 49^\circ$$

Work out the size of angle **FAH**

Give your answer correct to the nearest degree.

(4 marks)

Answer space continues on the next page.

20. continued.

o

(Total for Question 20 is 4 marks)

Turn over

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

**The graph gives the volume, in litres, of water in a container  $t$  seconds after the water starts to fill the container.**

**(a) Calculate an estimate for the gradient of the graph when  $t = 17.5$**

**You must show how you get your answer.**

**(3 marks)**

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**(continued on the next page)**

**21. continued.**

**(b) Describe fully what the gradient in part (a) represents.**

**(1 mark)**

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

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22. Given that

$$f(x) = \sqrt[3]{x}$$

$$g(x) = 2x + 3$$

$$h(x) = fg(x)$$

find  $h^{-1}(x)$

(3 marks)

Answer space continues on the next page.



22. continued.

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

(Total for Question 22 is 3 marks)

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Turn over

**23. A race is measured to have a distance of  $10.6$  km, correct to the nearest  $0.1$  km**

**Sam runs the race in a time of  $31$  minutes**

**$48$  seconds, correct to the nearest second.**

**Sam's average speed in this race is  $V$  km/hour.**

**By considering bounds, calculate the value of  $V$  to a suitable degree of accuracy.**

**You must show all your working and give a reason for your answer.**

**(5 marks)**

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

23. continued.

**23. continued.**

**(Total for Question 23 is 5 marks)**

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**Turn over**

24. A circle has equation  
 $x^2 + y^2 = 12 \cdot 25$

The point **P** lies on the circle.

The coordinates of **P** are  $(2 \cdot 1, 2 \cdot 8)$

The line **L** is the tangent to the circle at point **P**

Find an equation of **L**

Give your answer in the form  $ax + by = c$ ,  
where **a**, **b** and **c** are integers.

(4 marks)

Answer space continues on the next two pages.

24. continued.

Turn over

24. continued.

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(Total for Question 24 is 4 marks)

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**TOTAL FOR PAPER IS 80 MARKS**

**END OF PAPER**

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