

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.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

5

- 1. (a) Expand and simplify**
 $3(2y - 5) + 7(y + 2)$
(2 marks)

(continued on the next page)

Turn over

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**

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.

£ _____

(Total for Question 3 is 2 marks)

Turn over

4. Solve

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

$$x = \underline{\hspace{4cm}}$$

(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 $2:5:3$

How much money did Chris give to Errol?

(4 marks)

Answer space continues on the next page.

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.

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.

7. continued.

_____ minutes

(Total for Question 7 is 4 marks)

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)

9. Expand and simplify
 $(y + 7)(y - 2)(y + 3)$

(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

(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)

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.

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

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)

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**

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.

12. continued.

(Total for Question 12 is 3 marks)

13. Prove algebraically that $0.\dot{0}7\dot{2}\dot{3}$ can be written as

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

(Total for Question 13 is 3 marks)

14. y is proportional to x^2
 $y = 3$ when $x = 0.5$

x is inversely proportional to w
 $x = 2$ 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)

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

It shows an incomplete histogram.

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

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)

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)

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)

_____ 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**

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

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

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

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

AD is parallel to **BC**

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.

_____ cm^2

(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

$x^3 + 2x - 6 = 0$ can be rearranged to give

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

(1 mark)

(continued on the next page)

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)

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**

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

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

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

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

(4 marks)

Answer space continues on the next page.

18. continued.

(Total for Question 18 is 4 marks)

Turn over

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

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

(a) Find **gf**(−3)

(2 marks)

(continued on the next page)

19. continued.

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

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

(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 two pages.

20. continued.

Turn over

20. continued.

(Total for Question 20 is 4 marks)

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

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

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

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

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 is on the next page.

21. continued.

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER
