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

Total Marks

Mathematics

Paper 3
(Calculator)
Higher Tier

Tuesday 11 June 2019 – 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					

X55602A

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 and models are NOT accurate 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.

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. Look at the diagram for Question 1 in the Diagram Book.

It shows an incomplete Venn diagram.

$\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$A = \{1, 5, 6, 8, 9\}$

$B = \{2, 6, 9\}$

(a) Complete the Venn diagram to represent this information.

(3 marks)

(continued on the next page)

1. continued.

A number is chosen at random from the universal set $\mathscr{E}$

(b) Find the probability that the number is in the set $A \cap B$

(2 marks)

(Total for Question 1 is 5 marks)

2. Katy invests £200 000 in a savings account for 4 years.

The account pays compound interest at a rate of 1·5% per annum.

Calculate the total amount of interest Katy will get at the end of 4 years.

(3 marks)

Answer space continues on the next page.

2. continued.

£ _____

(Total for Question 2 is 3 marks)

3. The table below shows information about the heights of 80 plants.

Height (h cm)	Frequency
$10 < h \leq 20$	8
$20 < h \leq 30$	12
$30 < h \leq 40$	14
$40 < h \leq 50$	12
$50 < h \leq 60$	16
$60 < h \leq 70$	18

(a) Find the class interval that contains the median.

(1 mark)

(continued on the next page)

3. continued.

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

On the grid, draw a frequency polygon for the information in the table.

(2 marks)

(Total for Question 3 is 3 marks)

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4. Look at the diagram for Question 4 in the Diagram Book.

Sean has drawn a time series graph to show the numbers, in thousands, of visitors to a fun park.

Write down two things that are wrong or could be misleading with this graph.

1 _____

_____

_____

_____

_____

2 _____

_____

_____

_____

_____

_____

(Total for Question 4 is 2 marks)

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

It shows a hexagon $ABCDEF$

The hexagon has one line of symmetry.

$FA = BC$

$EF = CD$

Angle $ABC = 117°$

Angle $BCD = 2 \times$ angle CDE

Work out the size of angle AFE

You must show all your working.

(4 marks)

Answer space continues on the next page.

5. continued.

_____ °

(Total for Question 5 is 4 marks)

6. Look at the diagrams for Question 6 in the Diagram Book.

Diagram 1 shows a tank.

Jeremy has to cover 3 tanks completely with paint.

Each tank is in the shape of a cylinder with both a top and a bottom as shown in Diagram 2

The tank has a diameter of 1·6 metres and a height of 1·8 metres.

Jeremy has 7 tins of paint.

Each tin of paint covers 5 m^2

Has Jeremy got enough paint to cover completely the 3 tanks?

You must show how you get your answer.

(5 marks)

Answer space continues on the next two pages.

6. continued.

6. continued.

(Total for Question 6 is 5 marks)

7. Work out

$$\sqrt{\frac{2 \cdot 5 \times \sin 43^\circ}{8 \cdot 2^2 - 50 \cdot 5}}$$

Give your answer correct to 3 significant figures.

_____

(Total for Question 7 is 2 marks)

8. Look at the diagram for Question 8(a) in the Diagram Book.

ABC is a right–angled triangle.

Here is Sarah's method to find the length of BC

$$BC^2 = AB^2 + AC^2$$
$$= 6^2 + 8^2$$
$$= 100$$
$$BC = 10$$

(a) What mistake has Sarah made in her method?

(1 mark)

(continued on the next page)

8. continued.

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

It shows triangles PQR and XYZ on a grid.

Roy is going to enlarge triangle PQR with centre C and scale factor $1\frac{1}{2}$

He draws triangle XYZ

(b) Explain why Roy's diagram is NOT correct.

(1 mark)

(Total for Question 8 is 2 marks)

9. **Look at the table for Question 9 in the Diagram Book.**

A company has to make a large number of boxes.

The company has 6 machines.

All the machines work at the same rate.

When all the machines are working, they can make all the boxes in 9 days.

The table gives the number of machines working each day.

Work out the total number of days taken to make all the boxes.

(3 marks)

Answer space continues on the next page.

9. continued.

(Total for Question 9 is 3 marks)

10. Marie invests £8000 in an account for one year.
At the end of the year, interest is added to her account.

Marie pays tax on this interest at a rate of 20%
She pays £28·80 tax.

Work out the percentage interest rate for the account.

(3 marks)

Answer space continues on the next page.

10. continued.

_____ %

(Total for Question 10 is 3 marks)

11. In May 2019, the distance between Earth and Mars was $3 \cdot 9 \times 10^7$ km

In May 2019, a signal was sent from Earth to Mars. Assuming that the signal sent from Earth to Mars travelled at a speed of 3×10^5 km per second,

(a) how long did the signal take to get to Mars?

(2 marks)

_____ seconds

(continued on the next page)

11. continued.

The speed of the signal sent from Earth to Mars in May 2019 was actually less than 3×10^5 km per second.

(b) How will this affect your answer to part (a)?

(1 mark)

(Total for Question 11 is 3 marks)

12. Patrick has to work out the exact value of $64^{\frac{1}{4}}$

Patrick says,

"$\frac{1}{4}$ of 64 is 16 so $64^{\frac{1}{4}} = 16$"

Explain what is wrong with what Patrick says.

(Total for Question 12 is 1 mark)

13. The density of ethanol is $1 \cdot 09\ g/cm^3$

The density of propylene is $0 \cdot 97\ g/cm^3$

60 litres of ethanol are mixed with 128 litres of propylene to make 188 litres of antifreeze.

Work out the density of the antifreeze.

Give your answer correct to 2 decimal places.

(4 marks)

Answer space continues on the next page.

13. continued.

_____ g/cm^3

(Total for Question 13 is 4 marks)

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

It shows a rectangle, $ABDE$, and two congruent triangles, AFE and BCD

$AF = BC = 24$ cm

Angle FAE = Angle $CBD = 30°$

area of rectangle $ABDE$

= area of triangle AFE + area of triangle BCD

$AB : AE = 1 : 3$

Work out the length of AE

(4 marks)

Answer space continues on the next page.

14. continued.

_____ **cm**

(Total for Question 14 is 4 marks)

15. The graph of the curve C with equation $y = f(x)$ is transformed to give the graph of the curve S with equation $y = f(-x) - 3$

The point on C with coordinates $(7, 2)$ is mapped to the point Q on S

Find the coordinates of Q

(_____ , _____)

(Total for Question 15 is 2 marks)

16. Here are the first six terms of a quadratic sequence.

–1 5 15 29 47 69

Find an expression, in terms of n, for the nth term of this sequence.

(3 marks)

Answer space continues on the next page.

16. continued.

(Total for Question 16 is 3 marks)

17. Look at the diagram for Question 17 in the Diagram Book.

It shows four graphs.

The graphs represent four different types of function f

Match each description of the function in the table to the letter of its graph.

Description of function	Graph
$f(x)$ is inversely proportional to x	
$f(x)$ is a trigonometrical function	
$f(x)$ is an exponential function	
$f(x)$ is directly proportional to $\sqrt{x}$	

(Total for Question 17 is 2 marks)

18. (a) Show that

$(2x + 1)(x + 3)(3x + 7)$ can be written in the form $ax^3 + bx^2 + cx + d$ where

a, b, c and d are integers.

(3 marks)

Answer space continues on the next page.

18. (a) continued.

(continued on the next page)

18. continued.

(b) Solve

$$(1 - x)^2 < \frac{9}{25}$$

(3 marks)

Answer space continues on the next page.

18. (b) continued.

(Total for Question 18 is 6 marks)

19. $D = \frac{u^2}{2a}$

$u = 26 \cdot 2$ correct to 3 significant figures

$a = 4 \cdot 3$ correct to 2 significant figures

(a) Calculate the upper bound for the value of D

Give your answer correct to 6 significant figures.

You must show all your working.

(3 marks)

Answer space continues on the next page.

19. (a) continued.

The lower bound for the value of D is $78 \cdot 6003$ correct to 6 significant figures.

(b) By considering bounds, write down the value of D to a suitable degree of accuracy.
You must give a reason for your answer.
(2 marks)

(Total for Question 19 is 5 marks)

20. Solve algebraically the simultaneous equations

$$x^2 - 4y^2 = 9$$
$$3x + 4y = 7$$

(5 marks)

Answer space continues on the next two pages.

20. continued.

20. continued.

(Total for Question 20 is 5 marks)

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

The histogram gives information about the distribution of the weights of some onions grown by a farmer.

Onions less than 60 grams in weight are used for pickling.

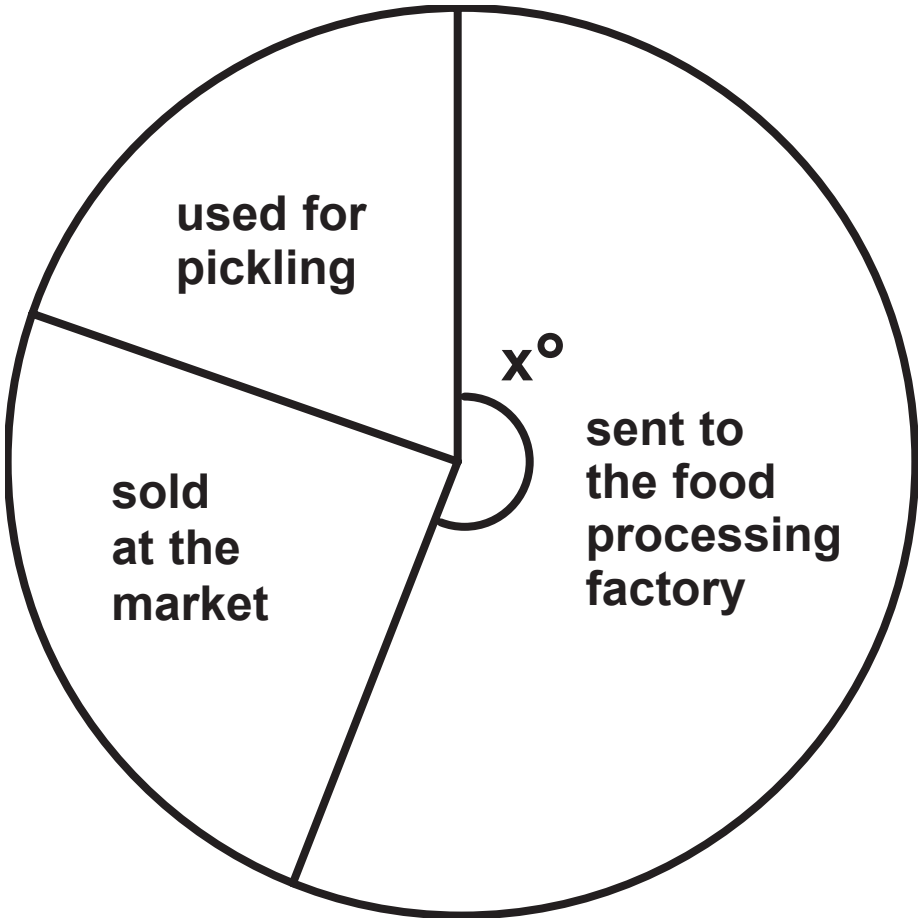
Onions greater than 120 grams in weight are sold at the market.

The rest of the onions are sent to a food processing factory.

(continued on the next page)

21. continued.

The pie chart below is drawn using the information in the histogram to show what the farmer does with the onions he grows.



The angle of the sector for the onions sent to the food processing factory is x°

Work out the value of the angle marked x°

(4 marks)

Answer space is on the next page.

21. continued.

x = _____

(Total for Question 21 is 4 marks)

22. Look at the diagram for Question 22 in the Diagram Book.

It shows a circle, centre O

AB is the tangent to the circle at the point A

OA is shown on the diagram.

Angle $OBA = 30°$

Point B has coordinates $(16, 0)$

Point P has coordinates $(3p, p)$

Find the value of p

Give your answer correct to 1 decimal place.

You must show all your working.

(4 marks)

Answer space continues on the next page.

22. continued.

$p =$ _____

(Total for Question 22 is 4 marks)

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

It shows the positions of three towns, Acton (A), Barston (B) and Chorlton (C)

Barston is 8 km from Acton on a bearing of 037°

Chorlton is 9 km from Barston on a bearing of 150°

Find the bearing of Chorlton from Acton.

Give your answer correct to 1 decimal place.

You must show all your working.

(5 marks)

Answer space continues on the next page.

23. continued.

_____°

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

END OF PAPER