

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

Total Marks

Mathematics
PAPER 2 (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 (enclosed). 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.

You may be provided with a shape for Question 2

You may be provided with a model for Question 17 and also formula models for Question 17

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. (a) Simplify
 $(x^3)^5$
(1 mark)
-

(continued on the next page)

1. continued.

(b) Expand and simplify

$$4(y + 3) + 7(4 - 2y)$$

(2 marks)

(continued on the next page)

Turn over

1. continued.

(c) Factorise fully

$$15x^3 + 3x^2y$$

(2 marks)

(Total for Question 1 is 5 marks)

Turn over

2. Look at the diagram for Question 2 in the Diagram Booklet.

It shows shape **S and shape **T** on a grid.**

A cut out shape may be available if you wish to use it.

Describe fully the single transformation that maps shape **S onto shape **T****

(2 marks)

Answer lines continue on the next page.

2. continued.

(Total for Question 2 is 2 marks)

3. The length of a football pitch is 90 metres, correct to the nearest metre.

Complete the error interval for the length of the football pitch.

_____ metres \leq length $<$ _____ metres

(Total for Question 3 is 2 marks)

- 4. Festival A will be in a rectangular field with an area of $80\,000\text{ m}^2$.
The greatest number of people allowed to attend Festival A is 425**

**Festival B will be in a rectangular field 700 metres by 2000 metres.
The greatest number of people allowed to attend Festival B is 6750**

The area per person allowed for Festival B is greater than the area per person allowed for Festival A

(continued on the next page)

4. continued.

(a) How much greater?

Give your answer correct to the nearest whole number.

(4 marks)

Answer space continues on the next page.

4. (a) continued.

_____ m²

(continued on the next page)

Turn over

4. continued.

Callum says,

“ 300 cm^2 is the same as 3 m^2

because there are 100 cm in 1 metre

so you divide by 100”

Callum’s method is wrong.

(b) Explain why.

(1 mark)

**Answer lines continue on the
next page.**

Turn over

4. (b) continued.

(Total for Question 4 is 5 marks)

- 5. The points L, M and N are such that LMN is a straight line.**

The coordinates of L are $(-3, 1)$

The coordinates of M are $(4, 9)$

Given that $LM : MN = 2 : 3$,

find the coordinates of N

(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. A new phone cost £679

The value of the phone decreases at a rate of 4% per year.

Work out the value of the phone at the end of 3 years.

(3 marks)

Answer space continues on the next page.

6. continued.

£ _____

(Total for Question 6 is 3 marks)

Turn over

7. In Spain, Sam pays 27 euros for 18 litres of petrol.

In Wales, Leo pays £40·80 for 8 gallons of the same type of petrol.

$$1 \text{ euro} = \text{£}0\cdot85$$

$$4\cdot5 \text{ litres} = 1 \text{ gallon}$$

Sam thinks that petrol is cheaper in Spain than in Wales.

Is Sam correct?

You must show how you get your answer.

(4 marks)

Answer space is on the next three pages.

Turn over

7. continued.

Turn over

7. continued.

Turn over

7. continued.

(Total for Question 7 is 4 marks)

Turn over

8. Use your calculator to work out

$$\frac{\sqrt[3]{1.57^4 + \tan 60^\circ}}{7 \cdot 2^{\frac{1}{2}}}$$

Give your answer correct to
3 significant figures.

(Total for Question 8 is 2 marks)

Turn over

9. A box in the shape of a cuboid is placed on a horizontal floor.

The box exerts a force of 180 newtons on the floor.

The box exerts a pressure of $187.5 \text{ newtons/m}^2$ on the floor.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

The face in contact with the floor is a rectangle of length 1.2 metres and width X metres.

(continued on the next page)

9. continued.

Work out the value of x

(3 marks)

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

9. continued.

X = _____

(Total for Question 9 is 3 marks)

Turn over

10. Look at the diagram for Question 10(a) in the Diagram Booklet.

It is a box plot which shows information about the sales, in thousands of pounds (£000s), of an online store each month.

Andrew says,

“Three quarters of the given data lies between 150 000 and 350 000 because these are the values of the lower quartile and the upper quartile.”

(continued on the next page)

10. continued.

Andrew is wrong.

(a) Explain why.

(1 mark)

(continued on the next page)

10. continued.

The table below shows information about the sales, in £000s, in a shop each month.

	Sales (£000s)
least value	50
lower quartile	100
median	150
upper quartile	250
greatest value	350

(continued on the next page)

10. continued.

**(b) Look at the diagram for
Question 10(b) in the
Diagram Booklet.**

**On the grid in the
Diagram Booklet, draw a box plot
for this information.
(2 marks)**

(continued on the next page)

10. continued.

(c) Compare the distribution of the sales of the online store with the distribution of the sales in the shop.

(2 marks)

Answer lines continue on the next page.

Turn over

10. (c) continued.

(Total for Question 10 is 5 marks)

11. Kieron has 13 workers he can use for a job.

He knows that 6 workers would take $14\frac{1}{2}$ days to complete this job.

Show that Kieron has enough workers to finish this job in less than 7 days.

(3 marks)

Answer space continues on the next page.

11. continued.

(Total for Question 11 is 3 marks)

Turn over

12. The equation of the line L_1 is
 $y = 2x + 3$

The equation of the line L_2 is
 $5y - 10x + 4 = 0$

Show that these two lines are parallel.
(2 marks)

Answer space continues on the
next page.

12. continued.

(Total for Question 12 is 2 marks)

Turn over

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

It shows shape A and shape B on a grid.

Shape A has been mapped onto shape B

Describe fully the single transformation that maps shape A onto shape B

(Total for Question 13 is 2 marks)

14. Saffron wants to work out an estimate for the total number of fish in a lake.

On Friday, Saffron catches 180 fish from the lake.

She puts a tag on each of these fish and puts them back into the lake.

On Saturday, Saffron catches 305 fish from the same lake.

She finds that 45 of the 305 fish are tagged.

(continued on the next page)

14. continued.

Work out an estimate for the total number of fish in the lake.

(3 marks)

Answer space continues on the next page.

14. continued.

(Total for Question 14 is 3 marks)

- 15. The ratio of Marta's hourly pay to Khalid's hourly pay is $6 : 5$**

Both Marta and Khalid get an increase of $\pounds 1.50$ in their hourly pay. The ratio of Marta's hourly pay to Khalid's hourly pay after this increase is $13 : 11$

Work out the hourly pay before the increase for Marta and for Khalid.

(4 marks)

Answer space continues on the next two pages.

15. continued.

Turn over

15. continued.

Marta £_____

Khalid £_____

(Total for Question 15 is 4 marks)

Turn over

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

It shows an incomplete Venn diagram.

**A shop manager wants to advertise
special offers on social media
platforms.**

(continued on the next page)

16. continued.

The manager asks 100 customers which of type A, type B or type C they use.

Of these customers,

4 use all three types

16 do not use any of type A, type B or type C

8 use both type A and type B, but not type C

14 use both type B and type C

62 in total use type A

all 20 who use type C also use at least one of type A and type B

(continued on the next page)

Turn over

16. continued.

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

(4 marks)

(continued on the next page)

16. continued.

One of the customers is chosen at random.

Given that this customer uses type A,

**(b) find the probability that this customer also uses type B
(2 marks)**

(Total for Question 16 is 6 marks)

Turn over

17. Look at Diagram 1, Diagram 2 and the formulas for Question 17 in the Diagram Booklet.

You may be provided with a model for the question and additional formula models.

A solid cone is joined to a solid hemisphere to make the solid **T as shown by Diagram 1 and the model.**

Diagram 2 is a simplified 2D diagram of solid **T**

(continued on the next page)

17. continued.

**The diameter of the base of the cone
is 7 cm**

**The diameter of the hemisphere is
7 cm**

The total volume of T is $120\pi \text{ cm}^3$

The total vertical height of T is $y \text{ cm}$

(a) Calculate the value of y

Give your answer correct to

3 significant figures.

(4 marks)

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

Turn over

17. (a) continued.

$y =$ _____

(continued on the next page)

Turn over

17. continued.

The diameter of the base of the cone and the diameter of the hemisphere are both increased by the same amount.

Assuming the total volume of T does not change,

(b) explain the effect this would have on your answer to part (a).

(1 mark)

Answer lines continue on the next page.

Turn over

17. (b) continued.

(Total for Question 17 is 5 marks)

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

It shows triangles PQR and QRS which have a common side QR

$$\mathbf{PQ = 11\text{ cm}}$$

$$\mathbf{PR = 9.4\text{ cm}}$$

$$\mathbf{\text{Angle QPR} = 27^\circ}$$

$$\mathbf{\text{Angle QRS} = 88^\circ}$$

$$\mathbf{\text{Angle RSQ} = 41^\circ}$$

(continued on the next page)

18. continued.

Calculate the length of QS

Give your answer correct to

3 significant figures.

You must show all your working.

(4 marks)

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

18. continued.

Turn over

18. continued.

_____ **cm**

(Total for Question 18 is 4 marks)

19. The functions g and h are such that

$$g(x) = \sqrt[3]{2x-5}$$

$$h(x) = \frac{1}{x}$$

(a) Find $g(16)$

(1 mark)

(continued on the next page)

Turn over

19. continued.

Remember:

The functions g and h are such that

$$g(x) = \sqrt[3]{2x-5}$$

$$h(x) = \frac{1}{x}$$

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

**Give your answer in terms of x
in its simplest form.**

(3 marks)

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

Turn over

19. (b) continued.

Turn over

19. (b) continued.

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

(Total for Question 19 is 4 marks)

Turn over

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

**A, B, C and D are points on the circumference of a circle, centre O
ADE and BCE are straight lines.**

Angle BOD = 132°

Angle DEC = 16°

Work out the size of angle CDE

Give a reason for each stage of your working.

(4 marks)

Answer space continues on the next two pages.

20. continued.

Turn over

20. continued.

○

(Total for Question 20 is 4 marks)

Turn over

**21. Look at the diagram for
Question 21(a) in the
Diagram Booklet.**

**It shows the graph of $y = f(x)$ on a
grid.**

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

(continued on the next page)

21. continued.

**Look at the diagram for
Question 21(b) in the
Diagram Booklet.**

**It shows a sketch of the graph of
 $y = \tan x^\circ$**

**The graph of $y = \tan x^\circ$ is translated
to give the graph of $y = g(x)$**

**Following the translation the point Q,
shown on the graph in the
Diagram Booklet, moves to point R
Point R has coordinates $(90, -5)$**

(continued on the next page)

Turn over

21. continued.

- (b) Find an expression for $g(x)$ in terms of x**
(2 marks)

(Total for Question 21 is 3 marks)

22. Find algebraically the set of values of x for which

$$x^2 - 49 > 0 \quad \text{AND} \quad 5x^2 - 31x - 72 > 0$$

(5 marks)

Answer space continues on the next three pages.

22. continued.

22. continued.

22. continued.

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER
