Please check the examination details below before entering your candidate information

| Candidate surname | Other names |
|---|---|

**Pearson Edexcel International GCSE**

Centre Number | Candidate Number

# Wednesday 13 January 2021

Afternoon (Time: 2 hours) | Paper Reference **4MA1/2H**

# Mathematics A

## Paper 2H
## Higher Tier



**You must have:**
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page 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.*

## Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

*Turn over* ▶

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Pearson

# International GCSE Mathematics

## Formulae sheet – Higher Tier

**Arithmetic series**

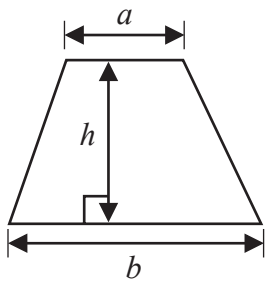
Sum to $n$ terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

**The quadratic equation**

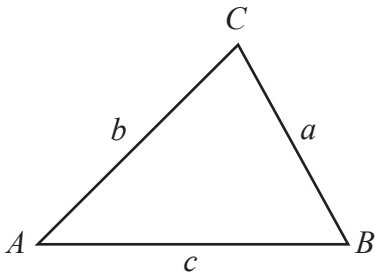
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Area of trapezium** $= \frac{1}{2}(a+b)h$




**Trigonometry**




**In any triangle *ABC***

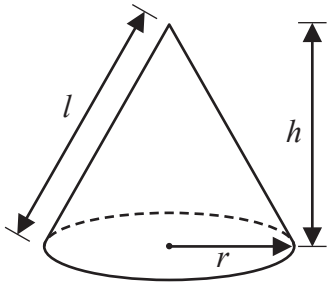
**Sine Rule** $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine Rule** $a^2 = b^2 + c^2 - 2bc\cos A$

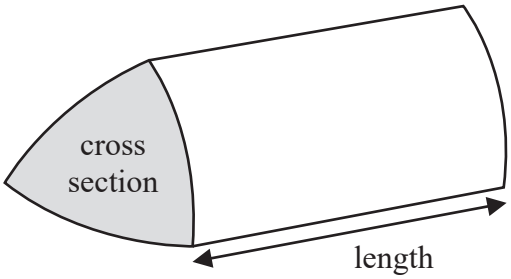
**Area of triangle** $= \frac{1}{2}ab\sin C$

**Volume of cone** $= \frac{1}{3}\pi r^2 h$

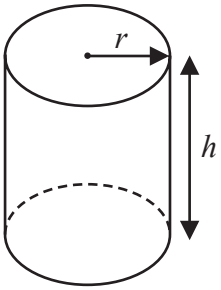
**Curved surface area of cone** $= \pi r l$




**Volume of prism**
= area of cross section × length

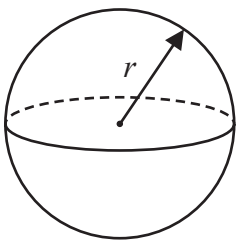



**Volume of cylinder** $= \pi r^2 h$
**Curved surface area of cylinder** $= 2\pi r h$




**Volume of sphere** $= \frac{4}{3}\pi r^3$

**Surface area of sphere** $= 4\pi r^2$

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**Answer ALL TWENTY TWO questions.**

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

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

**1** A train takes 6 hours 39 minutes to travel from New Delhi to Kanpur.
The train travels a distance of 429 km.

Work out the average speed of the train.
Give your answer in km/h correct to one decimal place.

..... km/h

**(Total for Question 1 is 3 marks)**

**2** Ava writes down five whole numbers.

For these five numbers

the median is 7

the mode is 8

the range is 5

Find a possible value for each of the five numbers that Ava writes down.

.....

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

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**3** Gladys buys a table for $465 to sell in her shop.

She sells the table for $520

(a) Work out the percentage profit that Gladys makes from the sale of the table.
Give your answer correct to 3 significant figures.

.....%

**(3)**

Gladys has a sale in her shop.

She decreases all the normal prices by 12%
The normal price of an armchair was $550

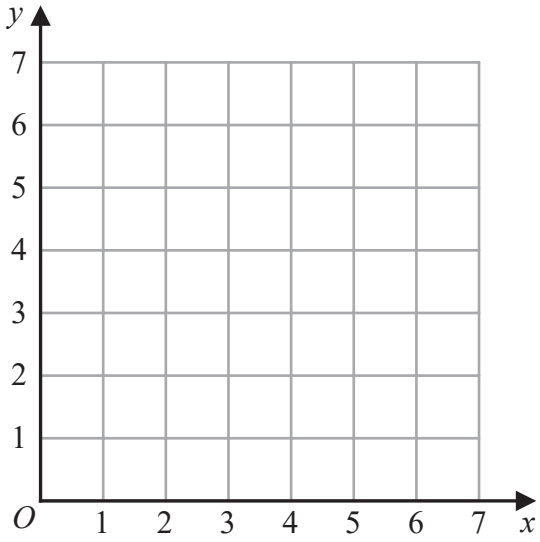
(b) Work out the sale price of the armchair.

$.....

**(3)**

**(Total for Question 3 is 6 marks)**

**4**




(a) On the grid, draw and **label** the straight line with equation

(i) $x = 1.5$

(ii) $y = x$

(iii) $x + y = 6$

**(3)**

(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$x \geqslant 1.5$ $y \geqslant x$ $x + y \leqslant 6$

Label the region **R**.

**(1)**

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

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**5** (a) Expand and simplify $4x(2x + 5) - 3x(2x - 3)$

.....

**(2)**

Given that $\dfrac{y^5 \times y^n}{y^6} = y^{13}$

(b) work out the value of $n$.

$n =$ .....

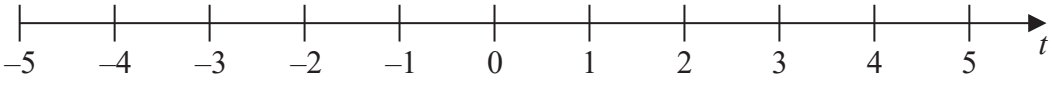
**(2)**

(c) (i) Solve the inequality $7t - 8 < 2t + 7$

.....

**(2)**

(ii) On the number line below, represent the solution set of the inequality solved in part (c)(i)




**(1)**

**(Total for Question 5 is 7 marks)**

**6** (a) Write down the value of $y^0$

.....

**(1)**

(b) Work out $\dfrac{9.6 \times 10^{141} + 6.4 \times 10^{140}}{3.2 \times 10^{16}}$

Give your answer in standard form.

.....

**(3)**

**(Total for Question 6 is 4 marks)**

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**7** There are 5 cocoa pods in a bag.
The mean weight of the 5 cocoa pods is 398 grams.

A sixth cocoa pod is put into the bag.
The mean weight of the 6 cocoa pods is 401 grams.

Work out the weight of the sixth cocoa pod that is put into the bag.

..... grams

**(Total for Question 7 is 3 marks)**

**8** $A$, $B$ and $C$ are points on a circle with centre $O$.

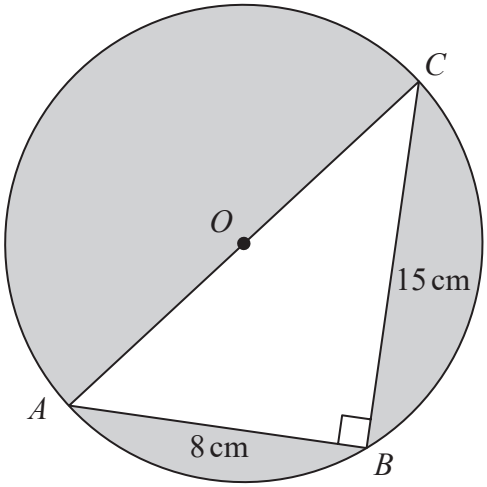


Diagram **NOT** accurately drawn

$AOC$ is a diameter of the circle.

$AB = 8\,\text{cm}$ $BC = 15\,\text{cm}$

Angle $ABC = 90°$

Work out the total area of the regions shown shaded in the diagram.
Give your answer correct to 3 significant figures.

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..... $cm^2$

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

**9** $A = 2^3 \times 3^2 \times 5^2 \times 11$
$B = 2^4 \times 3 \times 5^4 \times 13$

Find the lowest common multiple (LCM) of $A$ and $B$.
Give your answer as a product of powers of prime numbers.

.....

**(Total for Question 9 is 2 marks)**

**10** The people working for a company work in Team A or in Team B.

number of people in Team A : number of people in Team B = 3 : 4

$\frac{4}{5}$ of Team A work full time.

24% of Team B work full time.

Work out what fraction of the people working for the company work full time.
Give your fraction in its simplest form.

.....

**(Total for Question 10 is 3 marks)**

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**11** Simplify fully $\left(\frac{9t^4w^9}{18t^6w^{10}}\right)^{-2}$

.....

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

**12** 15 people were asked how long, in minutes, they had been waiting for a bus.

Here are the results.

2 3 3 4 5 6 6 8 9 10 11 13 14 15 18

Find the interquartile range of these times.

..... minutes

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

**13** *P*, *Q*, *R*, *S* and *T* are points on a circle with centre *O*.

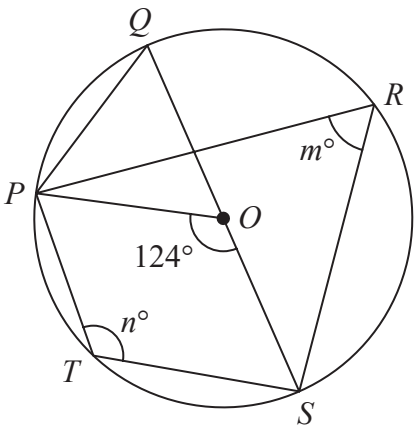


Diagram **NOT** accurately drawn

*QOS* is a diameter of the circle.

angle *POS* = 124°  angle *PRS* = *m*°  angle *PTS* = *n*°

(a) Find the value of

(i) *m*

.....

(ii) *n*

.....

**(2)**

(b) Find the size of angle *QPO*.

..... °

**(1)**

**(Total for Question 13 is 3 marks)**

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**14** (a) Solve $\frac{9a - 7}{5} - \frac{3a - 7}{4} = 4.55$

Show clear algebraic working.

$a =$ .....

**(3)**

(b) Make $c$ the subject of the formula $p = \sqrt{\frac{ac + 8}{3 + c}}$

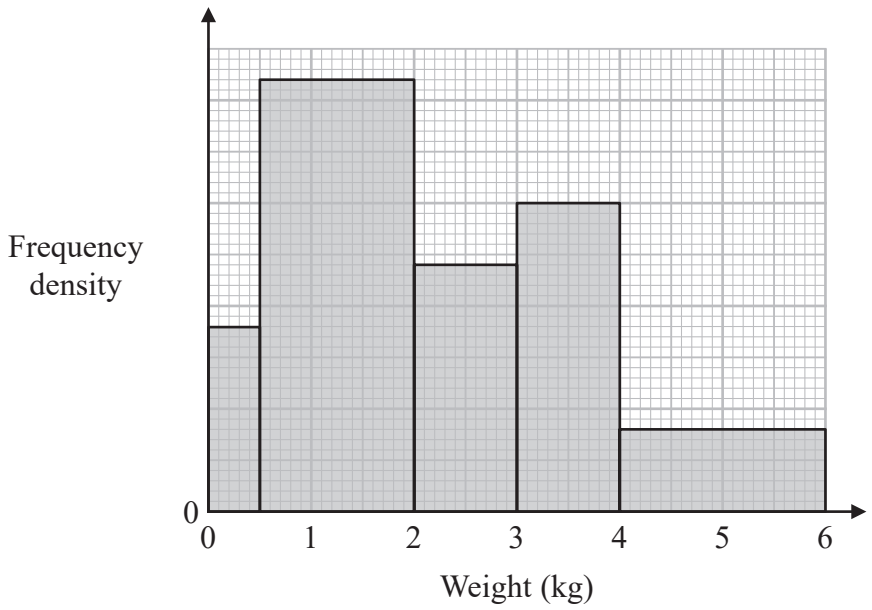
.....

**(4)**

**(Total for Question 14 is 7 marks)**

**15** A postman records the weight of each parcel that he delivers.

The histogram shows information about the weights of all the parcels that the postman delivered last Monday. No parcels weighed more than 6 kg.




63 of the parcels that the postman delivered last Monday each had a weight between 0.5 kg and 2 kg.

(a) Work out the total number of parcels the postman delivered last Monday.

.....

**(3)**

The postman picks at random two of the records of the parcels he delivered last Monday.

(b) Work out an estimate for the probability that each parcel weighed more than 2.25 kg.

.....

**(3)**

**(Total for Question 15 is 6 marks)**

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**16** Some students were asked the following question.

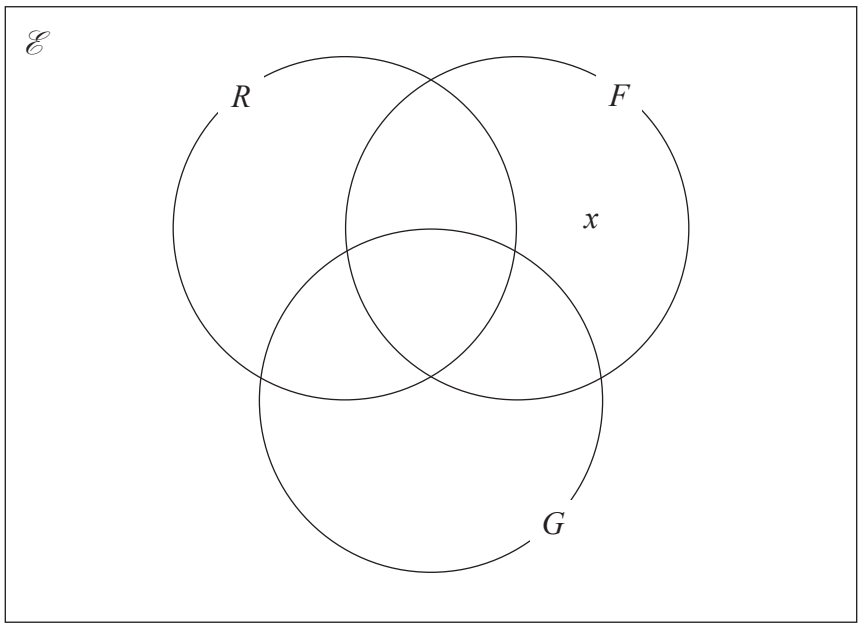
"Which of the subjects Russian ($R$), French ($F$) and German ($G$) do you study?"

Of these students

4 study all three of Russian, French and German
10 study Russian and French
13 study French and German
6 study Russian and German
24 study German
11 study none of the three subjects
the number who study Russian only is twice the number who study French only.

Let $x$ be the number of students who study French only.

(a) Show all this information on the Venn diagram, giving the number of students in each appropriate subset, in terms of $x$ where necessary.




**(3)**

Given that the number of students who were asked the question was 80

(b) work out the number of these students that study Russian.

.....

**(3)**

**(Total for Question 16 is 6 marks)**

**17** The diagram shows a solid prism *ABCDEFGH*.

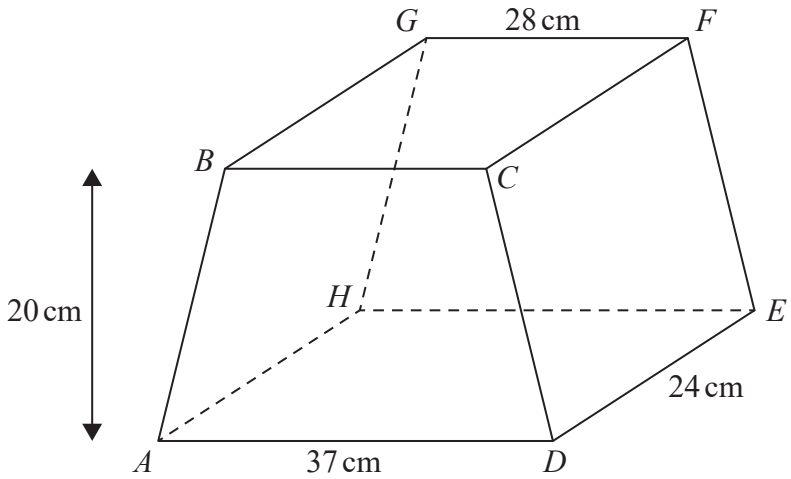



Diagram **NOT** accurately drawn

The trapezium *ABCD*, in which *AD* is parallel to *BC*, is a cross section of the prism.
The base *ADEH* of the prism is a horizontal plane.
*ADEH* and *BCFG* are rectangles.
The midpoint of *BC* is vertically above the midpoint of *AD* so that *BA* = *CD*.

*AD* = 37 cm  *GF* = 28 cm  *DE* = 24 cm

The perpendicular distance between edges *AD* and *BC* is 20 cm.

(a) Work out the total surface area of the prism.

..... cm²

**(4)**

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(b) Calculate the size of the angle between $AF$ and the plane $ADEH$.
Give your answer correct to one decimal place.

.....°

**(3)**

**(Total for Question 17 is 7 marks)**

**18** A rectangle *ABCD* is to be drawn on a centimetre grid such that

*A* has coordinates (–4, –2)
*B* has coordinates (1, 10)
*C* has coordinates (19, *a*)
*D* has coordinates (*b*, *c*)

(a) Work out the value of *a*, the value of *b* and the value of *c*.

*a* = .....

*b* = .....

*c* = .....

**(4)**

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(b) Calculate the perimeter, in centimetres, of rectangle *ABCD*.

..... cm

**(3)**

**(Total for Question 18 is 7 marks)**

**19** A particle $P$ is moving along a straight line.
The fixed point $O$ lies on this line.

At time $t$ seconds where $t \geqslant 0$, the displacement, $s$ metres, of $P$ from $O$ is given by

$$s = t^3 + 5t^2 - 8t + 10$$

Find the displacement of $P$ from $O$ when $P$ is instantaneously at rest.

Give your answer in the form $\frac{a}{b}$ where $a$ and $b$ are integers.

..... metres

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

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**20**

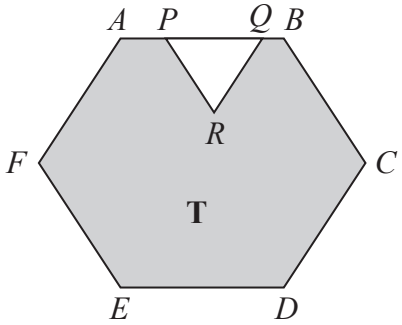


Diagram **NOT** accurately drawn

The diagram shows a shaded region **T** formed by removing an equilateral triangle *PQR* from a regular hexagon *ABCDEF*.

The points *P* and *Q* lie on *AB* such that $AB = 1.5 \times PQ$

Given that the area of region **T** is $72\sqrt{3}$ cm$^2$

work out the length of *PQ*.

..... cm

**(Total for Question 20 is 4 marks)**

**21** Write $\dfrac{25x^2 - 64}{5x^2 - 13x - 6} \times \dfrac{x^2 - 8x + 15}{5x + 8} - (x - 7)$

as a single fraction in its simplest form.
Show clear algebraic working.

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**(Total for Question 21 is 4 marks)**

**Turn over for Question 22**

**22** The diagram shows a sector $OBC$ of a circle with centre $O$ and radius $(6 + x)$ cm.

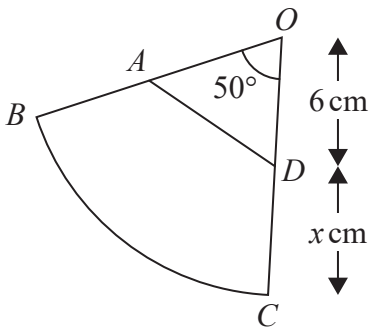


Diagram **NOT** accurately drawn

$A$ is the point on $OB$ and $D$ is the point on $OC$ such that $OA = OD = 6$ cm

Angle $BOC = 50°$

Given that

the perimeter of sector $OBC = 2 \times$ the perimeter of triangle $OAD$

find the value of $x$.
Give your answer correct to 3 significant figures.

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$x =$ .....

**(Total for Question 22 is 6 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

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