Paper Reference 4MA1/1H
Pearson Edexcel
International GCSE

Total Marks

# Mathematics A
## PAPER 1H
## Higher Tier
## (Calculator)

Time: 2 hours

**In the boxes below, write your name, centre number and candidate number.**

| | | | | | | |
|---|---|---|---|---|---|---|
| Surname | | | | | | |
| Other names | | | | | | |
| Centre Number | | | | | | |
| Candidate Number | | | | | | |

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Pearson

## YOU MUST HAVE

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

## YOU WILL BE GIVEN

**Diagram Booklet**
**Formulae Pages**

## INSTRUCTIONS

**Answer ALL questions.**

**Without sufficient working, correct answers may be awarded no marks.**

**Answer the questions in the spaces provided in this Question Paper or on the separate diagrams – there may be more space than you need.**

## CALCULATORS MAY BE USED.

**You must NOT write anything on the Formulae Pages. Anything you write on the Formulae Pages will gain NO credit.**

## INFORMATION

**The total mark for this paper is 100**

**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.**

**Check your answers if you have time at the end.**

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**Answer ALL TWENTY FOUR questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

1. Look at the table for Question 1 in the Diagram Booklet.

   80 students entered a dancing competition.

   The table gives information about the length of time, in minutes, for which each student spent dancing.

   Work out an estimate for the mean length of time the students spent dancing.

   (4 marks)

   Answer space continues on the next page.

1. continued.

_____ minutes

**(Total for Question 1 is 4 marks)**

2. Solve

$$3(2 - 4x) = 5 - 8x$$

Show clear algebraic working.

(3 marks)

Answer space continues on the next page.

2. continued.

$x =$ _____

**(Total for Question 2 is 3 marks)**

3. Look at the diagram for Question 3 in the Diagram Booklet.

Use ruler and compasses only to construct the perpendicular bisector of line **AB**

You must show all your construction lines.

**(Total for Question 3 is 2 marks)**

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

It is NOT accurately drawn.

It shows a pentagon **ABCDE**

Angle **ABC = 119°**

Angle **BCD = 67°**

Angle **CDE = 135°**

**DEA** is a right angle

Angle **EAB** is marked **x°**

Work out the value of **x**

(3 marks)

Answer space continues on the next page.

**4. continued.**

**x = _____**

**(Total for Question 4 is 3 marks)**

5. In a box, there are only green sweets, orange sweets and yellow sweets.

There are 280 sweets in the box so that

the number of green sweets : the number of orange sweets = 2 : 3

and

the number of orange sweets : the number of yellow sweets = 1 : 5

Work out how many green sweets there are in the box.

(3 marks)

Answer space continues on the next two pages.

5. continued.

5. continued.

(Total for Question 5 is 3 marks)

6. Shane bought a car.

The amount Shane paid for the car was $32 000

Theresa also bought a car.

To pay for this car, Theresa paid a deposit of $18 000 together with 14 monthly payments of $1160

Theresa paid more for her car than Shane paid for his car.

(a) Work out how much more Theresa paid as a percentage of the amount Shane paid.

(4 marks)

Answer space continues on the next page.

6. (a) continued.

_____%

(continued on the next page)

6. continued.

Kylie bought a van.

After 1 year, the value of the van was $39 865

During this year, the value of the van decreased by 15%

(b) Work out the value of the van when Kylie bought it.

(3 marks)

$_____

(Total for Question 6 is 7 marks)

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

Some members of a library were asked to name the type of book that they each liked to read the best.

One of the members is chosen at random.

The table shows information about the probability of the type of book that this member answered.

**48** members answered comedy books.

Work out how many of the members answered mystery books.

(4 marks)

Answer space continues on the next page.

7. continued.

**(Total for Question 7 is 4 marks)**

8. Look at the diagram for Question 8 in the Diagram Booklet.

It is NOT accurately drawn.

The diagram shows a triangle $ABC$ inside a semicircle.

$A$, $B$ and $C$ are points on the semicircle.

$AB$ is the diameter of the semicircle.

Angle $ACB = 90°$

Angle $BAC = 50°$

$AC = 18\,cm$

Work out the perimeter of the semicircle.

Give your answer correct to 2 significant figures.

(5 marks)

Answer space continues on the next two pages.

8. continued.

8. continued.

_____ cm

**(Total for Question 8 is 5 marks)**

9. (a) Write

$$6 \cdot 25 \times 10^{-4}$$

as an ordinary number.

(1 mark)

(continued on the next page)

9. continued.

(b) Work out

$$(2 \cdot 4 \times 10^{12}) \div (9 \cdot 6 \times 10^{4})$$

Give your answer in standard form.

(2 marks)

(Total for Question 9 is 3 marks)

10. (a) Factorise

$$y^2 - 2y - 48$$

(2 marks)

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

Write down the inequality shown on the number line in the Diagram Booklet.

(1 mark)

(continued on the next page)

10. continued.

(c) Solve the inequality

$$7w + 6 > 12w + 14$$

(3 marks)

(Total for Question 10 is 6 marks)

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

The region **R**, shown shaded in the diagram, is bounded by the straight lines with equations

$$2x + y = 6$$

$$2y = 5x + 1$$

$$3y + 2x = 4$$

Write down the three inequalities that define **R**

_____

_____

_____

**(Total for Question 11 is 3 marks)**

12. (a) Given that

$$3^{\frac{1}{2}} \times 3^{\frac{2}{5}} = 3^{m}$$

work out the value of $m$

(1 mark)

m = _____

(continued on the next page)

12. continued.

(b) Given that

$$5^{-10} \div 5^{-4} = 5^{n}$$

work out the value of $n$

(1 mark)

$n =$ _____

**(Total for Question 12 is 2 marks)**

13. Expand and simplify

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

Show clear algebraic working.

(3 marks)

Answer space continues on the next page.

13. continued.

(Total for Question 13 is 3 marks)

14. (a) Complete the table of values below for

$$y = \frac{2}{x}\left(5 - \frac{1}{x}\right)$$

There are two spaces to fill.

(1 mark)

| x | y |
|---|---|
| 0·5 | |
| 1 | 8 |
| 2 | |
| 3 | 3·1 |
| 4 | 2·4 |
| 5 | 1·9 |

(continued on the next page)

14. continued.

(b) Look at the diagram for Question 14(b) in the Diagram Booklet.

On the grid, draw the graph of

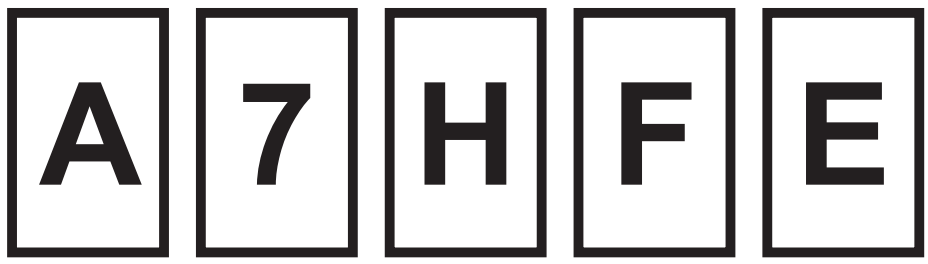
$$y = \frac{2}{x}\left(5 - \frac{1}{x}\right) \text{ for } 0{\cdot}5 \leq x \leq 5$$

**(2 marks)**

**(Total for Question 14 is 3 marks)**

15. Here are nine cards.

Each card has either a number on it or a letter on it.




Tomas is playing a game.

Tomas takes at random one of the cards and keeps it.

Tomas then takes at random another card and keeps it.

Look at the diagram for Question 15(a) in the Diagram Booklet.

(a) Complete the probability tree diagram.

There are six spaces to fill.

(2 marks)

(continued on the next page)

15. continued.

(b) Work out the probability that each of the two cards has a number on it.

(2 marks)

(continued on the next page)

15. continued.

(c) Work out the probability that there will be one card with a number on it and one card with a letter on it.

(3 marks)

Answer space continues on the next page.

15. (c) continued.

(Total for Question 15 is 7 marks)

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

It is NOT accurately drawn.

It shows a shape formed from two triangles

ABC and CDE

ACD and BCE are straight lines.

In triangle ABC,

BC = 31 cm

AC = 24 cm

Angle BAC = 64°

In triangle CDE,

CD = 16 cm

CE = 19 cm

Work out the length of DE

Give your answer correct to 3 significant figures.

(5 marks)

Answer space continues on the next two pages.

16. continued.

16. continued.

_____cm

**(Total for Question 16 is 5 marks)**

17. $y$ is inversely proportional to $\sqrt{x}$

$y = c^4$ when
$x = c^2$ where $c$ is a positive constant.

Find a formula for $y$ in terms of $x$ and $c$

Give your answer in its simplest form.

**(3 marks)**

Answer space continues on the next page.

17. continued.

(Total for Question 17 is 3 marks)

18. The function $f$ is such that

$$f(x) = \frac{k}{x} \text{ where } x \neq 0 \text{ and } k \text{ is an integer.}$$

(a) Express the inverse function $f^{-1}$ in the form

$$f^{-1}(x) = \ldots$$

(1 mark)

$f^{-1}(x) =$ _____

(continued on the next page)

18. continued.

The function $g$ is such that

$g(x) = 2 - 3x^4$ where $x \neq 0$

The function $h$ is such that

$h(x) = \frac{3x}{2-x}$ where $x \neq 2$

(b) (i) Find $g(-2)$

(1 mark)

(ii) Express the composite function $hg$ in the form $hg(x) = \ldots$

Give your answer in its simplest form.

(2 marks)

Answer space continues on the next page.

18. (b) (ii) continued.

$hg(x) =$ _____

**(Total for Question 18 is 4 marks)**

19. The acceleration, $a$, of an object is given by

$$a = \frac{v - u}{t}$$

where

$v = 45 \cdot 23$ correct to 2 decimal places

$u = 5 \cdot 12$ correct to 2 decimal places

$t = 8 \cdot 5$ correct to 2 significant figures

By considering bounds, work out the value of $a$ to a suitable degree of accuracy.

Show your working clearly and give a reason for your answer.

(5 marks)

Answer space continues on the next two pages.

19. continued.

19. continued.

a = _____

**(Total for Question 19 is 5 marks)**

20. The radius of a right circular cylinder is $x$ cm

The height of the cylinder is

$$\left(\frac{800}{\pi x} - x\right) \text{cm}$$

The volume of the cylinder is $V$ cm$^3$

Find the maximum value of $V$

Give your answer correct to the nearest whole number.

(5 marks)

Answer space continues on the next three pages.

20. continued.

20. continued.

Turn over

20. continued.

(Total for Question 20 is 5 marks)

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

It is NOT accurately drawn.

It shows the cross section of a circular water pipe.

$OABC$ is a sector of the circle, centre $O$

$AO = 4 \cdot 8\,cm$

Angle $AOC = 72°$

The shaded region in the diagram represents the water flowing in the pipe.

The water flows at $14\,cm/s$ in the pipe.

Work out the volume of water that has flowed through the pipe in $3$ minutes.

Give your answer in $cm^3$ correct to $3$ significant figures.

(5 marks)

Answer space continues on the next three pages.

21. continued.

21. continued.

21. continued.

_____ $cm^3$

**(Total for Question 21 is 5 marks)**

22. The first term of an arithmetic series is

$(2t + 1)$ where $t > 0$

The $n$th term of this arithmetic series is

$(14t - 5)$

The common difference of the series is $3$

The sum of the first $n$ terms of the series can be written as

$p(qt - 1)^r$ where $p$, $q$ and $r$ are integers.

Find the value of $p$, the value of $q$ and the value of $r$

Show clear algebraic working.

(4 marks)

Answer space continues on the next three pages.

22. continued.

22. continued.

22. continued.

p = _____

q = _____

r = _____

**(Total for Question 22 is 4 marks)**

23. The shape $ABCD$ is a kite.

$AB = AD$ and
$CB = CD$

The point $B$ has coordinates $(k, 1)$ where $k$ is a negative constant.

The point $D$ has coordinates $(8, 7)$

The straight line $L$ passes through the points $B$ and $D$

The straight line $L$ is parallel to the line with equation

$5y - 3x = 6$

Find an equation of $AC$

Give your answer in the form $px + qy = r$ where $p$, $q$ and $r$ are integers.

Show your working clearly.

(6 marks)

Answer space is on the next three pages.

23. continued.

23. continued.

23. continued.

(Total for Question 23 is 6 marks)

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

It is NOT accurately drawn.

$OAED$ is a quadrilateral.

$\overrightarrow{OA} = 2\underline{a}$

$\overrightarrow{OB} = 2\underline{b}$

$\overrightarrow{DE} = 7\underline{a} + 3\underline{b}$

$AB : BD = 1 : 2$

The point $C$ on $AB$ is such that $OCE$ is a straight line.

Use a vector method to find the ratio of $OC : CE$

(5 marks)

Answer space continues on the next two pages.

24. continued.

24. continued.

(Total for Question 24 is 5 marks)

**TOTAL FOR PAPER IS 100 MARKS**

**END OF PAPER**