

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

**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. 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 $3 \cdot 142$ 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 in case you need to use them.

**You may be provided with models for Question 4 and Question 25
They are NOT accurate.**

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. Make n the subject of the formula

$$p = 3n - 9$$

(Total for Question 1 is 2 marks)

- 2. Rob has been asked to divide 120 in the ratio 3 : 5**

Here is his working.

$$120 \div 3 = 40$$

$$120 \div 5 = 24$$

Rob's working is not correct.

(continued on the next page)

2. continued.

Describe what Rob has done wrong.

(Total for Question 2 is 1 mark)

3. 200 students chose one language to study.

Each student chose one language from French or Spanish or German.

Of the 200 students,

90 are boys and the rest of the students are girls

70 chose Spanish

60 of the 104 students who chose French are boys

18 girls chose German.

(continued on the next page)

3. continued.

Work out how many boys chose

Spanish.

(3 marks)

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

3. continued.

(Total for Question 3 is 3 marks)

Turn over

- 4. Look at the diagram for Question 4 in the Diagram Booklet.**

You may be provided with a model.

It is NOT accurate.

Karina has 4 tanks on her tractor.

Each tank is a cylinder with diameter 80 cm and height 160 cm

The 4 tanks are to be filled completely with a mixture of fertiliser and water.

The fertiliser has to be mixed with water in the ratio 1 : 100 by volume.

Karina has 32 litres of fertiliser.

(continued on the next page)

Turn over

4. continued.

$$1 \text{ litre} = 1000 \text{ cm}^3$$

**Has Karina enough fertiliser for the
4 tanks?**

**You must show how you get your
answer.**

(4 marks)

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

4. continued.

4. continued.

(Total for Question 4 is 4 marks)

5. Look at the diagram for Question 5 in the Diagram Booklet.

Triangle **ABC** and triangle **DEF** are similar.

$$AC = 5 \text{ cm}$$

$$BC = 4 \text{ cm}$$

$$DE = 22 \text{ cm}$$

$$DF = 20 \text{ cm}$$

$$\text{Angle } ABC = \text{Angle } DEF$$

$$\text{Angle } ACB = \text{Angle } DFE$$

(continued on the next page)

5. continued.

(a) Work out the length of EF
(2 marks)

_____ **cm**

(continued on the next page)

Turn over

5. continued.

(b) Work out the length of AB
(2 marks)

_____ **cm**

(Total for Question 5 is 4 marks)

Turn over

6. Look at the diagram for Question 6 in the Diagram Booklet.

One weekend the Keddie family is going to do a sports quiz and a music quiz.

The probability that the family will win the sports quiz is 0.3

The probability that the family will win the music quiz is 0.35

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

There are three spaces to fill.

(2 marks)

(continued on the next page)

Turn over

6. continued.

(b) Work out the probability that the Keddie family will win both the sports quiz and the music quiz.

(2 marks)

Answer space continues on the next page.

6. (b) continued.

(Total for Question 6 is 4 marks)

7. (a) Change 8000 cm^3 to m^3
(1 mark)

_____ m^3

(continued on the next page)

7. continued.

(b) Change a speed of 180 km per hour to metres per second.

(3 marks)

_____metres per second

(Total for Question 7 is 4 marks)

Turn over

- 8. There are 30 women and 20 men at a gym.**

**The mean height of all 50 people is
167.6 cm**

**The mean height of the 20 men is
182 cm**

**Work out the mean height of the
30 women.**

(3 marks)

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

8. continued.

_____cm

(Total for Question 8 is 3 marks)

Turn over

9. (a) Write

6.75×10^{-4} as an

ordinary number.

(1 mark)

(continued on the next page)

9. continued.

(b) Work out

$$\frac{2.56 \times 10^6 \times 4.12 \times 10^{-3}}{1.6 \times 10^{-2}}$$

Give your answer in standard form.

(2 marks)

Answer space continues on the next page.

9. (b) continued.

(Total for Question 9 is 3 marks)

10. Peter has to subtract
 $(x^2 - 2x - 4)$ from
 $(x^2 + 3x + 5)$

Here is his working

$$(x^2 + 3x + 5) - (x^2 - 2x - 4)$$

$$= x^2 + 3x + 5 - x^2 - 2x - 4$$

$$= x + 1$$

(continued on the next page)

10. continued.

Explain what is wrong with Peter's working.

(Total for Question 10 is 1 mark)

11. p and q are integers such that

$$3 < p < 8$$

$$4 < q < 10$$

$$\text{and } p + q = 14$$

**Find all the possible values of p
(2 marks)**

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

11. continued.

(Total for Question 11 is 2 marks)

12. Martin used his calculator to work out the value of a number P

He wrote down the first two digits of the answer on his calculator.

He wrote down 1.2

Complete the error interval for P

_____ $\leq P <$ _____

(Total for Question 12 is 2 marks)

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

Chen has the information in the table on the next page about the time that it took an operator at a call centre to answer each of 90 calls.

(continued on the next page)

13. continued.

Time (t seconds)	Cumulative frequency
$0 < t \leq 10$	4
$0 < t \leq 20$	25
$0 < t \leq 30$	70
$0 < t \leq 40$	88
$0 < t \leq 50$	90

Chen draws the cumulative frequency graph in the Diagram Booklet for the information in the table.

(continued on the next page)

Turn over

13. continued.

**Write down two different things that
are wrong with this graph.**

1

2

(Total for Question 13 is 2 marks)

14. (a) Simplify fully

$$(3x^5y^6)^4$$

(2 marks)

(continued on the next page)

Turn over

14. continued.

(b) Expand and simplify

$$(y + 2)(y - 3)(y + 4)$$

(3 marks)

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

14. (b) continued.

(Total for Question 14 is 5 marks)

Turn over

15. Look at the information for Question 15 in the Diagram Booklet. It shows details about the fish in a pet shop.

Show that there are 555 different ways for David to choose his fish.

(2 marks)

Answer space continues on the next page.

15. continued.

(Total for Question 15 is 2 marks)

Turn over

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

ABDE is a cyclic quadrilateral.

ABC and EDC are straight lines.

Angle DBC = 60°

(continued on the next page)

16. continued.

Given that

**size of angle EAB : size of
angle BCD = 2 : 1**

work out the size of angle BCD

You must show all your working.

(4 marks)

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

16. continued.

Turn over

16. continued.

○

(Total for Question 16 is 4 marks)

**17. There are four boxes on a shelf,
A, B, C and D**

**The total weight of A and B is
3 times the total weight of C and D**

**The weight of A is $\frac{2}{3}$ of the weight
of B**

**The weight of C is 75% of the weight
of D**

(continued on the next page)

17. continued.

Find the ratio

weight of A : weight of B :

weight of C : weight of D

(4 marks)

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

17. continued.

Turn over

17. continued.

(Total for Question 17 is 4 marks)

Turn over

- 18. Shape *A* is reflected in the line with equation $x = 2$ to give shape *B*
Shape *B* is reflected in the line with equation $x = 6$ to give shape *C***

Describe fully the

**SINGLE transformation that maps
shape *A* onto shape *C***

(2 marks)

**Answer space and lines continue on
the next two pages.**

18. continued.

Turn over

18. continued.

(Total for Question 18 is 2 marks)

- 19. There are only blue counters, red counters and green counters in a box.**

The probability that a counter taken at random from the box will be blue is 0.4

The ratio of the number of red counters to the number of green counters is $7 : 8$

(continued on the next page)

19. continued.

Sameena takes at random a counter from the box.

She records its colour and puts the counter back in the box.

Sameena does this a total of 50 times.

Work out an estimate for the number of times she takes a green counter.

(3 marks)

Answer space continues on the next page.

19. continued.

(Total for Question 19 is 3 marks)

Turn over

20. Look at the diagram for Question 20 in the Diagram Booklet.

It shows a triangle ADE

$$\mathbf{AE = DE}$$

$$\mathbf{AB : BC : CD = 1 : 2 : 1}$$

Prove that triangle ACE is congruent to triangle DBE

(3 marks)

Answer space continues on the next two pages.

20. continued.

Turn over

20. continued.

(Total for Question 20 is 3 marks)

21. The equation of a curve is

$$**y = 4x^2 - 56x**$$

The curve has one turning point.

**By completing the square, show that
the coordinates of the turning point
are $(7, -196)$**

You must show all your working.

(3 marks)

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

21. continued.

Turn over

21. continued.

(Total for Question 21 is 3 marks)

Turn over

22. $\frac{2x + 3}{x - 5} + \frac{x - 4}{x + 5} - 3$

can be written in the form

$\frac{ax + b}{x^2 - 25}$ where **a** and **b** are integers.

Work out the value of **a** and the value of **b**

You must show all your working.

(3 marks)

Answer space continues on the next three pages.

22. continued.

Turn over

22. continued.

Turn over

22. continued.

a = _____

b = _____

(Total for Question 22 is 3 marks)

Turn over

**23. Look at the diagram for
Question 23(a) in the
Diagram Booklet.**

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

- (a) On the grid in the
Diagram Booklet, sketch the
graph of $y = f(x + 2)$
(1 mark)**

(continued on the next page)

23. continued.

**Look at the diagram for
Question 23(b) in the
Diagram Booklet.**

**On the grid in the Diagram Booklet,
graph A has been reflected to give
graph B**

The equation of graph A is $y = g(x)$

**(b) Write down an equation of
graph B
(1 mark)**

(Total for Question 23 is 2 marks)

Turn over

24. Look at the diagram for Question 24 in the Diagram Booklet.

It shows $CDEF$ is a quadrilateral.

$$\overrightarrow{FE} = a$$

$$\overrightarrow{ED} = b$$

$$\overrightarrow{CD} = 2a$$

The point P is such that CEP is a straight line and that $CE = EP$

(continued on the next page)

24. continued.

Use a vector method to prove that

CF is parallel to DP

(4 marks)

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

24. continued.

(Total for Question 24 is 4 marks)

Turn over

25. Look at Diagram 1 and Diagram 2 for Question 25 in the Diagram Booklet. You may be provided with a model. It is NOT accurate.

The pyramid P is formed from two parts made of different materials.

The top part of P has a mass of 92.8 grams and is made from material with a density of 2.9 g/cm³

The bottom part of P has a mass of 972.8 grams

The average density of P is 4.7 g/cm³

(continued on the next page)

25. continued.

Calculate the volume of the top part of P as a percentage of the total volume of P

Give your answer correct to 1 decimal place.

You must show all your working.

(5 marks)

Answer space continues on the next two pages.

25. continued.

Turn over

25. continued.

_____ %

(Total for Question 25 is 5 marks)

26. Look at the diagram for Question 26 in the Diagram Booklet.

ABCDEFGG is a regular heptagon.

Points G and B are joined to form triangle ABG

The area of triangle ABG is 30 cm^2

Calculate the length of GB

Give your answer correct to 3 significant figures.

You must show all your working.

(5 marks)

Answer space continues on the next two pages.

26. continued.

Turn over

26. continued.

_____ **cm**

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER
