

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

Total Marks

Mathematics
PAPER 3
(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					

Y64634A

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

It is a scatter graph which shows information about the volume of traffic and the carbon monoxide level at a point on a road each day for 22 days.

One point is an outlier.

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

(1 mark)

(_____ , _____)

(continued on the next page)

Turn over

1. continued.

For another day, **370** cars pass the point on the road.

(b) Estimate the carbon monoxide level for this day.

(2 marks)

_____ mg/m^3

(continued on the next page)

Turn over

1. continued.

Alfie says,

“Because there is an outlier, there is no correlation.”

(c) Is Alfie correct?

You must give a reason for your answer.

(1 mark)

(Total for Question 1 is 4 marks)

Turn over

2. Natalie makes potato cakes in a restaurant.

She mixes potato, cheese and onion so that

**weight of potato : weight of
cheese : weight of onion = 9 : 2 : 1**

**Natalie needs to make 6000 grams of
potato cakes.**

Cheese costs £2.25 for 175 grams.

(continued on the next page)

Turn over

2. continued.

Work out the cost of the cheese needed to make 6000 grams of potato cakes.

(4 marks)

Answer space continues on the next two pages.

2. continued.

Turn over

2. continued.

£ _____

(Total for Question 2 is 4 marks)

Turn over

3. (a) Write

4.5×10^5 as an ordinary
number.

(1 mark)

(continued on the next page)

Turn over

3. continued.

(b) Write 0.007 in standard form.

(1 mark)

(continued on the next page)

Turn over

3. continued.

(c) Work out

$$4.2 \times 10^3 + 5.3 \times 10^2$$

Give your answer in standard form.

(2 marks)

(Total for Question 3 is 4 marks)

Turn over

4. A water tank is empty.

**Anil needs to fill the tank with
2400 litres of water.**

**Company A supplies water at a rate
of 8 litres in 1 minute 40 seconds.**

**Company B supplies water at a rate
of 2.2 gallons per minute.**

1 gallon = 4.54 litres

**Company A would take more time to
fill the tank than Company B would
take to fill the tank.**

(continued on the next page)

Turn over

4. continued.

How much more time?

**Give your answer in minutes correct
to the nearest minute.**

(4 marks)

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

Turn over

4. continued.

Turn over

4. continued.

_____ minutes

(Total for Question 4 is 4 marks)

Turn over

5. The first four terms of a Fibonacci sequence are

n $2n$ $3n$ $5n$

The sum of the first five terms of this sequence is 228

Work out the value of n

(3 marks)

Answer space continues on the next two pages.

5. continued.

Turn over

5. continued.

(Total for Question 5 is 3 marks)

Turn over

- 6. Look at the table for Question 6 in the Diagram Booklet.**

In a bag there are only red counters, blue counters, green counters and pink counters.

A counter is going to be taken at random from the bag.

The table in the Diagram Booklet shows the probabilities of taking a red counter or a blue counter.

(continued on the next page)

6. continued.

The probability of taking a green counter is 0.2 more than the probability of taking a pink counter.

(a) Complete the table in the Diagram Booklet.

There are two spaces to fill.

(2 marks)

(continued on the next page)

Turn over

6. continued.

There are 18 blue counters in the bag.

(b) Work out the total number of counters in the bag.

(2 marks)

Answer space continues on the next page.

6. continued.

(Total for Question 6 is 4 marks)

Turn over

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

It shows a sector **OPQR** of a circle, centre **O** and radius **8 cm**

$$OP = OR = 8 \text{ cm}$$

The marked angle is a right angle.

OPR is a triangle.

Work out the area of the shaded segment **PQR**

Give your answer correct to 3 significant figures.

(4 marks)

Answer space is on the next two pages.

Turn over

7. continued.

Turn over

7. continued.

_____ **cm²**

(Total for Question 7 is 4 marks)

Turn over

8. (a) Look at the diagram for

Question 8(a) in the

Diagram Booklet.

Using the axes in the

Diagram Booklet, sketch a graph

to represent the statement

y is directly proportional to x

(1 mark)

(continued on the next page)

Turn over

8. continued.

**(b) Look at the diagram for
Question 8(b) in the
Diagram Booklet.**

**Using the axes in the
Diagram Booklet, sketch a graph
to represent the statement**

y is inversely proportional to x

(1 mark)

(Total for Question 8 is 2 marks)

Turn over

- 9. On Monday, 12 people took 5 hours to clean a number of cars.**

On Tuesday, 15 people cleaned the same number of cars.

Assuming that all the people worked at the same rate,

- (a) work out how many hours the 15 people took to clean the cars.
(2 marks)**

Answer space continues on the next page.

9. (a) continued.

_____ hours

(continued on the next page)

Turn over

9. continued.

The assumption is wrong.

(b) How might this affect the time taken for the **15** people to clean the cars?

(1 mark)

(Total for Question 9 is 3 marks)

Turn over

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

The diagram shows two right-angled triangles **ACB** and **DEB**

Triangle **DEB** is smaller than triangle **ACB**

Both the marked angles are right angles.

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

$$DE = 2 \text{ cm}$$

$$DB = 6 \text{ cm}$$

(continued on the next page)

Turn over

10. continued.

Calculate the length of CB

Give your answer correct to

2 decimal places.

(4 marks)

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

Turn over

10. continued.

_____ **cm**

(Total for Question 10 is 4 marks)

Turn over

- 11. Freya writes down the value of x , correct to 1 decimal place.**

She writes $x = 6.4$

**Complete the error interval for x
(2 marks)**

Answer space continues on the next page.

11. continued.

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

(Total for Question 11 is 2 marks)

Turn over

12. $(mx^6)^{\frac{1}{n}} = 7x^3$

Work out the value of m and the value of n
(2 marks)

Answer space continues on the next page.

12. continued.

m = _____

n = _____

(Total for Question 12 is 2 marks)

Turn over

13. Look at the diagram for Question 13 in the Diagram Booklet.

It shows a pattern made from four identical rectangles within a set of axes.

The sides of the rectangles are parallel to the axes.

Point A has coordinates (3, 4)

Point B has coordinates (11, 20)

Point C is marked on the diagram in the Diagram Booklet.

(continued on the next page)

Turn over

13. continued.

Work out the coordinates of C

You must show all your working.

(5 marks)

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

Turn over

13. continued.

(_____ , _____)

(Total for Question 13 is 5 marks)

Turn over

14. Olivia and Jessica have in total half as many sweets as Fran and Gary have in total.

Fran and Gary share their sweets in the ratio $2:3$

Olivia and Jessica share their sweets in the ratio $9:1$

Fran got W sweets.

Gary got X sweets.

Olivia got y sweets.

Jessica got Z sweets.

Find, in its simplest form, $W:X:y:Z$
(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 a graph which gives the volume of water, in litres, in a container at time t seconds after the water started to flow out of the container.

Using the graph, work out an estimate for the rate at which the water is flowing out of the container when $t = 12$

You must show your working.

(3 marks)

Answer space is on the next page.

Turn over

15. continued.

_____ litres per second

(Total for Question 15 is 3 marks)

Turn over

16. The curve **C** has equation

$$y = x^2 + 3x - 3$$

The line **L** has equation

$$y - 5x + 4 = 0$$

Show, algebraically, that **C** and **L**
have exactly one point in common.

(4 marks)

Answer space continues on the next
three pages.

16. continued.

Turn over

16. continued.

Turn over

16. continued.

(Total for Question 16 is 4 marks)

Turn over

17. **X** is directly proportional to the square of **y**
y is directly proportional to the cube of **z**

$$z = 2 \text{ when } x = 32$$

Find a formula for **X** in terms of **z**
(4 marks)

Answer space continues on the next three pages.

Turn over

17. continued.

Turn over

17. continued.

Turn over

17. continued.

(Total for Question 17 is 4 marks)

Turn over

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

It shows a trapezium **OABC**

A straight line inside the trapezium joins point **O** and point **B**

$$\overrightarrow{OA} = a$$

$$\overrightarrow{AB} = b$$

$$\overrightarrow{OC} = 3b$$

D is the point on **OB** such that

$$OD:DB = 2:3$$

E is the point on **BC** such that

$$BE:EC = 1:4$$

(continued on the next page)

Turn over

18. continued.

Work out the vector \overrightarrow{DE} in terms of **a** and **b**

Give your answer in its simplest form.

(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. At the start of year n , the number of animals in a population is P_n

At the start of the following year, the number of animals in the population is P_{n+1} where

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

At the start of 2017 the number of animals in the population was 4000

At the start of 2019 the number of animals in the population was 3610

(continued on the next page)

Turn over

19. continued.

Find the value of the constant k

(3 marks)

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

Turn over

19. continued.

(Total for Question 19 is 3 marks)

Turn over

20. Pat throws a fair coin n times.

Find an expression, in terms of n , for the probability that Pat gets at least 1 head and at least 1 tail.

(2 marks)

Answer space continues on the next page.

20. continued.

(Total for Question 20 is 2 marks)

Turn over

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

It is a speed–time graph showing the speed, in metres per second, of an object t seconds after it started to move from rest.

- (a) Using 3 trapeziums of equal width, work out an estimate for the area under the graph between $t = 1$ and $t = 4$**
(3 marks)

Answer space continues on the next page.

21. (a) continued.

(continued on the next page)

Turn over

21. continued.

(b) What does this area represent?

(1 mark)

(Total for Question 21 is 4 marks)

Turn over

22. Show that

$$\frac{6y^3}{(9y^2 - 144)} \div \frac{2y^4}{3(y - 4)}$$

can be written in the form

$$\frac{1}{y(y + r)} \text{ where } r \text{ is an integer.}$$

(3 marks)

Answer space continues on the next two pages.

Turn over

22. continued.

Turn over

22. continued.

(Total for Question 22 is 3 marks)

Turn over

23. Look at the diagram for Question 23 in the Diagram Booklet.

It shows triangle ABC

**D is the point on BC such that
angle BAD = angle DAC = x°**

**Prove that $\frac{AB}{BD} = \frac{AC}{DC}$
(4 marks)**

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

23. continued.

Turn over

23. continued.

(Total for Question 23 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER
