

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

Total Marks

Mathematics
PAPER 2 (Calculator)
Higher Tier

Friday 10 November 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, calculator, 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 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.

You may be provided with a model for Question 7

It is NOT accurate.

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) Expand and simplify
 $3(2y - 5) + 7(y + 2)$
(2 marks)

(continued on the next page)

1. continued.

(b) Factorise fully

$$6x^2 + 15x$$

(2 marks)

(continued on the next page)

Turn over

1. continued.

(c) Make q the subject of the formula

$$p = 3q + 11$$

(2 marks)

(Total for Question 1 is 6 marks)

Turn over

2. Karen is organising a party for a charity.

She spends

£100 on food

£120 on a hall

£80 on a DJ.

Karen sells 54 tickets for the party.

Each ticket costs £7·50

(continued on the next page)

2. continued.

Work out the percentage profit Karen makes for the charity.

(4 marks)

Answer space continues on the next page.

2. continued.

_____ %

(Total for Question 2 is 4 marks)

Turn over

- 3. Andrew invests £4500 in a savings account for 2 years.**

The account pays compound interest at a rate of 3.4% per year.

Calculate how much Andrew has in this savings account at the end of the 2 years.

(2 marks)

Answer space continues on the next page.

3. continued.

£ _____

(Total for Question 3 is 2 marks)

Turn over

4. Solve

$$5x - 14 = 52 - x$$

(3 marks)

Answer space continues on the next page.

4. continued.

x = _____

(Total for Question 4 is 3 marks)

Turn over

- 5. Chris, Debbie and Errol share some money in the ratio $3:4:2$**
Debbie gets £120

Chris then gives some of his share to Debbie and some of his share to Errol.

The money that Chris, Debbie and Errol each have is now in the ratio $2:5:3$

(continued on the next page)

5. continued.

**How much money did Chris give to
Errol?**

(4 marks)

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

5. continued.

Turn over

5. continued.

£ _____

(Total for Question 5 is 4 marks)

Turn over

6. The bearing of port **B** from port **A** is 147°

Work out the bearing of port **A** from port **B**

_____ °

(Total for Question 6 is 2 marks)

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

You may be provided with a model.

They show an empty tank in the shape of a cylinder.

The cylinder has radius 15 cm and height 43 cm

Water flows into the tank at a rate of 0.47 litres per minute.

(continued on the next page)

7. continued.

Calculate the number of minutes it will take to completely fill the tank.

Give your answer correct to the nearest minute.

(4 marks)

Answer space continues on the next page.

Turn over

7. continued.

_____ minutes

(Total for Question 7 is 4 marks)

Turn over

8. A number X is written correct to 2 significant figures.

The result is 1.9

Complete the error interval for X

$$\underline{\hspace{2cm}} \leq x < \underline{\hspace{2cm}}$$

(Total for Question 8 is 2 marks)

Turn over

9. Expand and simplify

$$(y + 7)(y - 2)(y + 3)$$

(3 marks)

Answer space continues on the next page.

9. continued.

(Total for Question 9 is 3 marks)

Turn over

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

It shows an incomplete probability tree diagram.

Shakir has to complete two tests.

He can either pass or fail each test.

The probability that he will pass the first test is 0.87

If he passes the first test the probability he will pass the second test is 0.94

If he fails the first test the probability he will pass the second test is 0.73

(continued on the next page)

Turn over

10. continued.

(a) Complete the probability tree diagram in the Diagram Booklet for this information.

There are five spaces to fill.

(2 marks)

(continued on the next page)

10. continued.

**(b) Work out the probability that
Shakir passes at least one of the
tests.**

(3 marks)

(Total for Question 10 is 5 marks)

Turn over

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

**It shows four graphs labelled A, B, C
and D**

**The graphs of y against x represent
four different types of proportionality.**

(continued on the next page)

11. continued.

Match each type of proportionality in the table below to the correct graph in the Diagram Booklet.

There are four spaces to fill.

Type of proportionality	Graph
$y \propto x^2$	
$y \propto x$	
$y \propto \frac{1}{x}$	
$y \propto \sqrt{x}$	

(Total for Question 11 is 2 marks)

Turn over

**12. A is the point with coordinates
(7, 13)**

**B is the point with coordinates
(−3, 21)**

**C is the point with coordinates
(15, 23)**

M is the midpoint of AB

N is the midpoint of BC

(continued on the next page)

12. continued.

**Work out the distance between
M and N**

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

(3 marks)

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

Turn over

12. continued.

(Total for Question 12 is 3 marks)

Turn over

13. Prove algebraically that $0.\dot{0}72\dot{3}$ can be written as

$$\frac{241}{3330}$$

(3 marks)

Answer space continues on the next page.

13. continued.

(Total for Question 13 is 3 marks)

Turn over

14. y is proportional to x^2

$$y = 3 \text{ when } x = 0.5$$

x is inversely proportional to w

$$x = 2 \text{ when } w = 0.2$$

Find the value of y when $w = 2$

(5 marks)

Answer space continues on the next page.

14. continued.

$y =$ _____

(Total for Question 14 is 5 marks)

Turn over

15. Look at the diagram for Question 15(a) and 15(b) in the Diagram Booklet.

It shows an incomplete histogram.

The incomplete table on the following page and the incomplete histogram in the Diagram Booklet give information about the times taken by some students to run a race.

(continued on the next page)

15. continued.

Time (t seconds)	Frequency
$10 < t \leq 12$	
$12 < t \leq 16$	10
$16 < t \leq 20$	18
$20 < t \leq 22$	9
$22 < t \leq 26$	6

(continued on the next page)

Turn over

15. continued.

None of these students had a time for the race such that $t \leq 10$ or $t > 26$

(a) Use the histogram in the Diagram Booklet to complete the table on the previous page.

There is one space to fill.

(1 mark)

(b) Use the table on the previous page to complete the histogram in the Diagram Booklet.

(2 marks)

(continued on the next page)

Turn over

15. continued.

**Look at the diagram for
Question 15(c) in the
Diagram Booklet.**

**It shows a histogram giving
information about the times taken by
43 students to run a different race.**

**(c) Work out an estimate for the
median of the times taken by
these 43 students to run the
race.**

(3 marks)

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

Turn over

15. (c) continued.

_____ **seconds**

(Total for Question 15 is 6 marks)

Turn over

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

It shows trapezium ABCD

$$\mathbf{AB = 7.9 \text{ cm}}$$

$$\mathbf{BC = 15.3 \text{ cm}}$$

$$\mathbf{\text{Angle BAD} = 112^\circ}$$

$$\mathbf{\text{Angle ADB} = 42^\circ}$$

AD is parallel to BC

(continued on the next page)

16. continued.

Calculate the area of triangle BCD

Give your answer correct to

1 decimal place.

(4 marks)

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

16. continued.

_____ **cm²**

(Total for Question 16 is 4 marks)

Turn over

17. (a) Show that the equation
 $x^3 + 2x - 6 = 0$ has a solution
between $x = 1$ and $x = 2$
(2 marks)

(continued on the next page)

17. continued.

(b) Show that the equation

$$\mathbf{x^3 + 2x - 6 = 0 \text{ can be}}$$

rearranged to give

$$\mathbf{x = \frac{6}{x^2 + 2}}$$

(1 mark)

(continued on the next page)

Turn over

17. continued.

(c) Starting with $x_0 = 1.45$

use the iteration formula

$$x_{n+1} = \frac{6}{x_n^2 + 2} \text{ twice to find an}$$

estimate for the solution of

$$x^3 + 2x - 6 = 0$$

**Give your answer correct to
4 decimal places.**

(3 marks)

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

17. (c) continued.

(Total for Question 17 is 6 marks)

Turn over

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

It shows quadrilateral $ABCD$

E, F, G and H are the midpoints of AB, BC, CD and DA

$$\overrightarrow{AH} = \underline{a}$$

$$\overrightarrow{AE} = \underline{b}$$

$$\overrightarrow{DG} = \underline{c}$$

(continued on the next page)

18. continued.

Prove, using vectors, that $EFGH$ is a parallelogram.

(4 marks)

Answer space continues on the next two pages.

Turn over

18. continued.

Turn over

18. continued.

(Total for Question 18 is 4 marks)

Turn over

19. The functions **f** and **g** are such that

$$\mathbf{f(x) = (2x + 3)^2 \text{ and } g(x) = 2x - 1}$$

(a) Find **gf(−3)**

(2 marks)

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

19. (a) continued.

(continued on the next page)

19. continued.

(b) Find $g^{-1}(x)$

(2 marks)

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

(Total for Question 19 is 4 marks)

Turn over

20. Write

$$\frac{14}{3x-21} + \left[(x+4) \div \frac{2x^2-6x-56}{2x+3} \right]$$

in the form $\frac{ax+b}{cx+d}$ where a, b, c

and d are integers.

(4 marks)

Answer space continues on the next
three pages.

20. continued.

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.

It shows a Venn diagram.

Vicky has a collection of medals.

The Venn diagram gives information about the number of medals in her collection where

$\mathcal{E} = \{\text{all medals}\}$

$A = \{\text{English medals}\}$

$B = \{\text{gold medals}\}$

(continued on the next page)

21. continued.

Vicky is going to take at random a medal from her collection.

Given that the medal is gold, the probability that the medal is English is $\frac{2}{11}$

Work out the number of medals in Vicky's collection.

(4 marks)

Answer space continues on the next two pages.

Turn over

21. continued.

Turn over

21. continued.

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER
