

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

Total Marks

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

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 BE USED.

If your calculator does not have a π button, take the value of π 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.**

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.

Turn over

6

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

Turn over

- 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.

(continued on the next page)

1. continued.

One of the points is an outlier.

**(a) Write down the coordinates of
this point.**

(1 mark)

(_____ , _____)

(continued on the next page)

Turn over

1. continued.

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

(1 mark)

(continued on the next page)

Turn over

1. continued.

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)

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.**

(2 marks)

Answer space continues on the next page.

2. continued.

(Total for Question 2 is 2 marks)

Turn over

13

- 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)

Answer space continues on the next page.

Turn over

3. (a) continued.

(continued on the next page)

Turn over

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)

Answer space continues on the next page.

Turn over

3. (b) continued.

(Total for Question 3 is 4 marks)

Turn over

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°

All the marked angles are right angles.

(continued on the next page)

Turn over

4. continued.

$AB = 11$ 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
 14m^2 of garden.**

**Each bag of grass seed costs
 $\text{£}10.95$**

(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.

Turn over

4. continued.

£ _____

(Total for Question 4 is 5 marks)

Turn over

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

It shows shape **ABC**

ABC is the right angle

$$AC = 14.5 \text{ cm}$$

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

$$\text{angle } ACB = 53^\circ$$

Work out the value of **x**

Give your answer correct to

3 significant figures.

(2 marks)

Answer space continues on the next page.

Turn over

5. continued.

X = _____

(Total for Question 5 is 2 marks)

Turn over

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.

(3 marks)

Answer space continues on the next page.

6. continued.

£ _____

(Total for Question 6 is 3 marks)

Turn over

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)

(continued on the next page)

Turn over

7. continued.

(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)

Turn over

7. continued.

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

$$\mathbf{x^2 - 6x + 4 = 0}$$

(2 marks)

(Total for Question 7 is 4 marks)

Turn over

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)

Turn over

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.

(2 marks)

Answer space and lines are on the next page.

Turn over

9. continued.

(Total for Question 9 is 2 marks)

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 is on the next page.

Turn over

10. continued.

£ _____

(Total for Question 10 is 3 marks)

Turn over

- 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.

(continued on the next page)

11. continued.

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)

Turn over

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

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

(continued on the next page)

12. continued.

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.

Turn over

12. (a) continued.

(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)**

(Total for Question 12 is 3 marks)

Turn over

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.

(2 marks)

Answer space continues on the next page.

13. continued.

_____ **cm**

(Total for Question 13 is 2 marks)

Turn over

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)

Turn over

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)

Turn over

15. continued.

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

(3 marks)

Answer space continues on the next page.

Turn over

15. (a) continued.

(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.

(continued on the next page)

Turn over

15. continued.

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

(1 mark)

(Total for Question 15 is 4 marks)

Turn over

- 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.

(4 marks)

Answer space and lines continue on the next page.

16. continued.

(Total for Question 16 is 4 marks)

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.

(continued on the next page)

Turn over

17. continued.

For prism B

**the length of the base of the triangle
is 8.1 cm**

the area of the triangle is 43.74 cm^2

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

Work out the value of h

(4 marks)

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

Turn over

17. continued.

h = _____

(Total for Question 17 is 4 marks)

Turn over

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

It shows a triangle.

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

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

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

Work out the area of the triangle.

Give your answer correct to

3 significant figures.

(2 marks)

Answer space continues on the next page.

Turn over

18. continued.

_____ **cm²**

(Total for Question 18 is 2 marks)

Turn over

19. Solve

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

(3 marks)

Answer space continues on the next page.

Turn over

19. continued.

(Total for Question 19 is 3 marks)

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.

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

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

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

(continued on the next page)

Turn over

20. continued.

Work out the size of angle FAH

Give your answer correct to the nearest degree.

(4 marks)

Answer space continues on the next two pages.

Turn over

20. continued.

Turn over

20. continued.

○

(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.**

(continued on the next page)

21. continued.

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

You must show how you get your answer.

(3 marks)

(continued on the next page)

Turn over

21. continued.

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

(1 mark)

(Total for Question 21 is 4 marks)

Turn over

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 two pages.

Turn over

22. continued.

Turn over

22. continued.

$$h^{-1}(x) = \underline{\hspace{10cm}}$$

(Total for Question 22 is 3 marks)

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.

(continued on the next page)

23. continued.

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.

Turn over

23. continued.

Turn over

23. continued.

(Total for Question 23 is 5 marks)

Turn over

24. A circle has equation

$$x^2 + y^2 = 12.25$$

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

The coordinates of **P** are **(2.1, 2.8)**

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 is on the next
three pages.

Turn over

24. continued.

Turn over

24. continued.

Turn over

24. continued.

(Total for Question 24 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER
