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

Total Marks

Mathematics
PAPER 3 (Calculator)
Higher Tier

Monday 10 June 2024 – 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						

Q76927A

Pearson

YOU MUST HAVE

Ruler, protractor, pair of compasses, writing and drawing equipment, calculator, Formulae Booklet (enclosed). Tracing paper may be used.

YOU WILL BE GIVEN

A separate Diagram Booklet

INSTRUCTIONS

Answer ALL questions.

Answer the questions in the spaces provided in this Question Paper or in the separate Diagram Booklet – 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 $3{\cdot}142$ 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.

There may be spare copies of some diagrams.

You may be given a model for Question 3.

You may be given a model for Question 7.

You may be given models for Question 9.

You may be given a cut-out shape for Question 12.

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.

1. Find the highest common factor (HCF) of 63 and 105

(Total for Question 1 is 2 marks)

2. (a) (i) Write $5 \cdot 3 \times 10^{4}$ as an ordinary number.

(1 mark)

(ii) Write $7 \cdot 4 \times 10^{-5}$ as an ordinary number.

(1 mark)

(continued on the next page)

2. continued.

(b) Calculate the value of $9{\cdot}7 \times 10^6 + 2{\cdot}45 \times 10^7$

Give your answer in standard form.

(2 marks)

(Total for Question 2 is 4 marks)

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

It shows a solid triangular prism.

The diagram is NOT accurately drawn.

You may also be given a model.

(continued on the next page)

3. continued.

(a) Look at the diagram for Question 3 (a) in the separate Diagram Booklet.

The diagram shows a square grid.

Each square on the grid represents a 1 cm square.

Rana is trying to draw the side elevation of the solid prism from the direction of the arrow.

Her answer is shown on the grid.

Explain why Rana's side elevation is not correct.

(1 mark)

(continued on the next page)

3. continued.

(b) Look at the diagram for Question 3 (b) in the separate Diagram Booklet.

The diagram shows shape **A**, shape **B**, shape **C** and shape **D** drawn on a square grid.

Each square on the grid represents a **1 cm** square.

Which shape **A**, **B**, **C** or **D** is the plan view of the solid prism?

(2 marks)

Shape _____

(Total for Question 3 is 3 marks)

4. A company has 25 000 workers.

The number of workers increases at a rate of 6% per year for 3 years.

Calculate the total number of workers at the end of the 3 years.

(Total for Question 4 is 4 marks)

5. Habib has two identical tins.

He puts 600 grams of flour into one of the tins.

The flour fills the tin completely.

The density of the flour is $0{\cdot}6\ g/cm^3$

Habib puts 600 grams of salt into the other tin.

The salt does NOT fill the tin completely.

The volume of the space in the tin that is NOT filled with salt is $700\ cm^3$

Work out the density of the salt.

You must show all your working.

(4 marks)

Answer space continues on the next page.

5. continued.

_____ g/cm^3

(Total for Question 5 is 4 marks)

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

The diagram shows an incomplete probability tree diagram.

Tim has two biased coins, coin **A** and coin **B**.

He is going to throw both coins.

The probability that coin **A** will land on heads is **0·6**

The probability that coin **B** will land on heads is **0·55**

(a) Complete the probability tree diagram.

(2 marks)

(continued on the next page)

6. continued.

(b) Tim throws coin **A** once and he throws coin **B** once.

Work out the probability that both coins land on heads.

(2 marks)

(Total for Question 6 is 4 marks)

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

The diagram is NOT accurately drawn.

The diagram shows a paddling pool in the shape of a cylinder.

You may also be given a model.

The pool has radius 100 cm

The pool has depth 30 cm

The pool is empty.

It is then filled with water at a rate of $250\ cm^3$ per second.

Work out the number of minutes it takes to fill the pool completely.

Give your answer correct to the nearest minute.

You must show all your working.

(4 marks)

Answer space continues on the next page.

7. continued.

_____ minutes

(Total for Question 7 is 4 marks)

8. Look at the diagram for Question 8 in the separate Diagram Booklet.

The diagram is a grid.

On the grid, draw and label the vector $2\mathbf{a} + \mathbf{b}$

when $\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$

(Total for Question 8 is 3 marks)

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

The diagram is NOT accurately drawn.

The diagram shows a cube with sides 6 cm and a square-based pyramid with an 8 cm square base and perpendicular height h cm.

You may also be given two models.

The volume of the cube is equal to the volume of the pyramid.

Work out the perpendicular height, h cm, of the pyramid.

(3 marks)

Answer space continues on the next page.

9. continued.

_____ cm

(Total for Question 9 is 3 marks)

10. There are only red counters and yellow counters in bag **A**.

number of red counters : number of yellow counters = 3 : 5

There are only green counters and blue counters in bag **B**.

The number of counters in bag **B** is half the number of counters in bag **A**.

Given that there are **x** red counters in bag **A**,

use algebra to show that the total number of counters in bag **A** and bag **B** is **4x**

(3 marks)

Answer space continues on the next page.

10. continued.

(Total for Question 10 is 3 marks)

11. Mina records the speeds, in **mph**, of some cars on a road on Friday.

She uses her results to work out the information in the table below.

	Speed (mph)
Lowest speed	25
Lower quartile	35
Median	40
Interquartile range	10
Range	35

(a) On the grid provided for Question 11 (a) in the separate Diagram Booklet, draw a box plot to show the information in the table.

(3 marks)

(continued on the next page)

11. continued.

(b) Look at the diagram for Question 11 (b) in the separate Diagram Booklet.

The diagram shows a box plot.

Mina also records the speeds of some cars on the same road on Sunday.

She uses her results to draw the box plot.

Compare the distribution of the speeds on Friday with the distribution of the speeds on Sunday.

(2 marks)

(Total for Question 11 is 5 marks)

12. Look at the diagram for Question 12 in the separate Diagram Booklet.

The diagram shows triangle **T** and triangle **S** on a coordinate grid.

Describe fully the single transformation that maps triangle **T** onto triangle **S**.

You may be given a cut-out shape for this question.

(Total for Question 12 is 2 marks)

13. There are 30 students in a class.

A teacher is going to choose at random 2 of the students.

Work out the number of different pairs of students that the teacher can choose.

(Total for Question 13 is 2 marks)

14. At the start of 2022 Kim invested some money in a savings account.

The account paid 3·5% compound interest each year.

At the end of 2022

interest was added to the account then Kim took £750 from the account.

At the end of 2023

interest was added to the account then Kim took £1000 from the account.

There was then £2937·14 in the account.

Work out how much money Kim invested at the start of 2022

You must show all your working.

(4 marks)

Answer space continues on the next page.

14. continued.

£_____

(Total for Question 14 is 4 marks)

15. (a) Simplify fully $\frac{(p - 3)^2}{5(p - 3)}$

(1 mark)

(b) Factorise $3k^2 + 11k - 4$

(2 marks)

(continued on the next page)

15. continued.

(c) Simplify fully $\dfrac{4 - y^2}{y^2 + 3y} \div \dfrac{y + 2}{y + 3}$

(3 marks)

(Total for Question 15 is 6 marks)

16. The functions f and g are given by

$$f(x) = \frac{12}{x + 1} \quad \text{and} \quad g(x) = 5 - 3x$$

(a) Find $f(-3)$

(1 mark)

(continued on the next page)

16. continued.

(b) Find $fg(1)$

(2 marks)

(continued on the next page)

16. continued.

(c) Find $g^{-1}(4)$

(2 marks)

(Total for Question 16 is 5 marks)

17. A ball is thrown upwards and reaches a maximum height.

The ball then falls and bounces repeatedly.

After the nth bounce, the ball reaches a height of h_n

After the next bounce, the ball reaches a height given by $h_{n+1} = 0{\cdot}55h_n$

After the 1st bounce, the ball reaches a height of 8 metres.

What height does the ball reach after the 4th bounce?

(3 marks)

Answer space continues on the next page.

17. continued.

_____ metres

(Total for Question 17 is 3 marks)

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

The diagram is NOT accurately drawn.

The diagram shows a quadrilateral labelled **ABCD**.

In the diagram:

AD = 17 cm

Angle **ABC = 57°**

Angle **ACB = 48°**

Angle **CAD = 35°**

The area of triangle **ACD** is **54 cm^2**

Calculate the area of triangle **ABC**.

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

(5 marks)

Answer space continues on the next page.

18. continued.

_____ cm^2

(Total for Question 18 is 5 marks)

19. When $R = \frac{P}{Q}$

and $P = 5{\cdot}88 \times 10^8$ correct to 3 significant figures

and $Q = 3{\cdot}6 \times 10^5$ correct to 2 significant figures.

Work out the lower bound for R.

Give your answer as an ordinary number correct to the nearest integer.

You must show all your working.

(3 marks)

Answer space continues on the next page.

19. continued.

(Total for Question 19 is 3 marks)

20. (a) $x - 4$, $x + 2$ and $3x + 1$ are three consecutive terms of an arithmetic sequence.

Find the value of x.

(2 marks)

$x =$ _____

(continued on the next page)

20. continued.

(b) $y - 4$, $y + 2$ and $3y + 1$ are three consecutive terms of a geometric sequence.

Find the possible values of y.

(5 marks)

Answer space continues on the next page.

20. (b) continued.

(Total for Question 20 is 7 marks)

21. Look at the diagram for Question 21 in the separate Diagram Booklet.

The diagram is NOT accurately drawn.

The diagram shows a circle, radius r cm and two regular hexagons.

Each side of the larger hexagon **ABCDEF** is a tangent to the circle.

Each side of the smaller hexagon **PQRSTU** is a chord of the circle.

By considering perimeters, show that

$$3 < \pi < 2\sqrt{3}$$

(4 marks)

Answer space continues on the next page.

21. continued.

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER