

**Paper Reference 1MA1/3H**  
**Pearson Edexcel**  
**Level 1/Level 2 GCSE (9–1)**

Total Marks

# **Mathematics**

**Paper 3**  
**(Calculator)**  
**Higher Tier**

**Monday 11 November 2019 – Afternoon**

**Time: 1 hour 30 minutes 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 Book**

**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.**

## **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.**

**You may be provided with a shape and a model for  
Question 23  
They are NOT accurate.**

**There may be spare copies of some diagrams.**

## **ADVICE**

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

**Keep an eye on the time.**

**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. (a) Expand and simplify  
 $(y + 5)(y - 9)$   
(2 marks)

- 
- (b) Factorise fully  
 $9x^2 + 6x$   
(2 marks)

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(Total for Question 1 is 4 marks)

2. (a) Use your calculator to work out

$$\frac{29^2 - 4 \cdot 6}{\sqrt{35 - 1 \cdot 9^3}}$$

Write down all the figures on your calculator display.

(2 marks)

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(continued on the next page)

**2. continued.**

**(b) Write your answer to part (a) correct to  
4 significant figures.**

**(1 mark)**

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

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3. Look at the diagram for Question 3 in the Diagram Book.

The scatter graph shows information about the marks a group of students got in a Science test and in a Maths test.

Jamie got a mark of **35** in the Science test.

Using the scatter graph, find an estimate for Jamie's mark in the Maths test.

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(Total for Question 3 is 2 marks)

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4. Look at the table for Question 4 in the Diagram Book.

It gives information about the times taken, in seconds, by 18 students to run a race.

Work out an estimate for the mean time.

Give your answer correct to 3 significant figures.

\_\_\_\_\_ seconds

(Total for Question 4 is 3 marks)

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Turn over

5. Write  $37 \text{ cm}^3$  in  $\text{mm}^3$

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

(Total for Question 5 is 1 mark)

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6. Look at the table for Question 6 in the Diagram Book.

Nimer was driving to a hotel.

The table shows the information on his Sat Nav at 13 30

Nimer arrived at the hotel at 14 48

Work out the average speed of the car from 13 30 to 14 48

You must show all your working.

(4 marks)

Answer space continues on the next page.

6. continued.

\_\_\_\_\_ mph

(Total for Question 6 is 4 marks)

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7. (a) Write

**32 460 000** in standard form.

(1 mark)

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(continued on the next page)

7. continued.

(b) Write

$4.96 \times 10^{-3}$  as an ordinary number.

(1 mark)

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(continued on the next page)

7. continued.

Asma was asked to compare the following two numbers.

$$A = 6.212 \times 10^8 \quad \text{and} \quad B = 4.73 \times 10^9$$

She says,

**“6.212 is bigger than 4.73 so A is bigger than B”**

(c) Is Asma correct?

You must give a reason for your answer.

(1 mark)

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(Total for Question 7 is 3 marks)

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8. Look at the diagram for Question 8 in the Diagram Book.

It shows a regular pentagon and a parallelogram.

Two angles are marked  $117^\circ$  and  $x$

Work out the size of the angle marked  $x$

You must show all your working.

○

(Total for Question 8 is 4 marks)

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Turn over



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

It shows triangle **A** and triangle **B** on a coordinate grid.

Describe fully the transformation that maps triangle **A** onto triangle **B**

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(Total for Question 9 is 2 marks)

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10. (a) Solve

$$\frac{9 + y}{7} = 11 - y$$

(3 marks)

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

(continued on the next page)

10. continued.

(b) Simplify

$$\frac{4(y + 3)^3}{(y + 3)^2}$$

(1 mark)

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(Total for Question 10 is 4 marks)

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**11. Look at the diagram for Question 11 in the Diagram Book.**

**The probability tree diagram shows the probabilities that Bismah will be late for work on two days next week.**

**Calculate the probability that Bismah will be late on exactly one of the two days.**

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

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**Turn over**

**12. Look at Diagram 1 and Diagram 2 for Question 12 in the Diagram Book.**

**Diagram 1 shows a stem and leaf diagram.**

**Diagram 2 shows a grid.**

**The stem and leaf diagram shows information about the heights, in cm, of 23 sunflowers.**

**On the grid below Diagram 1, draw a box plot for this information.**

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

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13. Liquid **A** and liquid **B** are mixed together in the ratio **2 : 13** by volume to make liquid **C**

Liquid **A** has density **1.21 g/cm<sup>3</sup>**

Liquid **B** has density **1.02 g/cm<sup>3</sup>**

A cylindrical container is filled completely with liquid **C**

The cylinder has radius **3 cm** and height **25 cm**

Work out the mass of the liquid in the container.

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

You must show all your working.

(4 marks)

Answer space continues on the next two pages.

13. continued.

13. continued.

\_\_\_\_\_ grams

(Total for Question 13 is 4 marks)

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14. Look at the table for Question 14 in the Diagram Book.

A group of people went to a restaurant.

Each person chose one starter and one main course shown in the table.

the number of people who chose soup : the number of people who chose prawns =  $2 : 3$

Of those who chose soup,  
the number of people who chose lasagne : the number of people who chose curry =  $5 : 3$

Of those who chose prawns,  
the number of people who chose lasagne : the number of people who chose curry =  $1 : 5$

What fraction of the people chose curry?

You must show how you get your answer.

(4 marks)

Answer space is on the next two pages.

14. continued.

14. continued.

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(Total for Question 14 is 4 marks)

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15. Prove algebraically that the sum of the squares of any two consecutive even numbers is always a multiple of 4

(Total for Question 15 is 3 marks)

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16. **y** is inversely proportional to the square of **x**

$$y = 8 \text{ when } x = 2.5$$

Find the negative value of **x** when

$$y = \frac{8}{9}$$

(3 marks)

Answer space continues on the next page.

16. continued.

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(Total for Question 16 is 3 marks)

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

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

Use the graph to find estimates for the solutions to the equation

$$x^2 - 2x - 3 = 0$$

You must show how you get your solutions.

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(Total for Question 17 is 4 marks)

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

It shows triangle **ABC**

$$AB = 3.4 \text{ cm}$$

$$AC = 6.2 \text{ cm}$$

$$BC = 6.1 \text{ cm}$$

**D** is the point on **BC** such that

$$\text{size of angle } DAC = \frac{2}{5} \times \text{size of angle } BCA$$

Calculate the length **DC**

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

You must show all your working.

(5 marks)

Answer space continues on the next page.



18. continued.

\_\_\_\_\_ cm

(Total for Question 18 is 5 marks)

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Turn over

**19. Look at the diagram for Question 19 in the Diagram Book.**

**It shows information about part of a cyclist's journey.**

**Work out an estimate of the speed, in m/s, of the cyclist at time 6 seconds.**

\_\_\_\_\_ m/s

**(Total for Question 19 is 3 marks)**

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20. Here are the first five terms of a sequence.

**−1      0      3      8      15**

Find an expression, in terms of  $n$ , for the  $n$ th term of this sequence.

(2 marks)

Answer space continues on the next page.

20. continued.

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(Total for Question 20 is 2 marks)

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21. When a biased coin is thrown 4 times, the probability of getting 4 heads is  $\frac{16}{81}$

Work out the probability of getting 4 tails when the coin is thrown 4 times.

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(Total for Question 21 is 2 marks)

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Turn over

22. Show that

$$\frac{7x - 14}{x^2 + 4x - 12} \div \frac{x - 6}{x^3 - 36x}$$

simplifies to  $ax$  where  $a$  is an integer.

(4 marks)

Answer space continues on the next page.

**22. continued.**

**(Total for Question 22 is 4 marks)**

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**Turn over**

**23. Look at the diagrams and the formulae for Question 23 in the Diagram Book.**

**You may be provided with a model cone and a cut out shape of sector  $OACB$**

**Diagram 1 shows a sector  $OACB$  of a circle with centre  $O$**

**The point  $C$  is the midpoint of the arc  $AB$**

**Diagram 2 shows a hollow cone with vertex  $O$**

**The cone is formed by joining  $OA$  and  $OB$**

**The cone has volume  $56.8 \text{ cm}^3$  and height  $3.6 \text{ cm}$**

**The formulae are shown above Diagram 1 and Diagram 2 in the Diagram Book.**

**Calculate the size of angle  $AOB$  of sector  $OACB$**

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

**You must show all your working.**

**(5 marks)**

**Answer space is on the next three pages.**



**23. continued.**

23. continued.

**23. continued.**

\_\_\_\_\_ o

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

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24. Look at the diagram for Question 24 in the Diagram Book.

**OXYZ** is a parallelogram.

$$\overrightarrow{OX} = \mathbf{a}$$

$$\overrightarrow{OY} = \mathbf{b}$$

**P** is the point on **OX** such that **OP:PX = 1:2**

**R** is the point on **OY** such that **OR:RY = 1:3**

Work out, in its simplest form, the ratio **ZP:ZR**

You must show all your working.

(5 marks)

Answer space continues on the next page.

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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