Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel GCSE**

Centre Number | | | | | |

Candidate Number | | | | |

# Methods in Mathematics

## Unit 2: Methods 2

***For Approved Pilot Centres ONLY***

**Higher Tier**

Tuesday 20 June 2017 – Afternoon
**Time: 1 hour 45 minutes**

Paper Reference
**5MM2H/01**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of 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.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a $\pi$ button, take the value of $\pi$ to be 3.142 unless the question instructs otherwise.

### 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.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

### 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.

*Turn over* ▶

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P 5 3 5 0 6 A 0 1 2 4

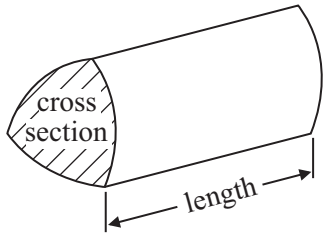
Pearson

**GCSE Mathematics 2MM01**

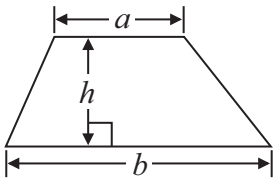
Formulae: Higher Tier

**You must not write on this formulae page.**
**Anything you write on this formulae page will gain NO credit.**

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

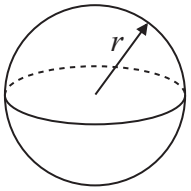



**Area of trapezium** = $\frac{1}{2}(a + b)h$



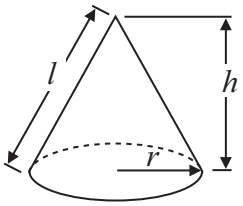

**Volume of sphere** = $\frac{4}{3}\pi r^3$

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

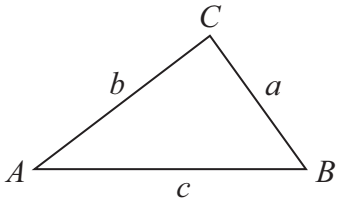



**Volume of cone** = $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** = $\pi rl$




**In any triangle *ABC***




**The Quadratic Equation**
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

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

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

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**Answer ALL questions.**

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

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

**1** (a) Divide 468 in the ratio 4 : 5

.....

**(2)**

(b) Some money is shared in the ratio 7 : 13

What percentage of this money is the greater share?

..... %

**(3)**

**(Total for Question 1 is 5 marks)**

**2** 8 cakes of the same type have a total cost of £13.20

Work out the cost of 12 of these cakes.

£.....

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

***3**

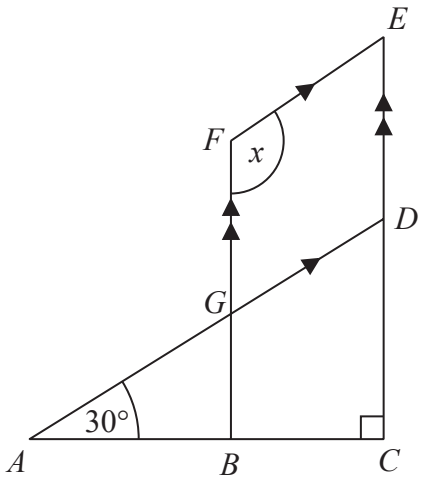



Diagram **NOT** accurately drawn

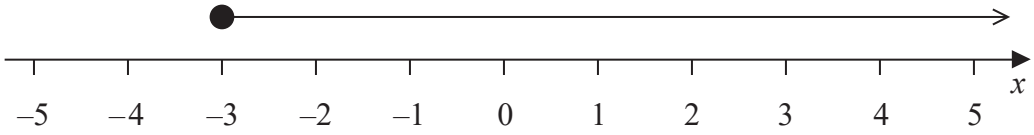
*ABC* is a straight line.
*BGF* is parallel to *CDE*.
*AGD* is parallel to *FE*.

Angle *CAD* = 30°
Angle *ACD* = 90°

Work out the size of the angle marked *x*.
Give reasons for your answer.

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

**4** Here is a number line.

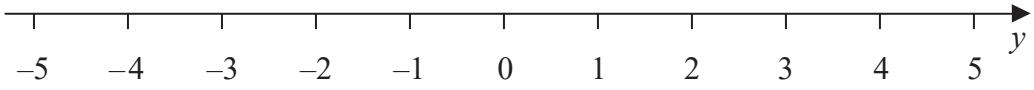



(a) Write down the inequality shown on the number line.

.....

**(1)**

Here is a number line.




(b) On this number line, show the inequality $-2 < y \leqslant 4$

**(2)**

$n$ is an integer and $-1 \leqslant n < 5$

(c) Write down all the possible values of $n$.

.....

**(2)**

**(Total for Question 4 is 5 marks)**

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**5** Here is a cylinder.

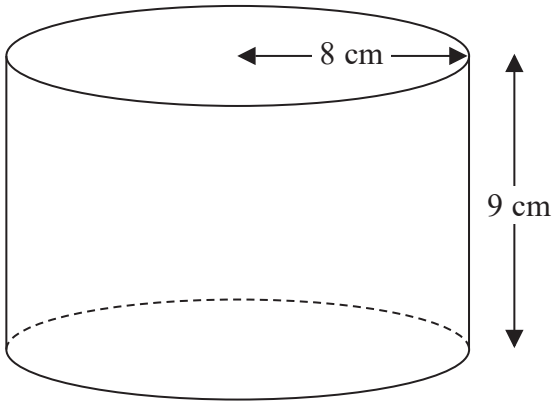



Diagram **NOT** accurately drawn

The cylinder has radius 8 cm.
It has a height of 9 cm.

Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.

.....

**(Total for Question 5 is 3 marks)**

**6** David has $x$ counters.

Lisa has 5 more counters than David.
Samia has 4 times as many counters as David.

The total number of counters is $T$.

(a) Write a formula for $T$ in terms of $x$.
Give your answer in its simplest form.

.....

**(3)**

(b) Make $w$ the subject of $5(w + x) = 3x + 9$

.....

**(3)**

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

**7** The width of a rectangle is a whole number of centimetres.
The length of the rectangle is 7 cm longer than the width.

The perimeter of the rectangle is less than 152 cm.

Find the greatest possible width of the rectangle.

..... cm

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

**8** Here is a hexagon.

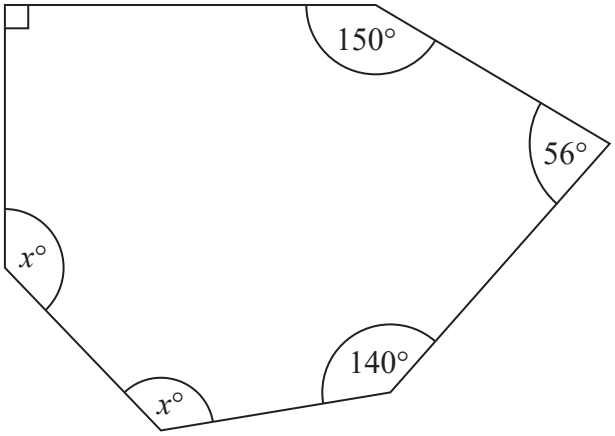



Diagram **NOT** accurately drawn

Work out the value of $x$.

.....

**(Total for Question 8 is 4 marks)**

***9** Here is a shape.

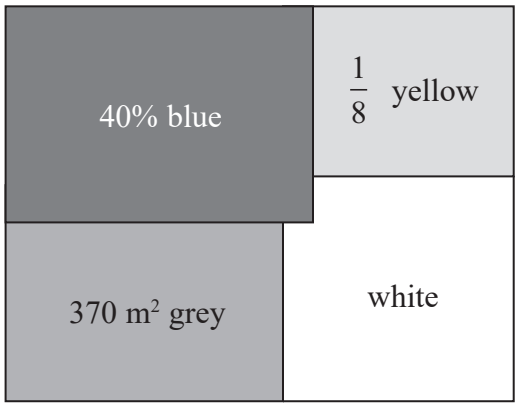



Diagram **NOT** accurately drawn

The total area of the shape is 1480 m$^2$.

40% of the shape is blue.

$\frac{1}{8}$ of the shape is yellow.

370 m$^2$ of the shape is grey.

The rest of the shape is white.

Does the white part of the shape have an area greater than 330 m$^2$?
You must show all your working.

**(Total for Question 9 is 5 marks)**

**10**

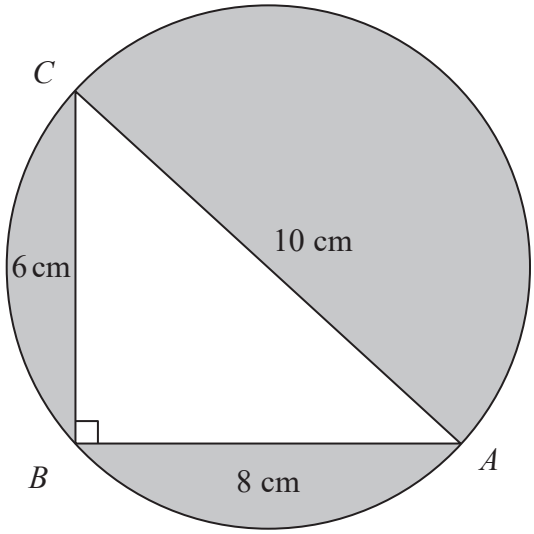



Diagram **NOT** accurately drawn

*A*, *B* and *C* are points on a circle with *AC* as a diameter.
*ABC* is a right-angled triangle.

Work out the total area of the regions shaded in the diagram.
Give your answer correct to 1 decimal place.

..... $cm^2$

**(Total for Question 10 is 5 marks)**

**11** (a) Use your calculator to work out $\dfrac{\sqrt{3.7 + 8.4}}{2.3^2}$

Write down all the figures on your calculator display.

.....

**(2)**

$\sqrt[3]{x} = 8$

(b) Find the value of $x$.

.....

**(1)**

(c) Calculate the value of $(\sin 45°)^2 + (\cos 135°)^2$

.....

**(2)**

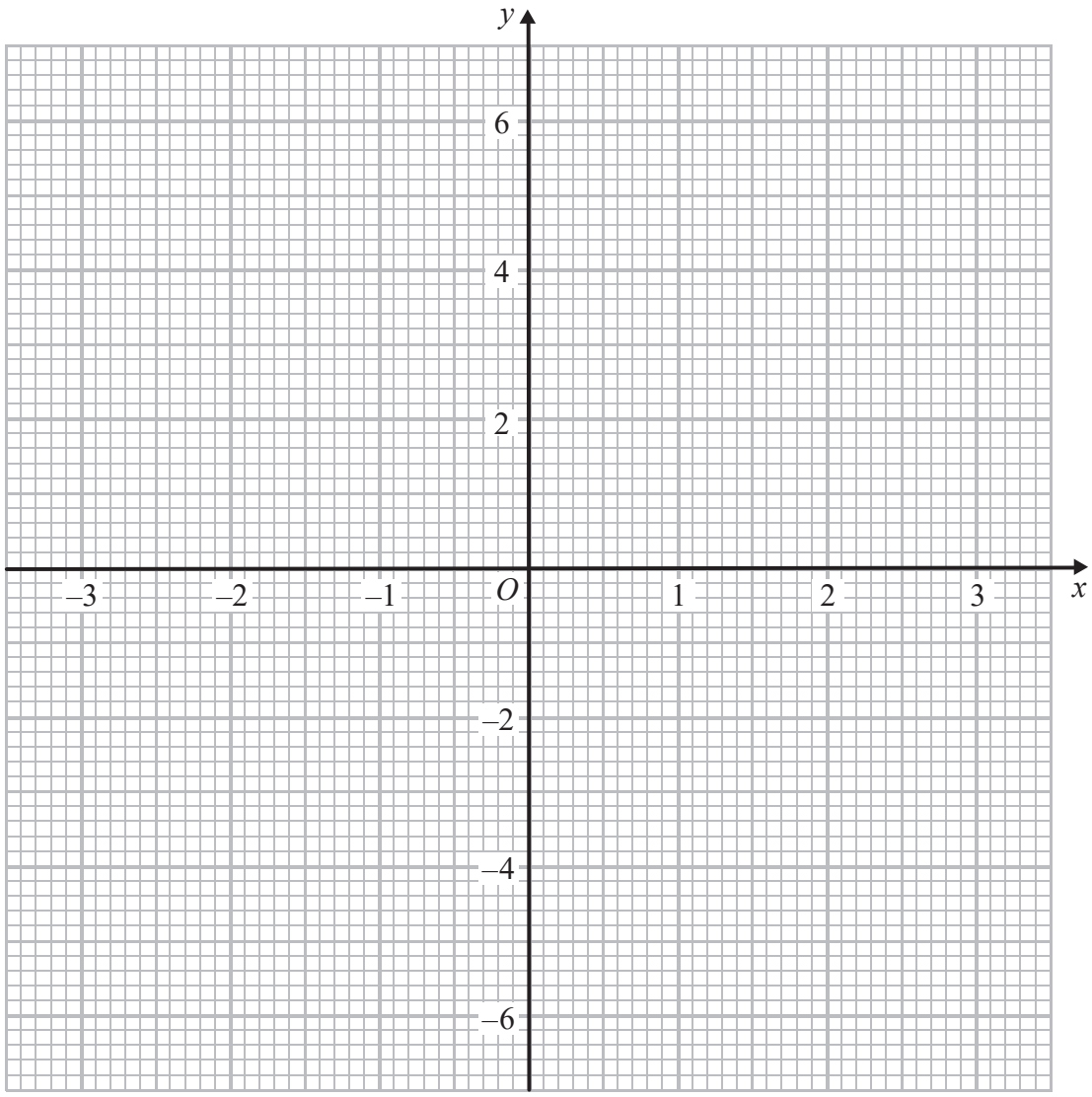
**(Total for Question 11 is 5 marks)**

**12** (a) Complete the table of values for $y = x^2 - 5$

| $x$ | –3 | –2 | –1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| $y$ | 4 | | –4 | | | –1 | |

**(2)**

(b) On the grid, draw the graph of $y = x^2 - 5$ for values of $x$ from –3 to 3




**(2)**

(c) Use the graph to find the values of $x$ for which $x^2 - 5 = 0$

.....

**(2)**

(d) Use the graph to find estimates of the values of $x$ when $x^2 - 5 = x$

.....

**(2)**

**(Total for Question 12 is 8 marks)**

**13** A number is increased by 35%.
The result is 324

Work out the number.

.....

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

**14**

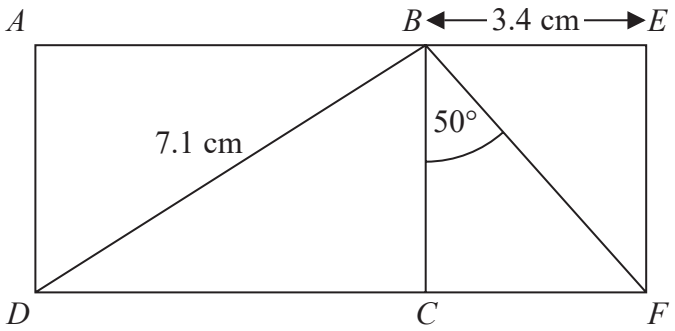



Diagram **NOT** accurately drawn

*ABCD* and *BEFC* are rectangles.

*BD* = 7.1 cm
*BE* = 3.4 cm
Angle *CBF* = 50°

Work out the size of angle *BDC*.
Give your answer correct to one decimal place.

.....°

**(Total for Question 14 is 5 marks)**

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**15** Simon invested £20 000 at a compound interest rate of 2.5% per annum.
At the end of $n$ years the investment has a value of £$V$.

(a) Work out the value of $V$ when $n = 2$

$V =$ .....

**(3)**

(b) Write down a formula for $V$ in terms of $n$.

.....

**(2)**

(c) Work out the least integer value of $n$ so that the value of $V$ is greater than 25 000

.....

**(2)**

**(Total for Question 15 is 7 marks)**

**16** Work out the value of

$$\frac{(3.2 \times 10^5) + (1.8 \times 10^4)}{8.7 \times 10^3}$$

Give your answer correct to 3 significant figures.

.....

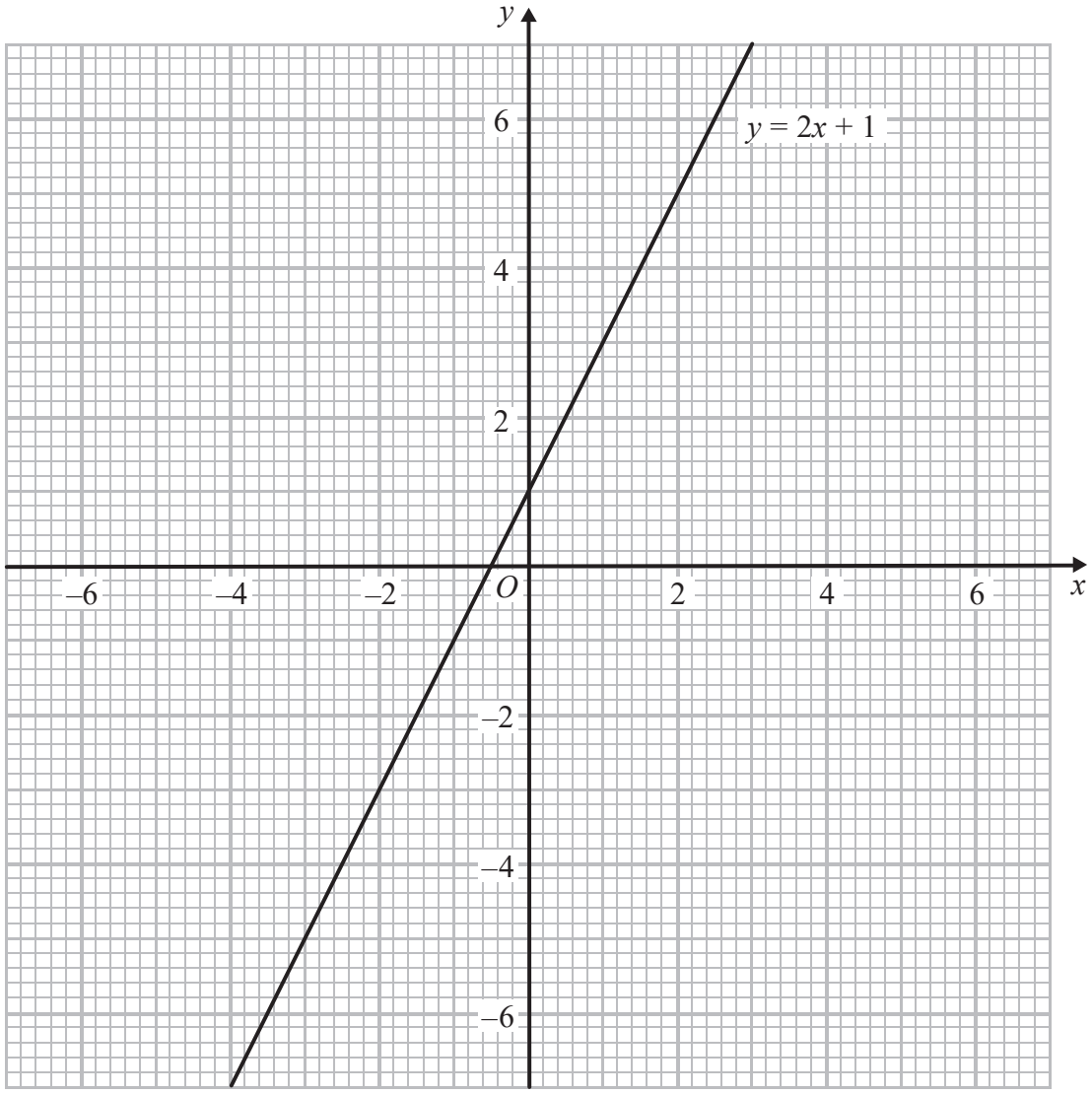
**(Total for Question 16 is 2 marks)**

***17** Prove algebraically that $0.1\dot{6}\dot{3} = \frac{9}{55}$

You must show your working.

**(Total for Question 17 is 3 marks)**

**18** The diagram shows the graph of $y = 2x + 1$




(a) Find an equation of the straight line that is perpendicular to $y = 2x + 1$ and passes through the point $(-2, 5)$.

.....

**(3)**

(b) Solve the simultaneous equations

$$y - 2x = 1$$
$$2y - 5x = 2$$

$x =$ .....

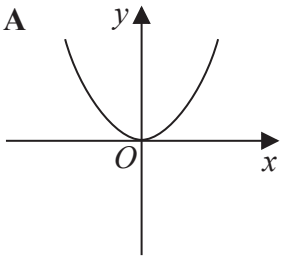
$y =$ .....

**(3)**

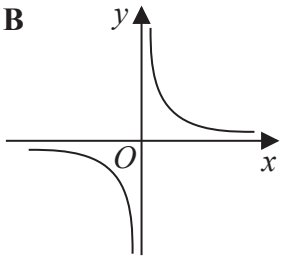
**(Total for Question 18 is 6 marks)**

**19** Here are some graphs.

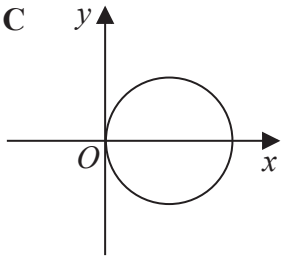
**A**



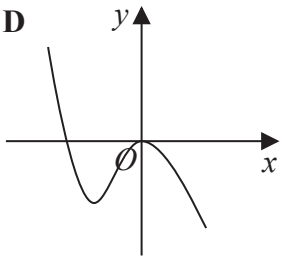

**B**



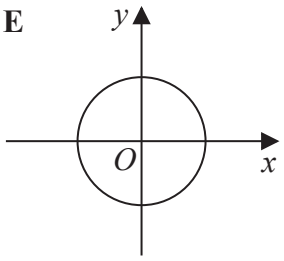

**C**



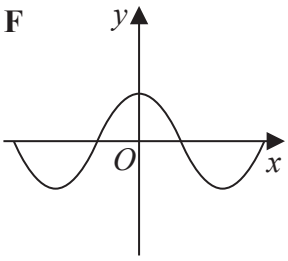

**D**



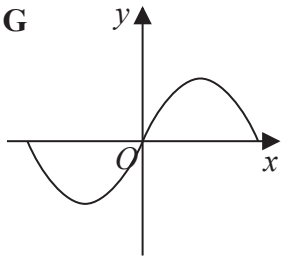

**E**



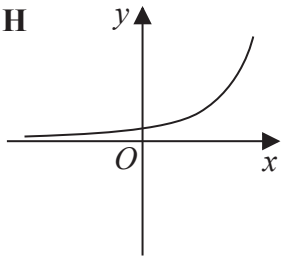

**F**



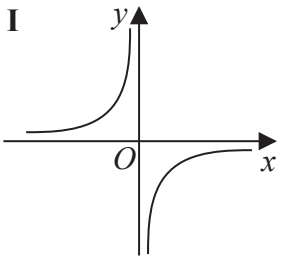

**G**




**H**




**I**




(a) Write down the letter of the graph that could have the equation $y = \cos x°$

.....

**(1)**

(b) Write down the letter of the graph that could have the equation $y = -x^3 - x^2$

.....

**(1)**

(c) Write down the letter of the graph that could have the equation $y = 2^x$

.....

**(1)**

**(Total for Question 19 is 3 marks)**

**20**

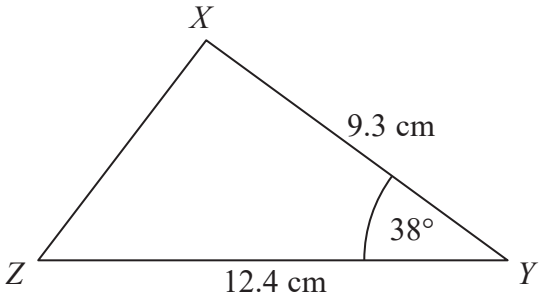



Diagram **NOT** accurately drawn

*XYZ* is a triangle.

*XY* = 9.3 cm
*YZ* = 12.4 cm
Angle *XYZ* = 38°

(a) Work out the area of triangle *XYZ*.
Give your answer correct to 3 significant figures.

..... $cm^2$

**(2)**

(b) Work out the length of *XZ*.
Give your answer correct to 3 significant figures.

.....cm

**(3)**

**(Total for Question 20 is 5 marks)**

**21** $y$ is directly proportional to the square of $x$.

$y = 96$ when $x = 4$

(a) Find a formula for $y$ in terms of $x$.

.....

**(3)**

(b) Work out the value of $y$ when $x = 7$

.....

**(1)**

(c) Work out the values of $x$ for which $y = 150$

.....

**(2)**

**(Total for Question 21 is 6 marks)**

***22**

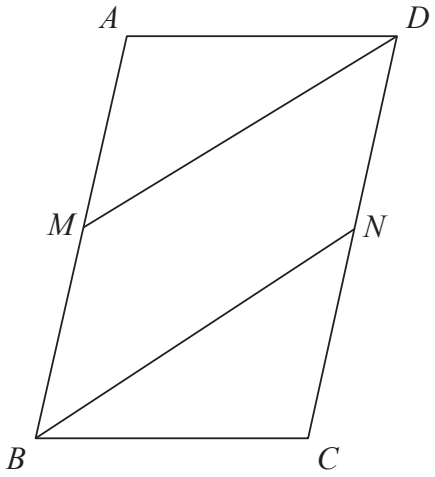



Diagram **NOT** accurately drawn

*ABCD* is a parallelogram.
*M* is the midpoint of *AB*.
*N* is the midpoint of *DC*.

(a) Prove that triangle *AMD* is congruent to triangle *CNB*.

**(3)**

(b) Hence, prove that *MD* = *NB*

**(1)**

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

**TOTAL FOR PAPER IS 100 MARKS**

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