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

Total Marks

Mathematics

Paper 3
(Calculator)
Higher Tier

Monday 8 June 2020 – Morning

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					

Q62279A

Pearson

YOU MUST HAVE

Ruler, protractor, compasses, writing and drawing equipment, calculator. Tracing paper may be used.

YOU WILL BE GIVEN

Diagram Book

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.

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 models for Question 9 and Question 18
They are NOT accurate.

You may be provided with a shape for Question 11
It is accurate.

There may be spare copies of some diagrams.

ADVICE

Read each question carefully before you start to answer it.

Keep an eye on the time.

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

$$n^3 \times n^5$$

(1 mark)

(continued on the next page)

1. continued.

(b) Simplify

$$\frac{p^3q^4}{p^2q}$$

(2 marks)

(continued on the next page)

1. continued.

(c) Solve

$$\frac{5x}{2} > 7$$

(2 marks)

(Total for Question 1 is 5 marks)

2. Andy cycles a distance of **30 km** at an average speed of **24 km/h**

He then runs a distance of **12 km** at an average speed of **8 km/h**

Work out the total time Andy takes.

Give your answer in hours and minutes.

(3 marks)

Answer space continues on the next page.

2. continued.

_____ hours _____ minutes

(Total for Question 2 is 3 marks)

3. A number, m, is rounded to 1 decimal place.

The result is $9 \cdot 4$

Complete the error interval for m

_____ ≤ m < _____

(Total for Question 3 is 2 marks)

4. Maisie knows that she needs 3 kg of grass seed to make a rectangular lawn 5 metres by 9 metres.

Grass seed is sold in 2 kg boxes.

Maisie wants to make a rectangular lawn 10 metres by 14 metres.

She has 5 boxes of grass seed.

(a) Has Maisie got enough grass seed to make a lawn 10 metres by 14 metres?

You must show all your working.

(4 marks)

Answer space continues on the next page.

4. (a) continued.

(continued on the next page)

4. continued.

Maisie opens the 5 boxes of grass seed.

She finds that 4 of the boxes contain 2 kg of grass seed.

The other box contains 1 kg of grass seed.

(b) Does this affect whether Maisie has enough grass seed to make her lawn?

Give a reason for your answer.

(1 mark)

(Total for Question 4 is 5 marks)

5. Look at the diagrams for Question 5 in the Diagram Book.

They show two spinners, labelled **A** and **B** and a probability tree diagram.

Amanda has two fair 3–sided spinners.

Amanda spins each spinner once.

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

There are six spaces to fill.

(2 marks)

(continued on the next page)

5. continued.

(b) Work out the probability that Spinner A lands on 2 and Spinner B does NOT land on 2

(2 marks)

(Total for Question 5 is 4 marks)

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

It shows the graphs of

$5x - 9y = -46$ and

$y = -2x$

(a) Use these graphs to solve the simultaneous equations

$5x - 9y = -46$

$y = -2x$

(1 mark)

$x =$ _____

$y =$ _____

(continued on the next page)

6. continued.

(b) Look at the diagram for Question 6(b) in the Diagram Book.

It shows the graph of $y = x^2 - 4x + 2$

Use this graph to find estimates for the solutions of the quadratic equation

$x^2 - 4x + 2 = 0$

(2 marks)

(Total for Question 6 is 3 marks)

---

7. There is a total of 45 boys and girls in a choir.

The mean age of the 18 boys is 16·2 years.

The mean age of the 27 girls is 16·7 years.

Calculate the mean age of all 45 boys and girls.

(3 marks)

Answer space continues on the next page.

7. continued.

_____ years

(Total for Question 7 is 3 marks)

8. Look at the table for Question 8 in the Diagram Book.

There are some counters in a bag.

The counters are blue or green or red or yellow.

The table shows the probabilities that a counter taken at random from the bag will be blue or will be green.

The probability that a counter taken at random from the bag will be red is five times the probability that the counter will be yellow.

There are 300 counters in the bag.

Work out the number of yellow counters in the bag.

(3 marks)

Answer space continues on the next page.

8. continued.

(Total for Question 8 is 3 marks)

9. Look at Diagram 1 and Diagram 2 for Question 9 in the Diagram Book.

You may be provided with a model.

Diagram 1 and the model represent a prism.

One angle is marked $40°$

The prism has length 20 cm

The cross section of the prism as shown in Diagram 2 has exactly one line of symmetry.

Work out the volume of the prism.

Give your answer correct to 3 significant figures.

(5 marks)

Answer space continues on the next page.

9. continued.

_____ cm^3

(Total for Question 9 is 5 marks)

10. A person's heart beats approximately 10^5 times each day.

A person lives for approximately 81 years.

(a) Work out an estimate for the number of times a person's heart beats in their lifetime.

Give your answer in standard form correct to 2 significant figures.

(2 marks)

Answer space continues on the next page.

10. (a) continued.

2×10^{12} red blood cells have a total mass of 90 grams.

(b) Work out the average mass of 1 red blood cell.

Give your answer in standard form.

(2 marks)

Answer space continues on the next page.

10. (b) continued.

_____ grams

(Total for Question 10 is 4 marks)

11. Look at the diagram for Question 11 in the Diagram Book.

It shows triangle **P**, triangle **Q** and triangle **R** on a grid.

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

(a) (i) Describe fully the single transformation that maps triangle **P** onto triangle **Q**

(ii) Describe fully the single transformation that maps triangle **Q** onto triangle **R**

(continued on the next page)

11. (a) continued.

(iii) Describe fully the single transformation that maps triangle **P** onto triangle **R**

(3 marks)

Under the transformation that maps triangle **P** onto triangle **R**, the point **A** is invariant.

(b) Write down the coordinates of point **A**

(1 mark)

(_____ , _____)

(Total for Question 11 is 4 marks)

12. (a) Express

$$\frac{y}{y+2} + \frac{2y}{y-4}$$

as a single fraction in its simplest form.

(3 marks)

Answer space continues on the next page.

12. (a) continued.

(continued on the next page)

12. continued.

(b) Expand and simplify

$$(y - 3)(2y + 3)(4y + 5)$$

(3 marks)

(Total for Question 12 is 6 marks)

13. (a) Look at the diagram for Question 13(a) in the Diagram Book.

On the grid show, by shading, the region that satisfies all these inequalities.

$x \geq 0$ $x \leq 2$ $y \leq x + 3$ $2x + 3y \geq 6$

Label the region **R**

(4 marks)

(continued on the next page)

13. continued.

(b) Look at the diagram for Question 13(b) in the Diagram Book.

It is a grid showing the region **S** that satisfies the inequalities

$y \leq 4x$ $y \geq \frac{1}{2}x$ $x + y \leq 6$

Geoffrey says that the point with coordinates $(2, 4)$ does not satisfy all the inequalities because it does not lie in the shaded region.

Is Geoffrey correct?

You must give a reason for your answer.

(1 mark)

(Total for Question 13 is 5 marks)

14. Look at the diagram for Question 14 in the Diagram Book.

Points B, D, E and F lie on a circle.

ABC is the tangent to the circle at B

Angle BDF = 40°

Angle DEF = 100°

Find the size of angle ABD

You must give a reason for each stage of your working.

(4 marks)

Answer space continues on the next page.

14. continued.

(Total for Question 14 is 4 marks)

15. Prove algebraically that $0\cdot7\dot{3}$ can be written as $\frac{11}{15}$

(Total for Question 15 is 2 marks)

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

It shows a speed–time graph for a car.

(a) Work out an estimate for the distance the car travelled in the first 30 seconds.

(2 marks)

_____ metres

(continued on the next page)

16. continued.

(b) Is your answer to part (a) an underestimate or an overestimate of the actual distance the car travelled in the first 30 seconds?

Give a reason for your answer.

(1 mark)

(continued on the next page)

16. continued.

Julian used the graph to answer this question.

Work out an estimate for the acceleration of the car at time 60 seconds.

Here is Julian's working.

acceleration = speed ÷ time

$= 13 \div 60$

$= 0 \cdot 21\dot{6}\ m/s^2$

Julian's method does not give a good estimate of the acceleration at time 60 seconds.

(c) Explain why.

(1 mark)

(Total for Question 16 is 4 marks)

17. Look at the diagram for Question 17 in the Diagram Book.
It shows a histogram.
The histogram gives information about the distances 80 competitors jumped in a long jump competition.

Calculate an estimate for the mean distance.

_____ metres

(Total for Question 17 is 4 marks)

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

You may be provided with a model.

The diagram and the model show a cube ABCDEFGH

AH = 11·3 cm correct to the nearest mm

Calculate the lower bound for the length of an edge of the cube.

You must show all your working.

(4 marks)

Answer space continues on the next page.

18. continued.

_____ cm

(Total for Question 18 is 4 marks)

19. Look at the diagram for Question 19 in the Diagram Book.

ABCDEF is a shaded regular hexagon with sides of length **x**

This hexagon is enlarged, centre **F**, by scale factor **p** to give hexagon **FGHIJK**

Show that the area of the unshaded region in the diagram is given by

$$\frac{3\sqrt{3}}{2}(p^2 - 1)x^2$$

(4 marks)

Answer space continues on the next page.

19. continued.

(Total for Question 19 is 4 marks)

20. Here is a list of five numbers.

98^{53}

98^{64}

98^{73}

98^{88}

98^{91}

Find the lowest common multiple of these five numbers.

(Total for Question 20 is 1 mark)

21. Given that

$$5p + q = p + 4q$$

(a) Find the ratio $p : q$

(2 marks)

(continued on the next page)

21. continued.

Given that

$6x^2 = 7xy + 20y^2$ where $x > 0$ and $y > 0$

(b) Find the ratio $x : y$

(3 marks)

Answer space continues on the next page.

21. (b) continued.

(Total for Question 21 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER