**In Between Exam Revision**

**1.** Here are the first five terms of an arithmetic sequence.

7 11 15 19 23

(a) Write down, in terms of *n*, an expression for the *n*th term of this sequence.

.....

**(2)**

Pat says that 453 is a term in this sequence.
Pat is wrong.

(b) Explain why.

.....

.....

**(1)**
**(Total 3 marks)**

**2.** Lisa used $\frac{1}{2}$ of her lottery win to buy a house.

She gave $\frac{1}{6}$ of her lottery win to a charity.

Lisa then shared the remainder of her lottery win equally between her four children.

Work out the fraction of Lisa's lottery win that **each** of her four children received.

……..

**(Total 4 marks)**

**3.** (a) Express the following numbers as products of their prime factors.

(i) 56

…….

(ii) 84

…….

**(4)**

(b) Find the Highest Common Factor of 56 and 84.

……

**(1)**
**(Total 5 marks)**

**4.** Wallace bought a computer for £3000.
Each year the computer depreciated by 20%.

Work out its value two years after he bought it.

£ ……

**(Total 3 marks)**

**5.** (a) Work out $\frac{2}{5} + \frac{3}{8}$

……

**(2)**

(b) Work out $5\frac{2}{3} - 2\frac{3}{4}$

……

**(3)**

**(Total 5 marks)**

**6.** The equation

$$x^3 - 2x = 67$$

has a solution between 4 and 5
Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

$x$ = .....

**(Total 4 marks)**

**7.** Three woman earned a total of £36

They shared the £36 in the ratio 7:3:2

Donna received the largest amount.

(a) Work out the amount Donna received.

£……..

**(3)**

A year ago, Donna weighed 51.5 kg.

Donna now weighs $8\frac{1}{2}$% less.

(b) Work out how much Donna now weighs.
Give your answer to an appropriate degree of accuracy.

…….kg

**(4)**

**(Total 7 marks)**

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

When $x = 4$, $y = 25$.

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

……..……..

**(3)**

(b) Calculate $y$ when $x = 2$.

……

**(1)**

(c) Calculate $x$ when $y = 9$.

……

**(2)**

**(Total 6 marks)**

**9.** In a sale all the normal prices are reduced by 18%.
In the sale Mandy pays £12.71 for a hat.

Calculate the normal price of the hat.

£……..

**(Total 3 marks)**

**10.** $x = \dfrac{p-q}{pq}$

$p = 4 \times 10^5$
$q = 1.25 \times 10^4$

(a) Calculate the value of $x$.
Give your answer in standard form.

……

**(2)**

(b) Make $q$ the subject of the formula

$$x = \frac{p-q}{pq}$$

$q$ = …….

**(4)**
**(Total 6 marks)**

**11.** Use your calculator to work out the value of

$$\frac{(7.91-\sqrt[3]{81})\times 4.32}{6.23+1.491}$$

Give your answer correct to 3 significant figures.

……

**(Total 3 marks)**

**12.**

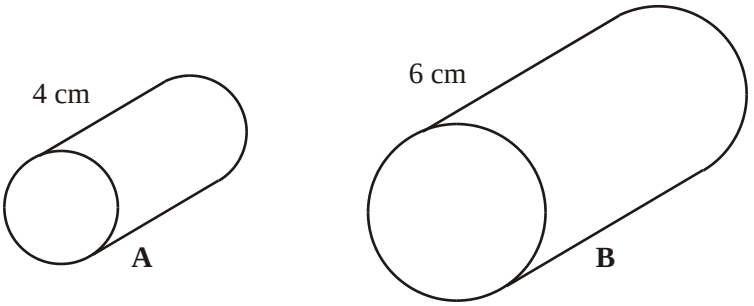



Diagram **NOT** accurately drawn

Cylinder **A** and cylinder **B** are mathematically similar.
The length of cylinder **A** is 4 cm and the length of cylinder **B** is 6 cm.
The volume of cylinder **A** is 80 $cm^3$.

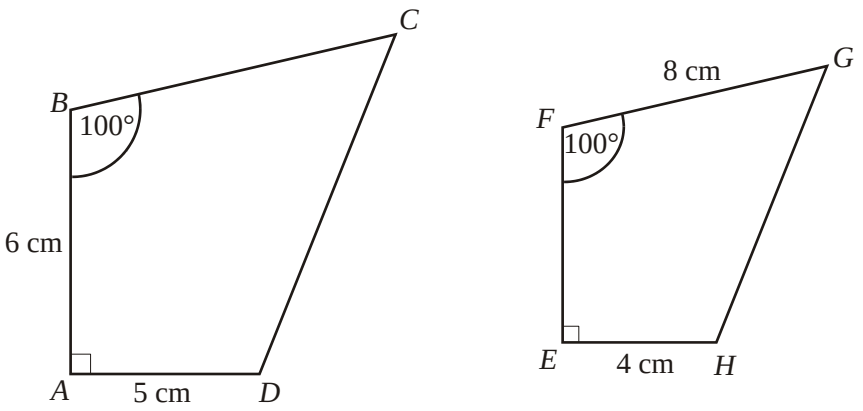
Calculate the volume of cylinder **B**.

…… $cm^3$

**(Total 3 marks)**

**13.**

Diagrams **NOT** accurately drawn




Shapes *ABCD* and *EFGH* are mathematically similar.

(i) Calculate the length of *BC*.

*BC* = …… cm

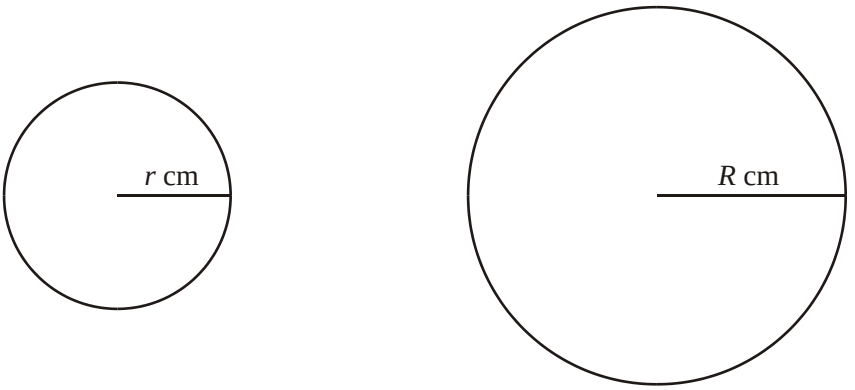
(ii) Calculate the length of *EF*.

*EF* = …… cm

**(Total 5 marks)**

**14.**

Diagram **NOT** accurately drawn




The diagram represents two metal spheres of different sizes.

The radius of the smaller sphere is $r$ cm.
The radius of the larger sphere is $R$ cm.

$r = 1.7$ correct to 1 decimal place.

$R = 31.0$ correct to 3 significant figures.

(a) Write down the upper and lower bounds of $r$ and $R$.

Upper bound of $r$ = ……

Lower bound of $r$ = ……

Upper bound of $R$ = ……

Lower bound of $R$ = ……

**(2)**

(b) Find the smallest possible value of $R - r$.

……

**(1)**

The larger sphere of radius $R$ cm was melted down and used to make smaller spheres of radius $r$ cm.

(c) Calculate the smallest possible number of spheres that could be made.

……

**(4)**
**(Total 7 marks)**

**15.** (a) Write down the value of $8^{\frac{1}{3}}$

.....

**(1)**

$8\sqrt{8}$ be written in the form $8^k$

(b) Find the value of $k$.

$k$ = .....

**(1)**

$8\sqrt{8}$ can also be expressed in the form $m\sqrt{2}$ where $m$ is a positive integer.

(c) Express $8\sqrt{8}$ in the form $m\sqrt{2}$

.....

**(2)**

(d) Rationalise the denominator of $\dfrac{1}{8\sqrt{8}}$

Give your answer in the form $\dfrac{\sqrt{2}}{p}$ where p is a positive integer.

.....

**(2)**
**(Total 6 marks)**

**16.** Mario invests £2000 for 3 years at 5% per annum **compound** interest.

Calculate the value of the investment at the end of 3 years.

£…….

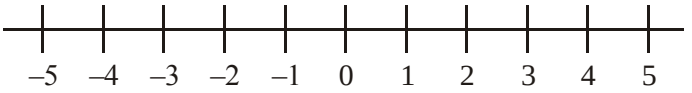
**(Total 3 marks)**

**17.** (i) Solve the inequality

$$5x - 7 < 2x - 1$$

.....

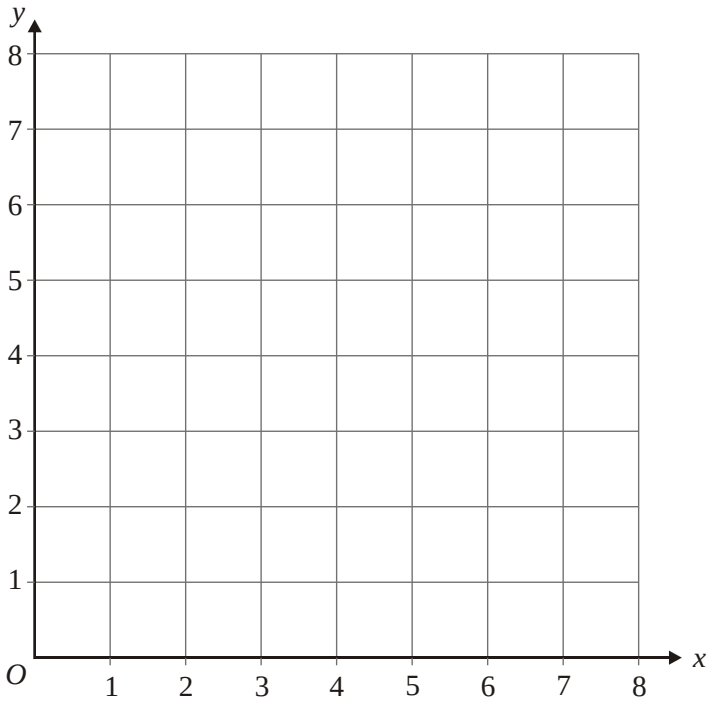
(ii) On the number line, represent the solution set to part (i).




**(Total 3 marks)**

**18.** (a) On the grid below, draw straight lines and use shading to show the region **R** that satisfies the inequalities

$x \geq 2$ $\quad y \geq x$ $\quad x + y \leq 6$




**(3)**

The point $P$ with coordinates $(x, y)$ lies inside the region **R**.
$x$ and $y$ are **integers**.

(b) Write down the coordinates of **all** the points of **R** whose coordinates are both integers.

.....

**(2)**
**(Total 5 marks)**

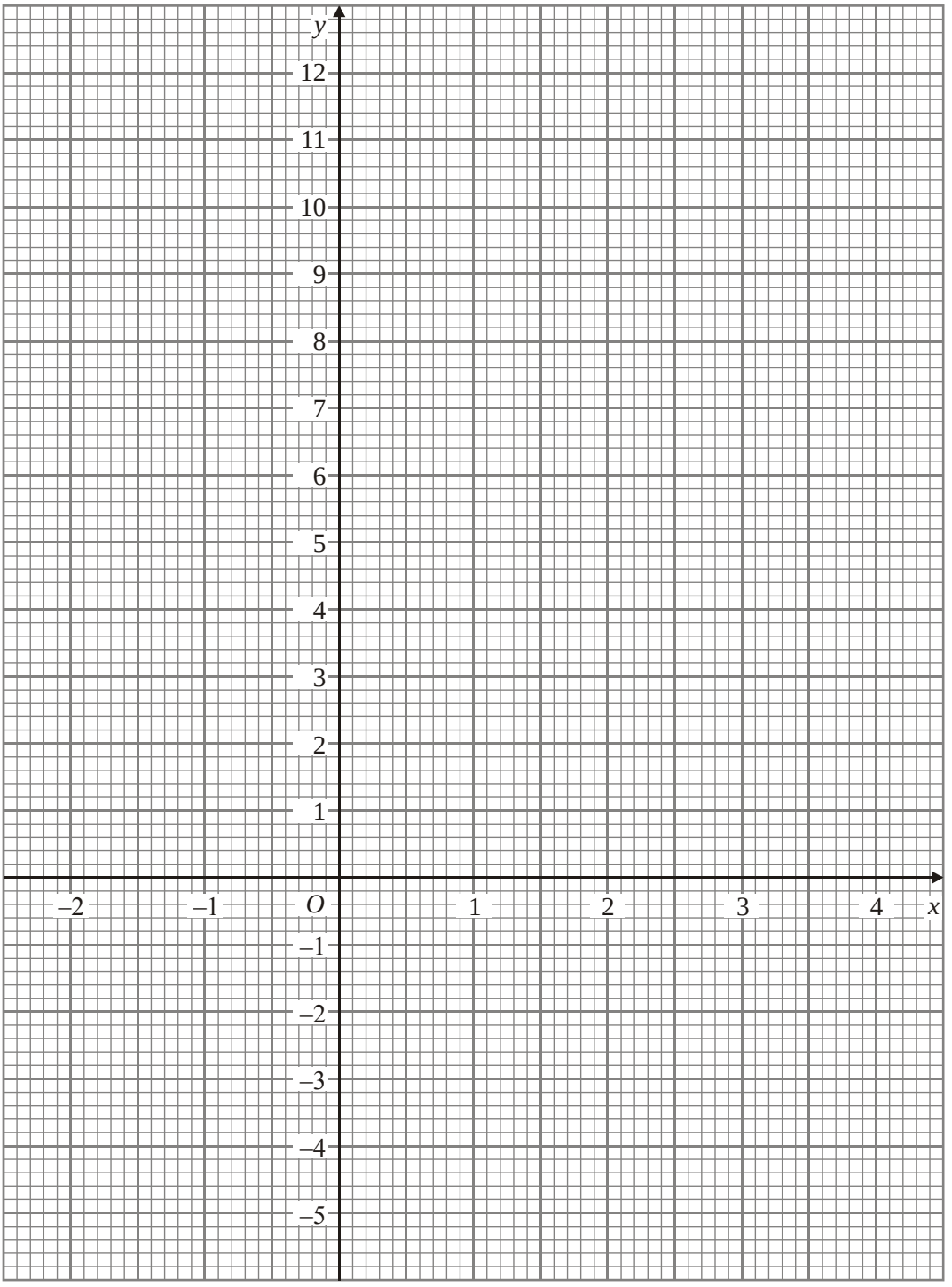
**19.** (a) Complete the table for $y = x^2 - 3x + 1$

| $x$ | –2 | –1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|
| $y$ | 11 | | 1 | –1 | | 1 | 5 |

**(2)**

(b) On the grid below, draw the graph of $y = x^2 - 3x + 1$

**(2)**

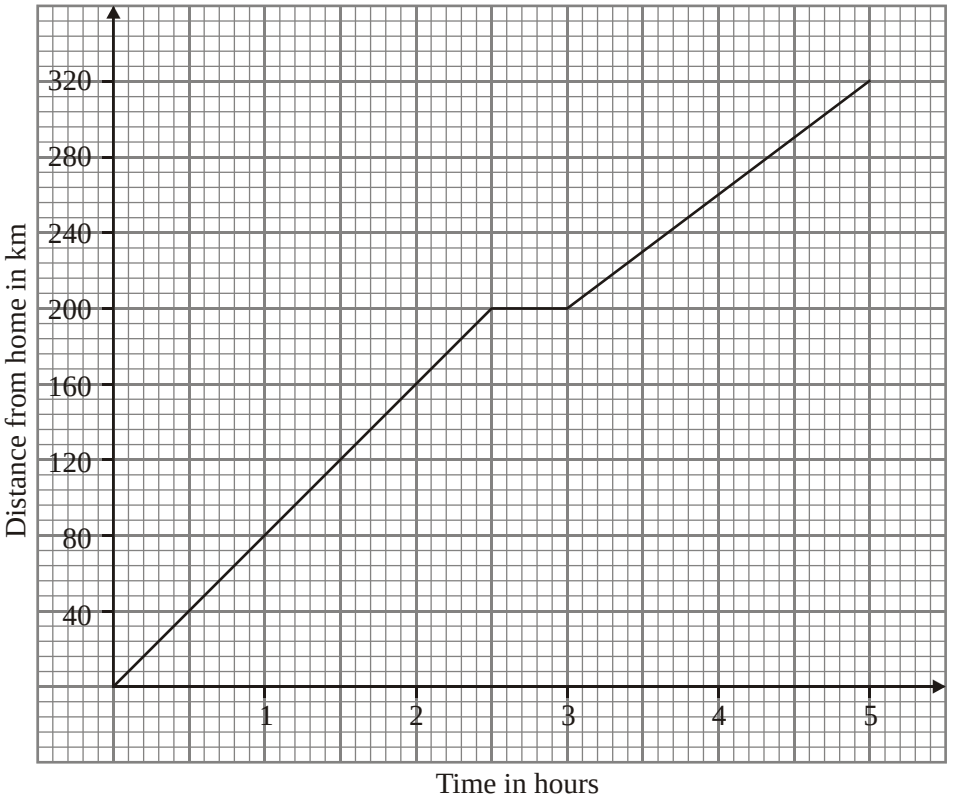



(c) Use your graph to find an estimate for the minimum value of $y$.

$y =$ ……

**(1)**
**(Total 5 marks)**

**20.** Jane drove 320 km from her home to the airport.
The travel graph shows Jane's journey.




During the journey, Jane stopped for lunch.

(a) (i) For how long did Jane stop for lunch?

……

(ii) How far had Jane travelled in the first 90 minutes?

…….. km

**(2)**

(b) Work out the steady speed that Jane travelled at after lunch.

……. km/h

**(2)**

Jane's car uses 1 gallon of petrol for each 40 miles.
A gallon of petrol costs £3.20

(c) Work out the cost of petrol for Jane's 320 km journey.

£ ……..

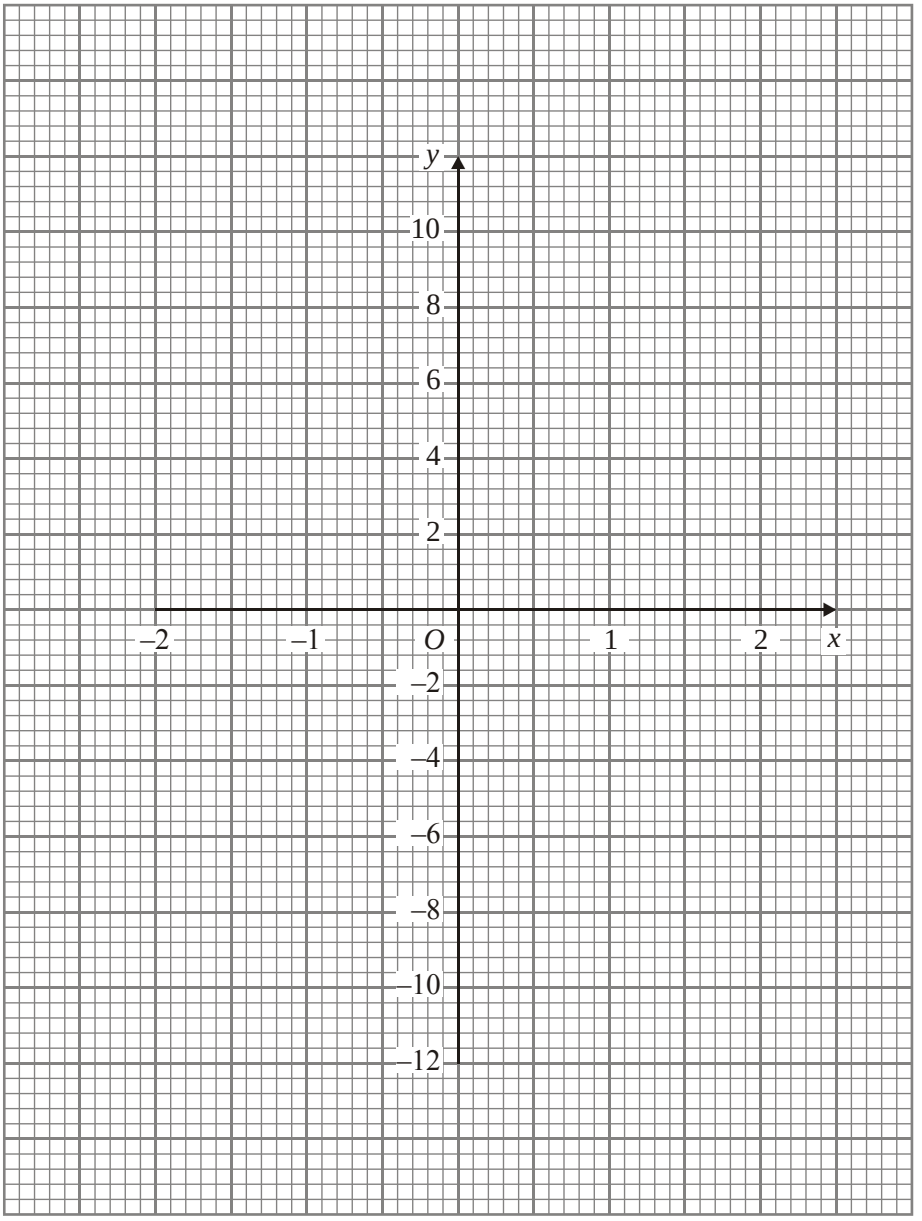
**(4)**
**(Total 8 marks)**

**21.** (a) Complete this table of values for $y = x^3 + x - 2$

| $x$ | –2 | –1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| $y$ | –12 | | | 0 | |

**(3)**

(b) On the grid, draw the graph of $y = x^3 + x - 2$




**(2)**
**(Total 5 marks)**

**22.** A straight line has equation $y = 4x - 5$.

(a) Find the value of $x$ when $y = 1$.

$x =$ …….

**(2)**

(b) Write down the equation of the straight line that is parallel to $y = 4x - 5$ and passes through the point (0, 3).

……

**(2)**

(c) Rearrange the equation $y = 4x - 5$ to find $x$ in terms of $y$.

$x =$ …….

**(2)**

**(Total 6 marks)**

**23.** (a) Solve $6x + 2 = 4(x - 7)$

$x =$ ……..

**(2)**

(b) Solve $\frac{15 - 2x}{3} = 4$

$x =$ ……..

**(3)**

(c) (i) Factorise $x^2 - 23x + 42$

……..

(ii) Hence solve $x^2 - 23x + 42 = 0$

……

**(3)**

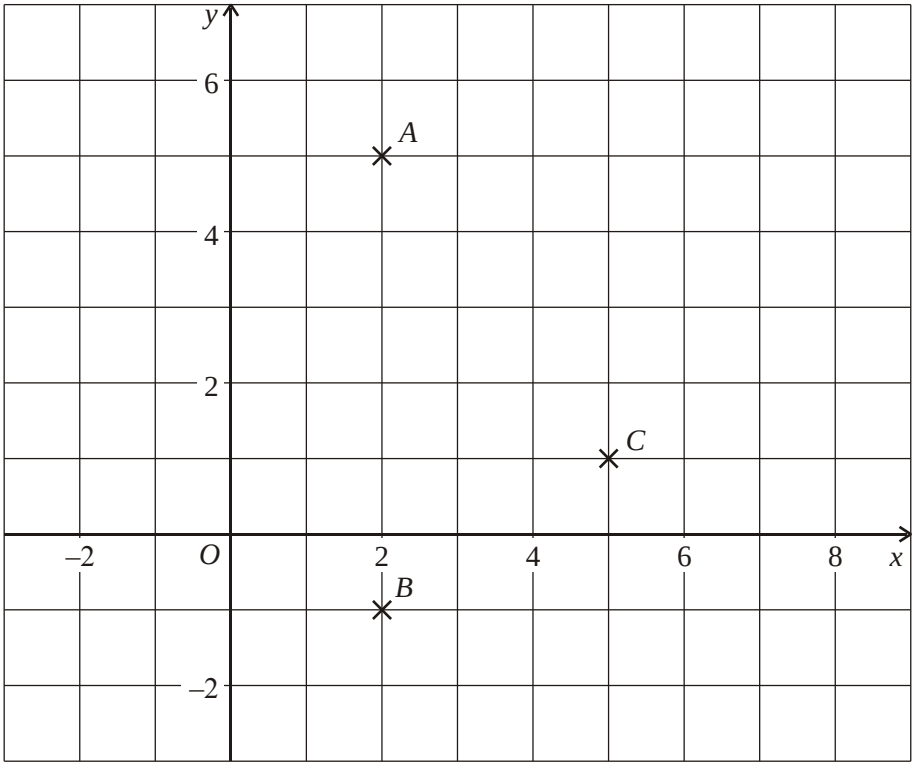
(d) Factorise $(x + y)^2 - 3(x + y)$

……..

**(1)**

**(Total 9 marks)**

**24.** The diagram shows three points *A*, *B* and *C* on a centimetre grid.




(a) On the grid, draw the locus of points which are equidistant from *A* and *B*.

**(1)**

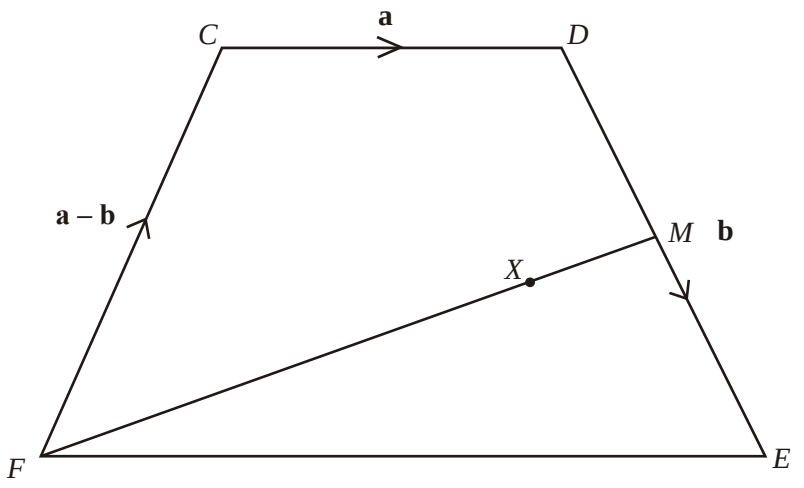
(b) On the grid, draw the locus of points which are 3 cm from *C*.

**(1)**

(c) On the grid, shade the region in which points are nearer to *A* than *B* and also less than 3 cm from *C*.

**(1)**
**(Total 3 marks)**

**25.**




*CDEF* is a quadrilateral with $\overrightarrow{CD}$ = **a**, $\overrightarrow{DE}$ = **b** and $\overrightarrow{FC}$ = **a – b**.

(a) Express $\overline{CE}$ in terms of **a** and **b**.

……..

**(1)**

(b) Prove that *FE* is parallel to *CD*.

……....

……

**(2)**

*M* is the midpoint of *DE*.

(c) Express $\overrightarrow{FM}$ in terms of **a** and **b**.

…….

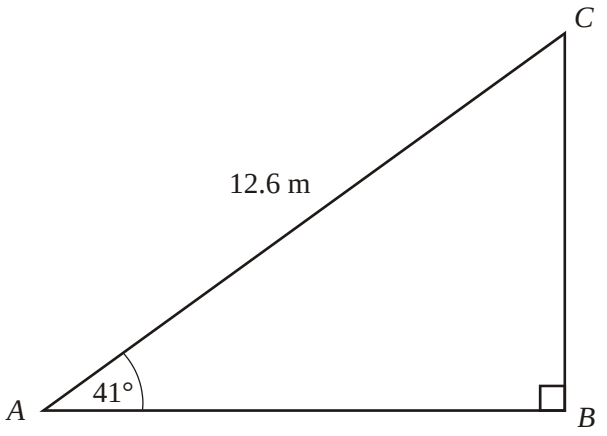
**(1)**

*X* is the point on *FM* such that *FX* : *XM* = 4 : 1.

(d) Prove that *C*, *X* and *E* lie on the same straight line.

**(3)**
**(Total 7 marks)**

**26.**




The diagram shows a right-angled triangle *ABC*.
*AC* = 12.6 m.
Angle *CAB* = 41°
Angle *ABC* = 90°

Find the length of the side *AB*. Give your answer correct to 3 significant figures.

…… m
**(Total 3 marks)**

**27.**

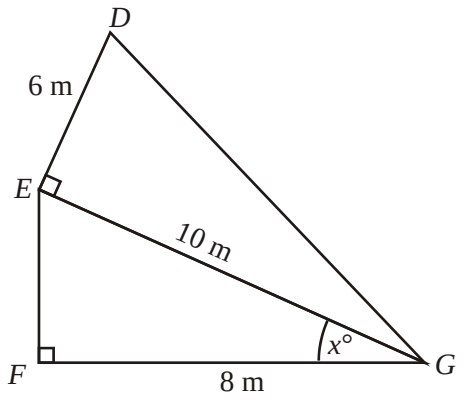



Diagram **NOT** accurately drawn

*DE* = 6m.
*EG* = 10 m.
*FG* = 8 m.
Angle *DEG* = 90°. Angle *EFG* = 90°.

(a) Calculate the length of *DG*.
Give your answer correct to 3 significant figures.

..... m
**(3)**

(b) Calculate the size of the angle marked *x*°.
Give your answer correct to one decimal place.

.....°
**(3)**
**(Total 6 marks)**

**28.**

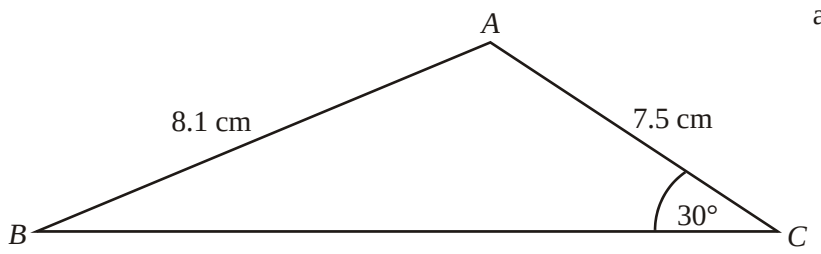



Diagram **NOT** accurately drawn

In triangle *ABC*,

*AB* = 8.1 cm,
*AC* = 7.5 cm,
angle *ACB* = 30°.

(a) Calculate the size of angle *ABC*.
Give your answer correct to 3 significant figures.

…….°

**(3)**

(b) Calculate the area of triangle *ABC*.
Give your answer correct to 3 significant figures.

……..$cm^2$

**(3)**
**(Total 6 marks)**

**29.**

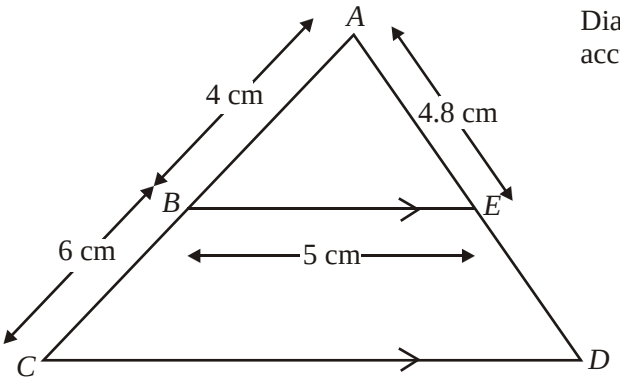



Diagram **NOT** accurately drawn

*BE* is parallel to *CD*.
*ABC* and *AED* are straight lines.
*AB* = 4 cm, *BC* = 6 cm, *BE* = 5 cm, *AE* = 4.8 cm.

(a) Calculate the length of *CD*.

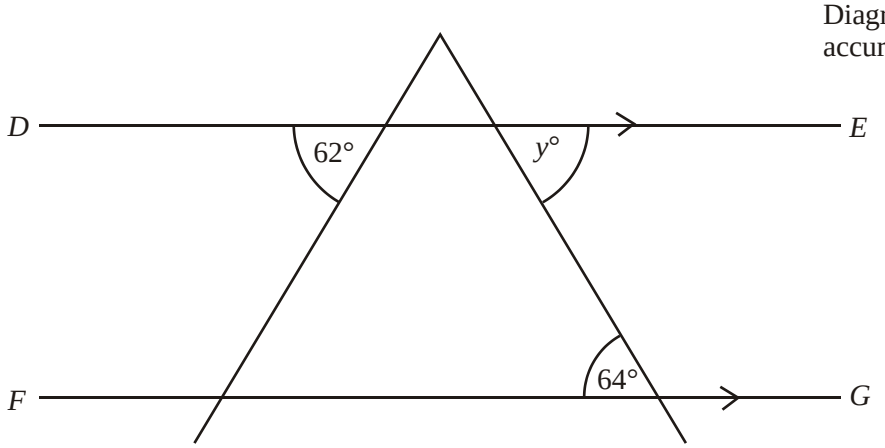
..... cm
**(2)**

(b) Calculate the length of *ED*.

..... cm
**(2)**
**(Total 4 marks)**

**30.**

Diagram **NOT** accurately drawn

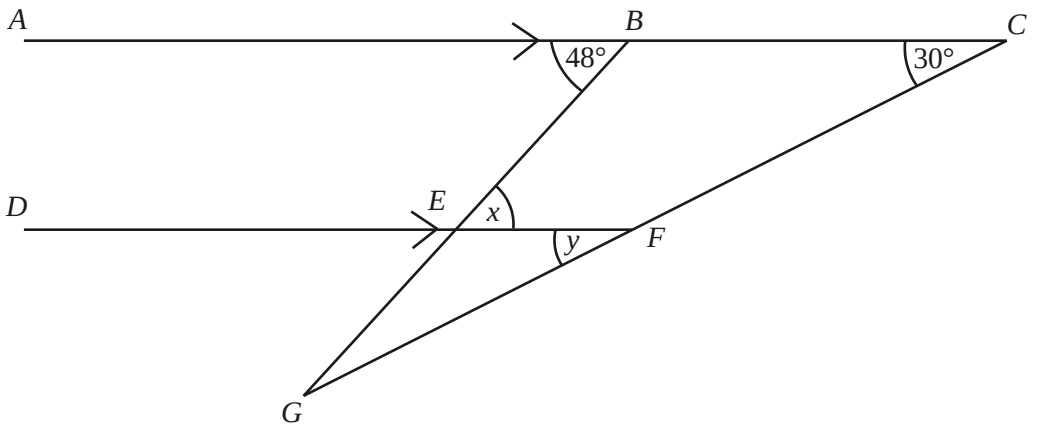



*DE* is parallel to *FG*.
Find the size of the angle marked *y*°.

.....°
**(Total 1 mark)**

**31.**

Diagram **NOT** accurately drawn




*BEG* and *CFG* are straight lines.
*ABC* is parallel to *DEF*.
Angle *ABE* = 48°.
Angle *BCF* = 30°.

(a) (i) Write down the size of the angle marked *x*.

*x* = .....°

(ii) Give a reason for your answer.

.....

**(2)**

(b) (i) Write down the size of the angle marked *y*.

*y* = .....°

(ii) Give a reason for your answer.

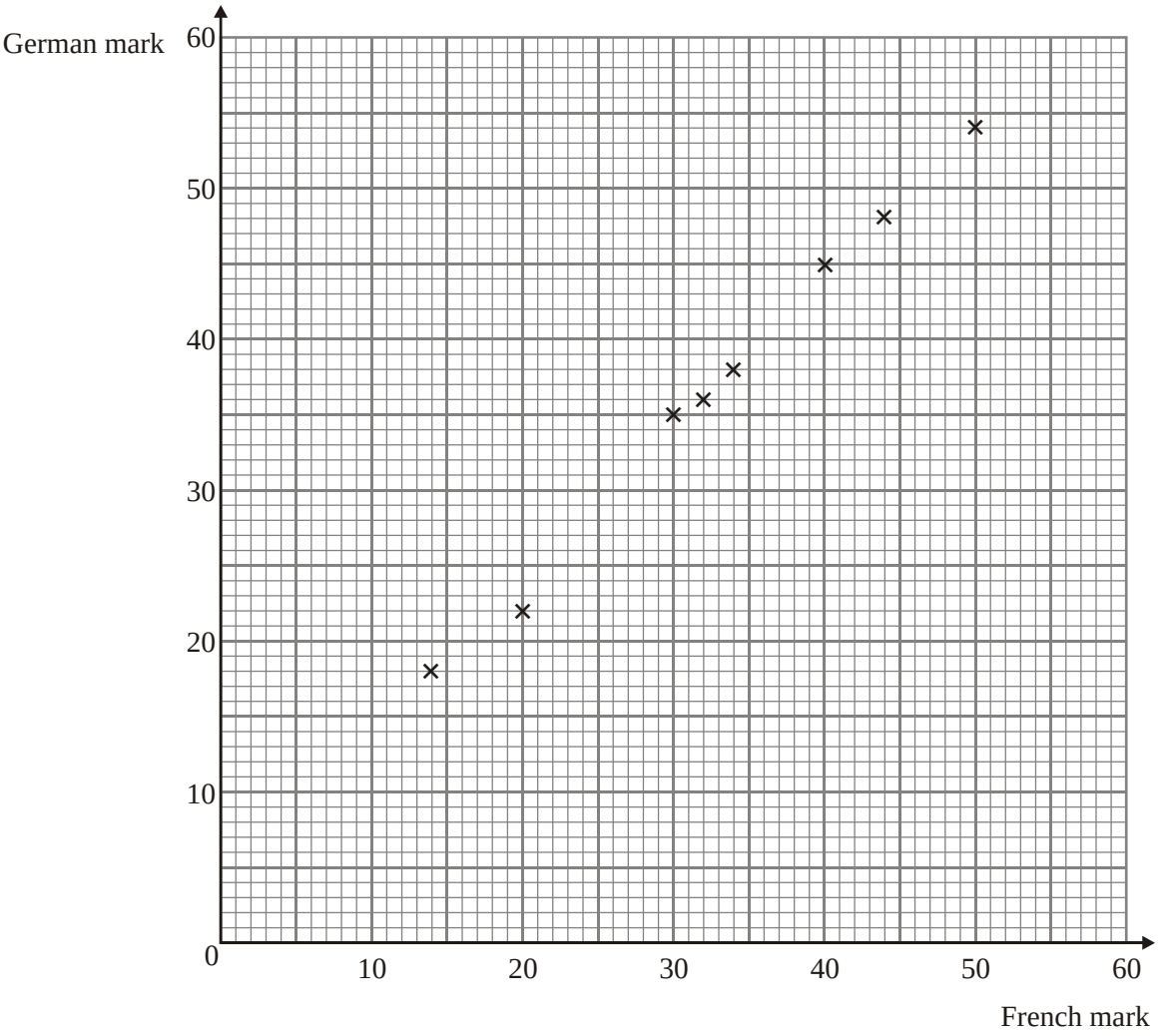
.....

**(2)**
**(Total 4 marks)**

**32.** 10 students each took a French test and a German test.
The table shows their marks.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| French marks | 44 | 30 | 40 | 50 | 14 | 20 | 32 | 34 | 20 | 45 |
| German marks | 48 | 35 | 45 | 54 | 18 | 22 | 36 | 38 | 25 | 50 |

(a) Complete the scatter graph to show the information in the table.
The first 8 points in the table have been plotted for you.




**(1)**

(b) What type of correlation does this scatter graph show?

.....

**(1)**

(c) Draw a line of best fit on the scatter diagram.

**(1)**

(d) Use your line of best fit to estimate

(i) the German mark for a student with a French mark of 26,

.....

(ii) the French mark for a student with a German mark of 43.

.....

**(2)**
**(Total 5 marks)**

**33.** Charles found out the length of reign of each of 41 kings.
He used the information to complete the frequency table.

| Length of reign ($L$ years) | Number of kings | | |
|---|---|---|---|
| $0 < L \leq 10$ | 14 | | |
| $10 < L \leq 20$ | 13 | | |
| $20 < L \leq 30$ | 8 | | |
| $30 < L \leq 40$ | 4 | | |
| $40 < L \leq 50$ | 2 | | |

(a) Write down the class interval that contains the median.

…….

**(2)**

(b) Calculate an estimate for the mean length of reign.

……. years

**(4)**
**(Total 6 marks)**

**34.** There are 800 pupils at Hightier School.
The table shows information about the pupils.

| Year group | Number of boys | Number of girls |
|---|---|---|
| 7 | 110 | 87 |
| 8 | 98 | 85 |
| 9 | 76 | 74 |
| 10 | 73 | 77 |
| 11 | 65 | 55 |

An inspector is carrying out a survey into pupil's views about the school. She takes a sample, stratified both by Year group and by gender, of 50 of the 800 pupils.

(a) Calculate the number of Year 9 boys to be sampled.

…….

**(2)**

Toni stated "There will be twice as many Year 7 boys as Year 11 girls to be sampled."

(b) Is Toni's statement correct?
You must show how you reached your decision.

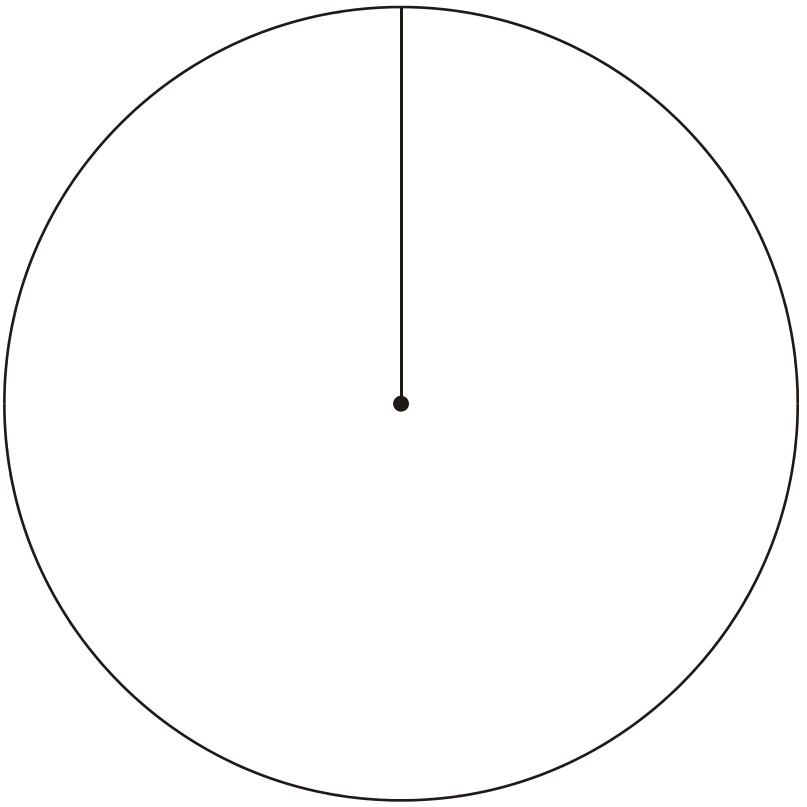
**(2)**
**(Total 4 marks)**

**35.** Sam recorded the colours of cars parked at his school yesterday.
The table shows his results.

| **Colour** | **Frequency** | |
|---|---|---|
| Blue | 20 | |
| Red | 22 | |
| Green | 6 | |
| White | 12 | |

Complete an accurate pie chart to show this information.

Use the circle given below.



**(Total 4 marks)**

**36.** Rosie had 10 boxes of drawing pins.

She counted the number of drawing pins in each box.

The table gives information about her results.

| Number of drawing pins | Frequency | |
|---|---|---|
| 29 | 2 | |
| 30 | 5 | |
| 31 | 2 | |
| 32 | 1 | |

(a) Write down the modal number of drawing pins in a box.

.....

**(1)**

(b) Work out the range of the number of drawing pins in a box.

.....

**(1)**

(c) Work out the mean number of drawing pins in a box.

.....

**(3)**

**(Total 5 marks)**

**37.** The expression $x^2 - 6x + 14$ can be written in the form $(x - p)^2 + q$, for all values of $x$.

(a) Find the value of (i) $p$, (ii) $q$.

(i) $p$ = .....

(ii) $q$ = .....

**(3)**

**38.** Solve the simultaneous equations

$$x^2 + y^2 = 29$$

$$y - x = 3$$

……

**(Total 7 marks)**

**39.** (a) Solve $x^2 + x + 11 = 14$
Give your solutions correct to 3 significant figures.

.....

**(3)**

$$y = x^2 + x + 11$$

The value of $y$ is a prime number when $x = 0, 1, 2$ and $3$

The following statement is **not** true.
'$y = x^2 + x + 11$ is **always** a prime number when $x$ is an integer'

(b) Show that the statement is not true.

.....

.....

**(2)**
**(Total 5 marks)**

**40.** The diagram below shows a 6-sided shape.

All the corners are right angles.

All measurements are given in centimetres.

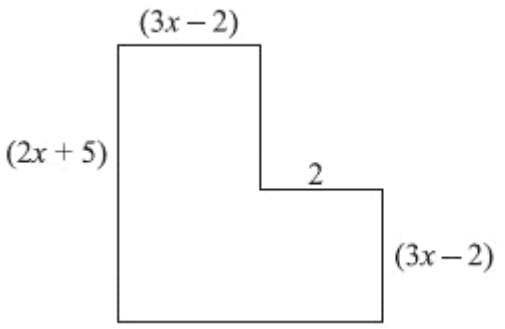



Diagram **NOT** accurately drawn

The area of the shape is 25 cm$^2$.

(a) Show that $6x^2 + 17x - 39 = 0$

**(3)**

(b) (i) Solve the equation

$6x^2 + 17x - 39 = 0$

$x$ = …… or $x$ = ……

(ii) Hence work out the length of the longest side of the shape.

……..cm

**(4)**

**(Total 7 marks)**

**41.** (a) Expand and simplify

$(x - y)^2$

.....

**(2)**

(b) Rearrange $a(q - c) = d$ to make $q$ the subject.

$q$ = .....

**(3)**

**(Total 5 marks)**