

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 plus your additional time allowance

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. 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 them.

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.

5

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

Turn over

- 1. (a) Look at the diagram for Question 1(a) in the Diagram Booklet.**

It shows a number line.

Write down the inequality shown on the number line.

(1 mark)

(continued on the next page)

1. continued.

**(b) Look at the diagram for
Question 1(b) in the
Diagram Booklet.**

It shows a blank number line.

**On the number line, show the
inequality**

$$\mathbf{-3 \leq y < 4}$$

(2 marks)

(Total for Question 1 is 3 marks)

- 2. (a) Find the Highest Common Factor (HCF) of 60 and 84**
(2 marks)

Answer space continues on the next page.

2. (a) continued.

(continued on the next page)

Turn over

2. continued.

**(b) Find the Lowest Common
Multiple (LCM) of 24 and 40
(2 marks)**

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

2. (b) continued.

(Total for Question 2 is 4 marks)

Turn over

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

Sam drives his car on a journey.

The travel graph for the first

15 minutes of his journey is shown in the Diagram Booklet.

(a) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

(2 marks)

_____ km/h

(continued on the next page)

Turn over

3. continued.

**At 10 15 Sam stops for 10 minutes
and then drives for 20 minutes at a
speed of 75 km/h**

**(b) On the grid in the
Diagram Booklet, complete the
travel graph for Sam's journey.**

(3 marks)

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

3. (b) continued.

(Total for Question 3 is 5 marks)

Turn over

4. (a) On the next page complete the table of values for

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

There are four spaces to fill.

(2 marks)

4. (a) continued.

x	y
-2	10
-1	
0	2
1	
2	
3	5
4	

(continued on the next page)

Turn over

4. continued.

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

It shows a grid.

**On the grid, draw the graph of
 $y = x^2 - 2x + 2$ for values of x
from -2 to 4
(2 marks)**

(continued on the next page)

4. continued.

(c) Use your graph to find estimates

of the solutions of the equation

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

(2 marks)

(Total for Question 4 is 6 marks)

Turn over

- 5. Look at Diagram 1 and Diagram 2 for Question 5 in the Diagram Booklet.**

Diagram 1 shows a right-angled triangle labelled shape **A with a base length of **10 mm** and a vertical height of **8 mm****

Diagram 2 is a shaded shape made from two shape **A triangles.**

Work out the perimeter of the shaded shape in Diagram 2

Give your answer correct to 3 significant figures.

(4 marks)

Answer space is on the next two pages.

Turn over

5. continued.

Turn over

5. continued.

_____ mm

(Total for Question 5 is 4 marks)

Turn over

6. Look at the diagram for Question 6(a) in the Diagram Booklet.

It shows a right-angled triangle, **ABC**

$$AC = 12 \text{ cm}$$

$$\text{Angle } BAC = 56^\circ$$

Angle **ACB** is a right angle.

- (a) Work out the length of **BC**

Give your answer correct to
1 decimal place.

(2 marks)

Answer space continues on the
next page.

6. (a) continued.

_____ cm

(continued on the next page)

Turn over

6. continued.

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

It shows a right-angled triangle, PQR

$PR = 18 \text{ cm}$

$RQ = 15 \text{ cm}$

Angle PQR is a right angle.

Angle PRQ is marked X

**(b) Work out the size of the angle
marked X**

**Give your answer correct to
1 decimal place.**

(2 marks)

Answer space is on the next page.

Turn over

6. (b) continued.

○

(Total for Question 6 is 4 marks)

Turn over

7. Liquid **A** has a density of 1.8 g/cm^3
Liquid **B** has a density of 1.2 g/cm^3

80 cm^3 of liquid **A** is mixed with
 40 cm^3 of liquid **B** to make
 120 cm^3 of liquid **C**

Work out the density of liquid **C**
(3 marks)

Answer space continues on the next
page.

7. continued.

_____ g/cm^3

(Total for Question 7 is 3 marks)

Turn over

- 8. Look at Table 1 and Table 2 for Question 8 in the Diagram Booklet. Table 1 is a grouped frequency table which gives information about the time, in minutes, taken by 50 people to solve a puzzle.**

Brian was asked to draw a cumulative frequency table for this information.

(continued on the next page)

8. continued.

Brian drew Table 2

**Write down ONE thing that is wrong
with the cumulative frequency table.**

(Total for Question 8 is 1 mark)

Turn over

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

It is a box plot which shows information about the length of time, in minutes, some people waited to see a doctor at a hospital on Monday.

**(a) Work out the interquartile range of the information in the box plot.
(2 marks)**

_____ minutes

(continued on the next page)

Turn over

9. continued.

Becky says,

“50% of the people waited for at least 2 hours.”

(b) Is Becky correct?

Explain why.

(1 mark)

(continued on the next page)

Turn over

9. continued.

Look at the table for Question 9(c) in the Diagram Booklet.

It gives information about the length of time, in minutes, some people waited to see a doctor at the same hospital on Tuesday.

Becky was asked to compare the distribution of the lengths of times people waited on Monday with the distribution of the lengths of times people waited on Tuesday.

(continued on the next page)

Turn over

9. continued.

She wrote,

**“People had to wait longer on
Tuesday than on Monday.”**

**(c) Give ONE reason why Becky may
be wrong.**

(1 mark)

(Total for Question 9 is 4 marks)

Turn over

- 10. Look at the information for Question 10 in the Diagram Booklet.**
- Louise invests £X in Better Investments for 3 years.**
- Sadiq invests £X in County Bank for 3 years.**

At the end of the 3 years, the value of Louise's investment is £344 605

Work out the value of Sadiq's investment at the end of the 3 years.

(4 marks)

Answer space is on the next two pages.

10. continued.

Turn over

10. continued.

£ _____

(Total for Question 10 is 4 marks)

Turn over

11. Look at the diagram for Question 11 in the Diagram Booklet.

It shows a sketch of the line L

The points $P(-6, 0)$ and $Q(0, 3)$ are points on the line L

The point R is such that PQR is a straight line and $PQ : QR = 2 : 3$

**(a) Find the coordinates of R
(2 marks)**

Answer space continues on the next page.

11. (a) continued.

(_____ , _____)

(continued on the next page)

Turn over

11. continued.

- (b) Find an equation of the line that is perpendicular to L and passes through Q**
(3 marks)

(Total for Question 11 is 5 marks)

Turn over

12. Expand and simplify

$$(y - 2)(3y + 2)(2y + 3)$$

(3 marks)

Answer space continues on the next page.

12. continued.

(Total for Question 12 is 3 marks)

Turn over

13. In a school there are 16 teachers and 220 students.

Of these students 120 are girls and 100 are boys.

One teacher, one girl and one boy are going to be chosen to represent the school.

Work out the number of different ways there are to choose one teacher, one girl and one boy.

(2 marks)

Answer space is on the next page.

13. continued.

(Total for Question 13 is 2 marks)

Turn over

14. Look at the diagram for Question 14 in the Diagram Booklet.

A, B, C and D are four points on a circle.

SBT is a tangent to the circle.

Angle ABD = 20°

the size of angle BAD : the size of angle BCD = 3 : 1

Find the size of angle SBA

Give a reason for each stage of your working.

(4 marks)

Answer space is on the next two pages.

Turn over

14. continued.

Turn over

14. continued.

○

(Total for Question 14 is 4 marks)

Turn over

15. Look at the diagram for Question 15 in the Diagram Booklet.

It shows the triangle ABC

$$\mathbf{AC = 8\text{ cm}}$$

$$\mathbf{AB = 11\text{ cm}}$$

$$\mathbf{\text{Angle CAB} = 72^\circ}$$

(a) Find the length of BC

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

(3 marks)

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

15. (a) continued.

_____ **cm**

(continued on the next page)

Turn over

15. continued.

(b) Find the area of triangle ABC

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

(2 marks)

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

Turn over

15. (b) continued.

_____ **cm²**

(Total for Question 15 is 5 marks)

16. (a) Use the iteration formula

$$\mathbf{x_{n+1} = \sqrt[3]{10 - 2x_n}}$$

**to find the values of x_1 , x_2
and x_3**

Start with $x_0 = 2$

(3 marks)

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

16. (a) continued.

16. (a) continued.

$$x_1 = \underline{\hspace{10cm}}$$

$$x_2 = \underline{\hspace{10cm}}$$

$$x_3 = \underline{\hspace{10cm}}$$

(continued on the next page)

Turn over

16. continued.

The values of x_1 , x_2 and x_3 found in part (a) are estimates of the solution of an equation of the form $x^3 + ax + b = 0$ where a and b are integers.

(continued on the next page)

16. continued.

**(b) Find the value of a and the
value of b
(1 mark)**

$a =$ _____

$b =$ _____

(Total for Question 16 is 4 marks)

Turn over

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

It shows a histogram.

Some people took part in the first round of a competition.

The histogram gives information about the scores of these people in the first round.

20% of the people got a score high enough for them to qualify for the second round.

(continued on the next page)

Turn over

17. continued.

Work out an estimate for the score needed to qualify for the second round.

You must show all your working.

(4 marks)

Answer space continues on the next two pages.

17. continued.

Turn over

17. continued.

(Total for Question 17 is 4 marks)

18. Look at the diagram for Questions 18(a) and 18(b) in the Diagram Booklet.

It shows a graph of $y = \sin x^\circ$ for $0 \leq x \leq 360$

(a) Using the graph, find estimates of all FOUR solutions of

$$\sin x^\circ = 0.6 \quad \text{for } 0 \leq x \leq 720$$

(2 marks)

(continued on the next page)

Turn over

18. continued.

**The graph of $y = \sin x^\circ$ is reflected
in the X-axis.**

**(b) Write down an equation of the
reflected graph.**

(1 mark)

(continued on the next page)

18. continued.

**Look at the diagram for Question 18(c)
in the Diagram Booklet.**

It shows a graph of $y = f(x)$

- (c) On the grid, draw the graph of
 $y = f(x - 2)$
(1 mark)**

(Total for Question 18 is 4 marks)

19. **A**, **B** and **C** are three spheres.

The volume of sphere **A** is 125 cm^3

The volume of sphere **B** is 27 cm^3

The ratio of the radius of sphere **B** to the radius of sphere **C** is $1 : 2$

Work out the ratio of the surface area of sphere **A** to the surface area of sphere **C**

(3 marks)

Answer space continues on the next two pages.

19. continued.

Turn over

19. continued.

(Total for Question 19 is 3 marks)

Turn over

20. In a village,

**if it rains on one day, the probability
that it will rain on the next day is 0.8**

**if it does NOT rain on one day, the
probability that it will rain on the
next day is 0.6**

A weather forecaster says,

**“There is a 70% chance that it will
rain in the village on Monday.”**

(continued on the next page)

Turn over

20. continued.

Work out an estimate for the probability that it will rain in the village on Wednesday.

You must show all your working.

(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. The time period, T seconds, of a simple pendulum of length L cm is given by the formula

$$T = 2\pi\sqrt{\frac{L}{g}}$$

Katie uses a simple pendulum in an experiment to find an estimate for the value of g

Here are her results.

**$L = 52.0$ correct to
3 significant figures.**

**$T = 1.45$ correct to
3 significant figures.**

(continued on the next page)

Turn over

21. continued.

Work out the upper bound and the lower bound for the value of g

Use $\pi = 3.142$

You must show all your working.

(4 marks)

Answer space continues on the next two pages.

21. continued.

Turn over

21. continued.

upper bound = _____

lower bound = _____

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER
