58. Work out

$$10^{-2} = \frac{1}{100}$$

Give your answer as a decimal.
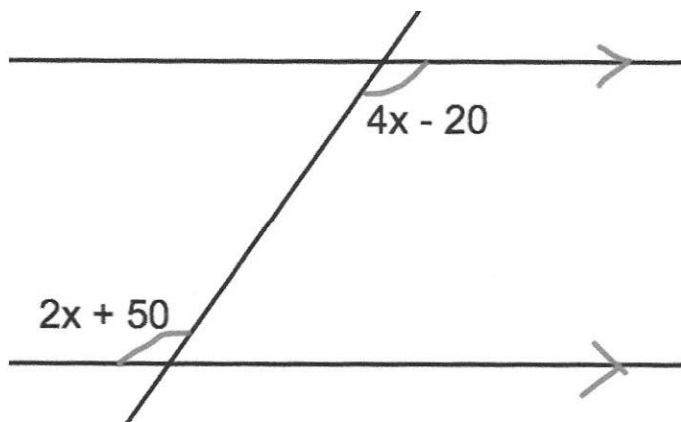
0·01

(2)

---

59. Expand and simplify $(y - 1)(y - 2)$

$$y^2 - y - 2y + 2$$
$$y^2 - 3y + 2$$

$y^2 - 3y + 2$

(2)

---

60. The diagram below shows a pair of parallel lines.

Calculate the size of the angle, 2x + 50.

$2(35) + 50 = 120$

$$4x - 20 = 2x + 50$$
$$2x = 70$$
$$x = 35$$

120°

(4)

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61. Here are the first five terms in a number sequence.

7 10 13 16 19 22 25 28 31 34
    3   3   3   3

(a) Find the 10th term in this number sequence.

$3n + 4$

$3(10) + 4 = 34$

34

(2)

(b) Write an expression, in terms of n, for the nth term of this number sequence.

$3n + 4$

(2)

---

62. Factorise

$$a^2 + 3a$$

$a(a+3)$

$a(a+3)$

(1)

---

63. Factorise $x^2 - 3x - 18$

$(x+3)(x-6)$

$(x+3)(x-6)$

(2)

64. A line has equation $y = 3x + 4$

(a) Write down the gradient of the line

3
(1)

(b) Write down the y-intercept of the line

4   or $\left(0, 4 \right)$
(1)

---

65. $-4 \leq n < 1$

n is an integer.

(a) Write down all the possible values of n.

$-4, -3, -2, -1, 0$
(2)

(b) Solve the inequality $4x + 11 < 27$

$4x < 16$
$x < 4$

$x < 4$
(2)

66.

Turkish Lira
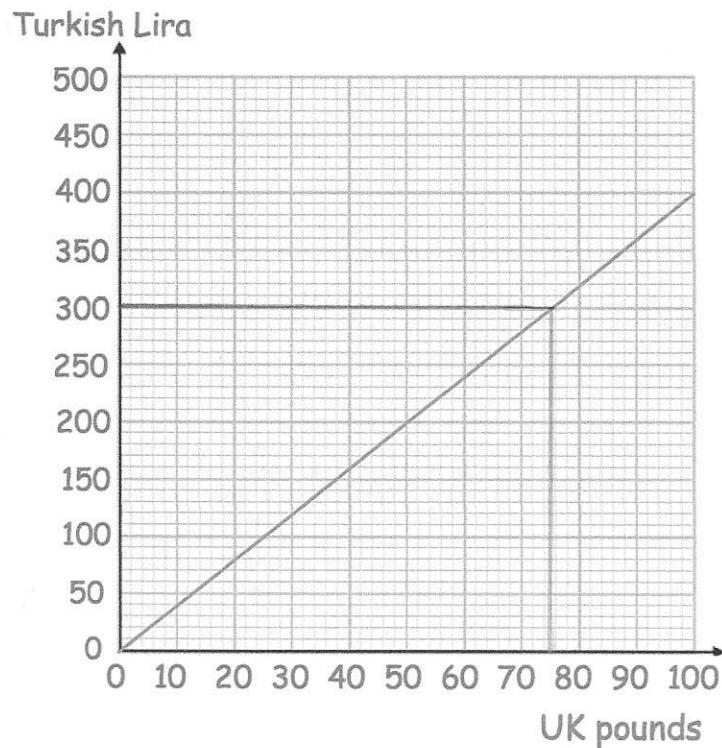
UK pounds

Richard has ₺300 and £800.
He buys a flight that costs ₺900

He pays use the ₺300 and some of the pounds.

Work out how many pounds he has left.

$$900 - 300 = 600$$
$$300 \text{ turkish lira} = £75$$
$$600 \text{ turkish lira} = £150$$
$$800 - 150 = 650$$

£ 650 ....

(3)

---

67.   Factorise $c^2 - 36$

$$(c + 6)(c - 6)$$

$(c+6)(c-6)$ ....

(1)

68. Fiona leaves £1600 in the bank for four years.
It earns compound interest of 4% each year.

Calculate the total amount Fiona has in the bank at the end of the four years.

$$1600 \times 1.04^4 = 1871.7736\ldots$$

£ 1871.77
(3)

---

69. The table gives the circumference, in metres, of planets in the solar system.
The circumferences are given to an accuracy of 3 significant figures.

Planet	Circumference (metres)
Mercury	1.54×10^7
Venus	3.81×10^7
Earth	4.01×10^7
Mars	2.13×10^7
Jupiter	4.39×10^8
Saturn	3.66×10^8
Uranus	1.59×10^8
Neptune	1.55×10^8

(a) Which planet has the largest circumference?

Jupiter
(1)

(b) Which planet has the smallest circumference?

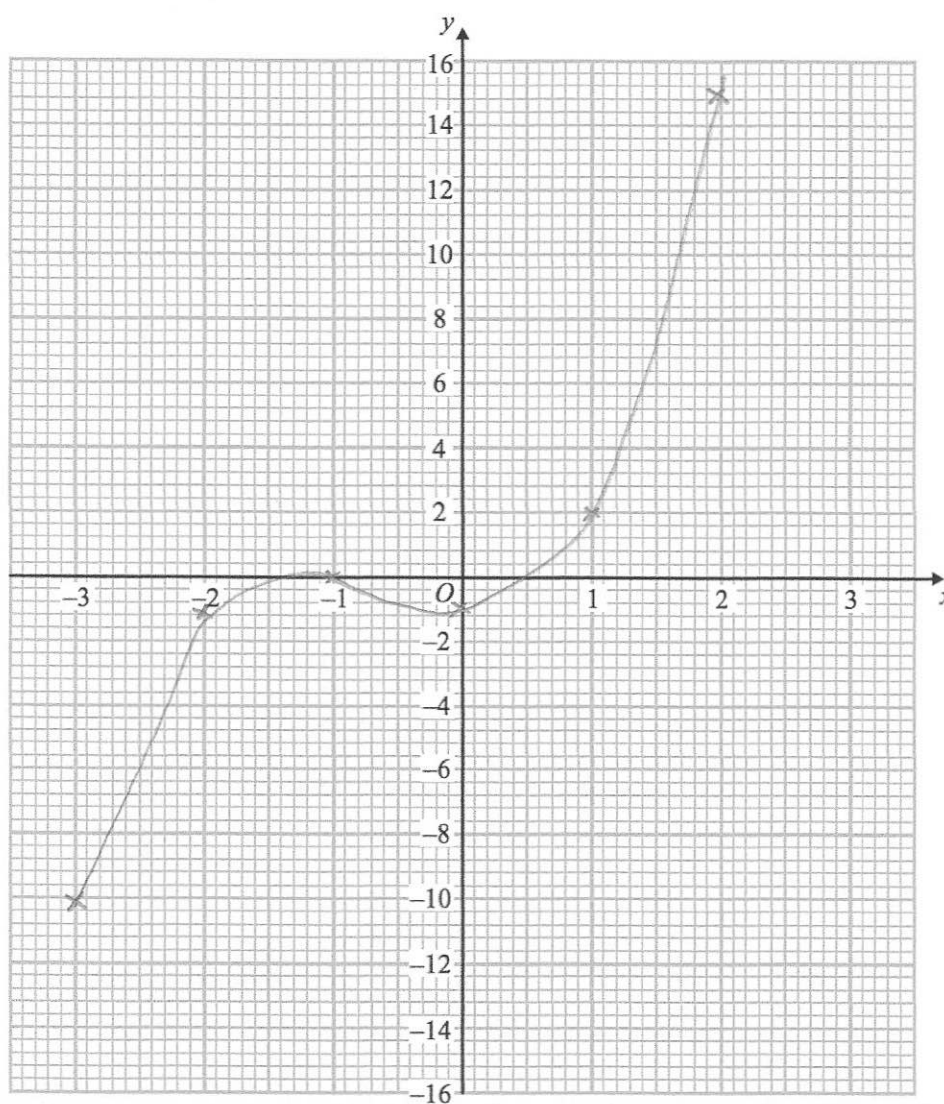Mercury
(1)

(c) Write 1.54×10^7 as an ordinary number.

154 00 000
(1)

70.   (a) Complete the table of values for $y = x^3 + 2x^2 - 1$

x	-3	-2	-1	0	1	2
y	-10	-1	0	-1	2	15

(2)

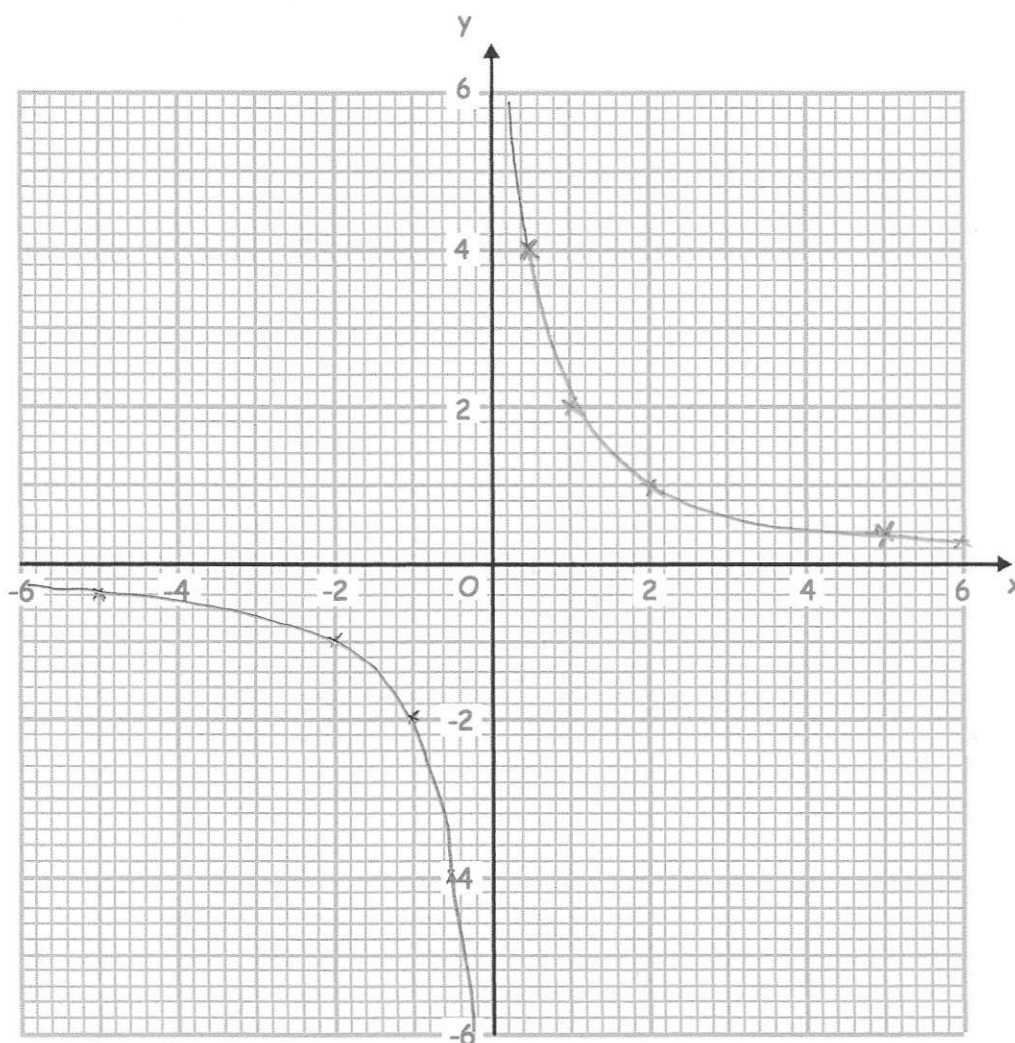(b) On the grid, draw the graph of $y = x^3 + 2x^2 - 1$ for the values of x
    $-3 \le x \le 2$

(2)

71.   (a) Complete the table of values for $y = \dfrac{2}{x}$

x	-5	-2	-1	-0.5	0.5	1	2	5
y	-0.4	-1	-2	-4	4	2	1	0.4

(2)

(b) On the grid, draw the graph of $y = \dfrac{2}{x}$ for $0.5 \le x \le 10$

(2)

72.   AB is parallel to CD.

A ——— E ——— G ——— B
154   13   y 167

154° 13

C ——— F ——— D
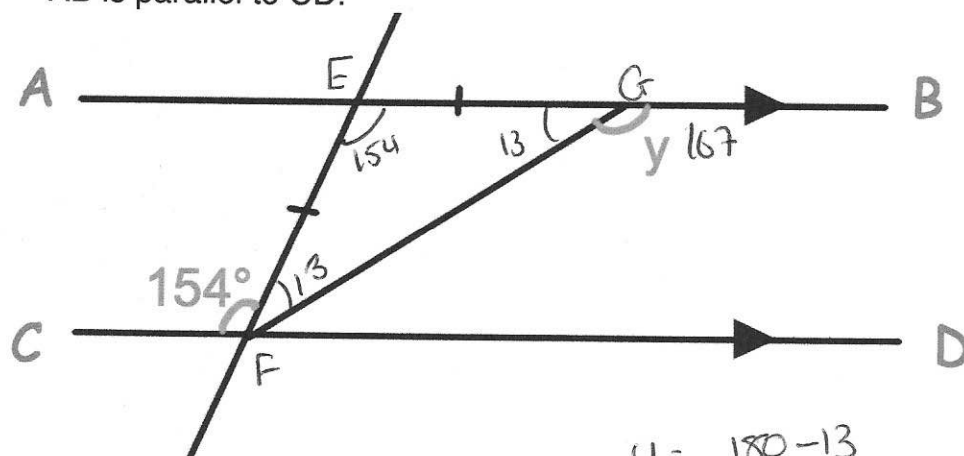
$$y = 180 - 13$$
$$= 167°$$

Work out the size of angle y.
Give reasons for your answer.

$C\hat{F}E = F\hat{E}G$ as they are alternate angles

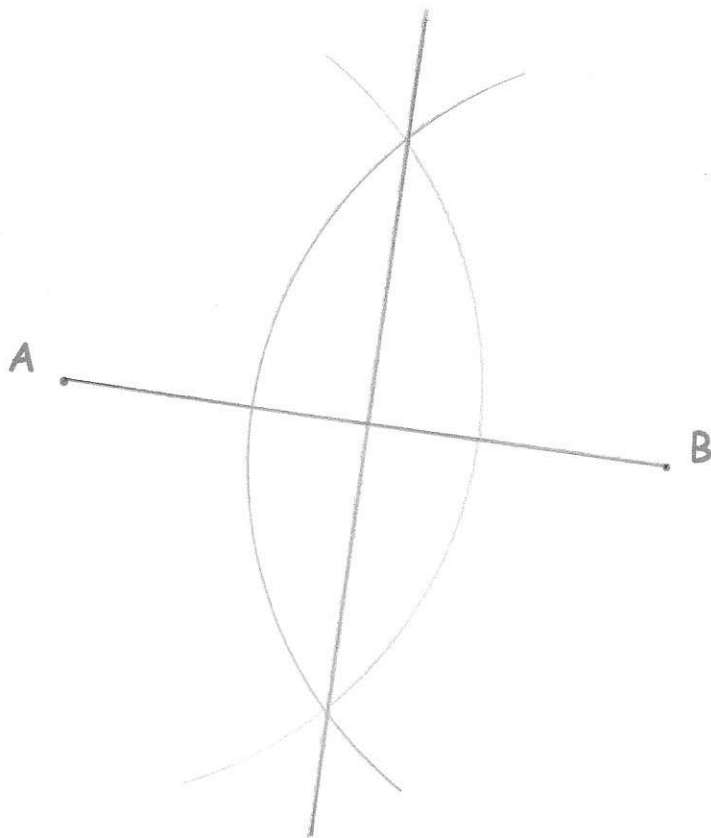The triangle is isosceles therefore $E\hat{F}G$ and $E\hat{G}F$ are equal.

Angles in triangle add to 180° so 180 - 154 = 26°

26 ÷ 2 = 13°

Angles EGF and BGF are in a straight line so they must add to 180°, so y = 167°

........167.......°

(4)

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73. Use ruler and compasses to construct the perpendicular bisector of AB.
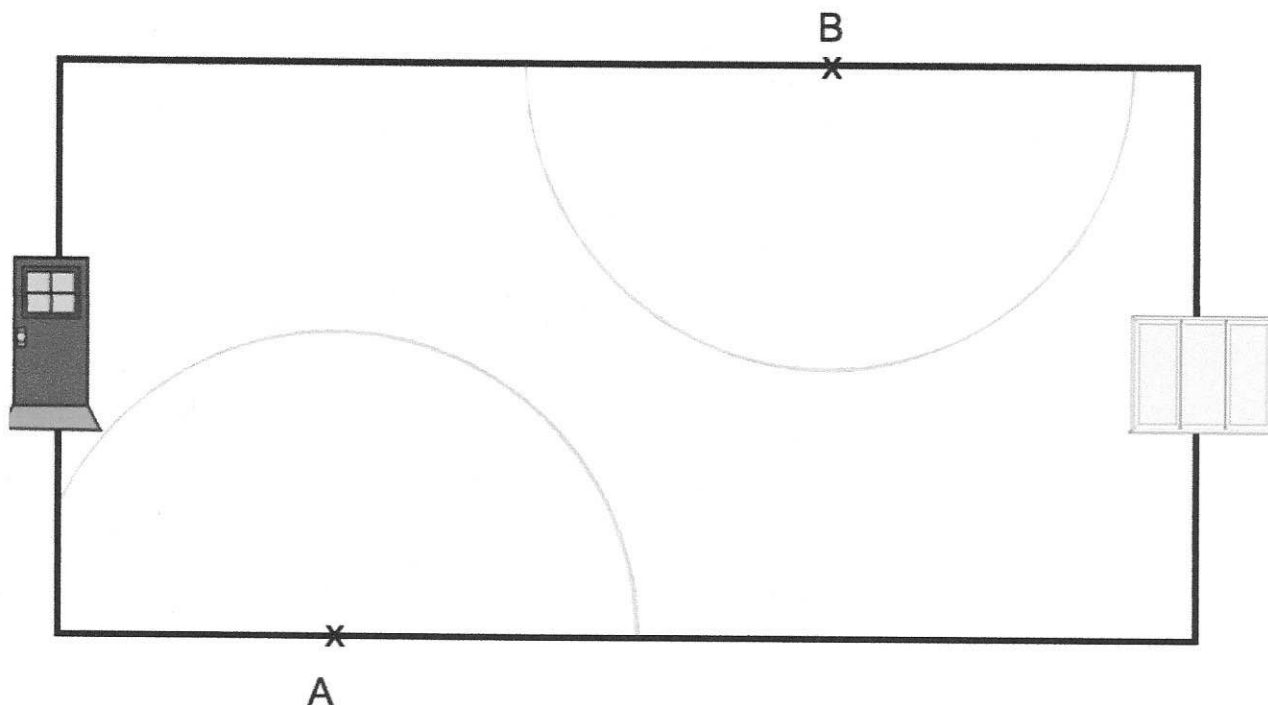You **must** show clearly all your construction arcs.

A

B

(2)

74. Below is a diagram of a hall.
There is a front door at one end of the hall and a patio door at the other.
There are two burglar alarm sensors, one at A and one at B.
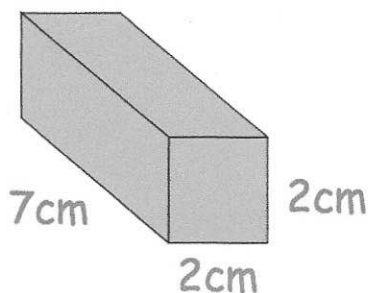
The range of each sensor is 4m.

4m = 4cm

1cm = 1 metre

The alarm is switched on.

Is it possible to walk from the front door to the patio door without setting off the alarm?

Yes

(3)

75.

Find the surface area of this cuboid.
Include suitable units.

$2 \times 2 = 4 cm^2$ $7 \times 2 = 14 cm^2$
$4 \times 2 = 8 cm^2$ $14 \times 4 = 56 cm^2$

$56 + 8 = 64 cm^2$

..........64cm²..........

(3)

76.   A solid silver spoon has a mass of 65.1g.
       The volume of the spoon is 6.2cm³.
       Calculate the density of silver.

$D = \dfrac{m}{V} = \dfrac{65.1}{6.2} = 10.5$

..........10.5..........g/cm³

(2)

77.   A cylinder is placed on a table.
       The cylinder has a weight of 400N and has a diameter of 10cm.

       Work out the pressure on the table in newtons/cm²

$Area = \pi r^2$
$= \pi (5^2)$
$= 25\pi$

$P = \dfrac{F}{A} = \dfrac{400}{25\pi} = 5.0929...$

..........5.09..........N/cm²

(2)

78. Shown below is a triangular prism.
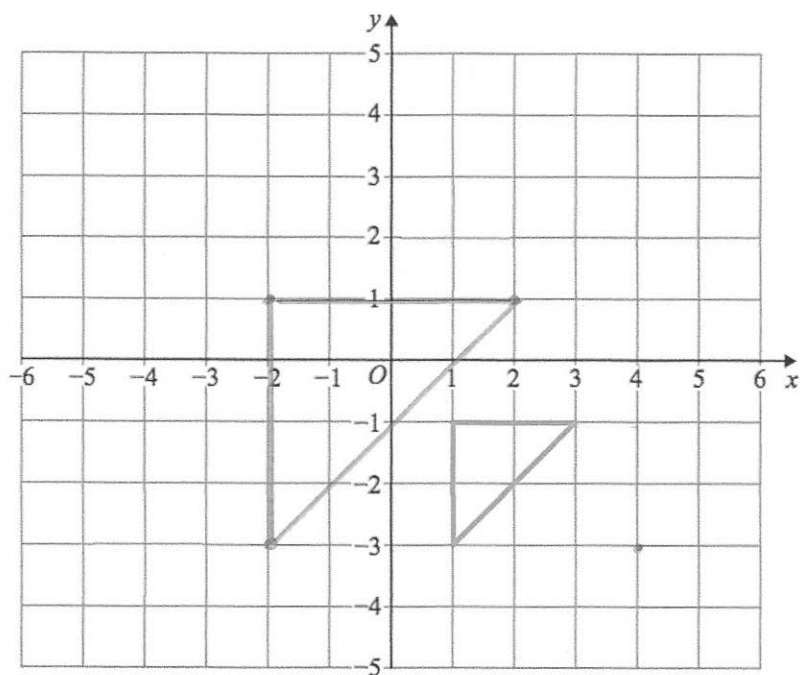

8.5cm

21.5cm

6.8cm
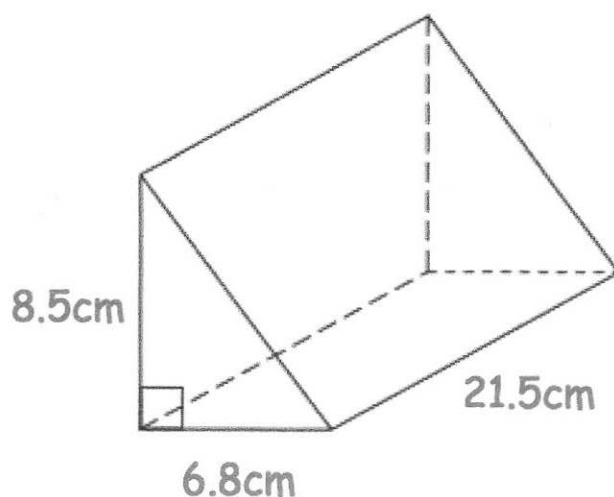
Find the volume of the triangular prism.

$\frac{1}{2}(6.8 \times 8.5) = 28.9$
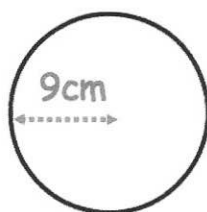
$28.9 \times 21.5 = 621.35$

..........621.35........cm³

(3)

79.

Enlarge by scale factor 2 using
(4, -3) as the centre of enlargement

80.

9cm

Work out the circumference of the circle.
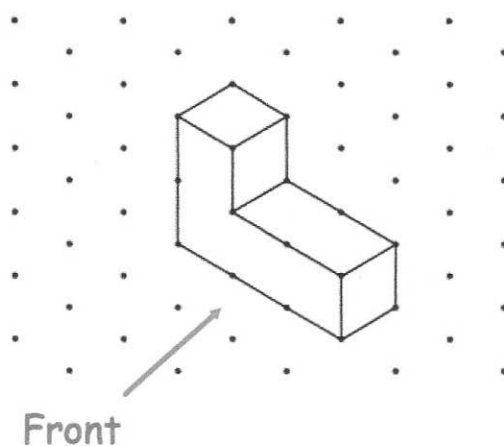Give your answer to 1 decimal place.

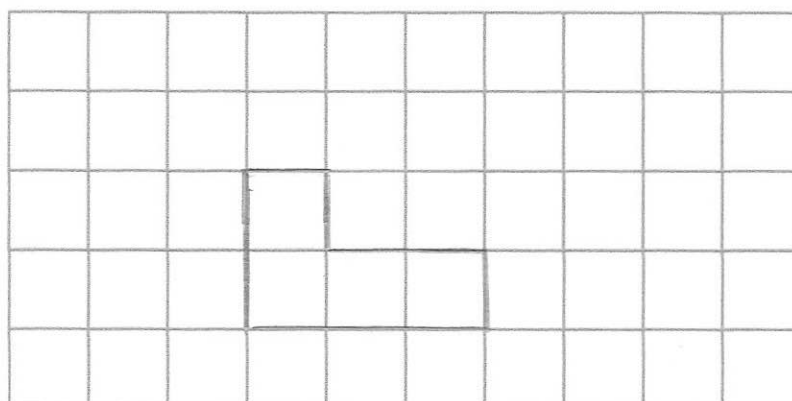$$C = \pi d$$
$$d = 18$$
$$C = 18\pi$$
$$C = 56.548\ldots$$

56.5

...........................cm

(2)

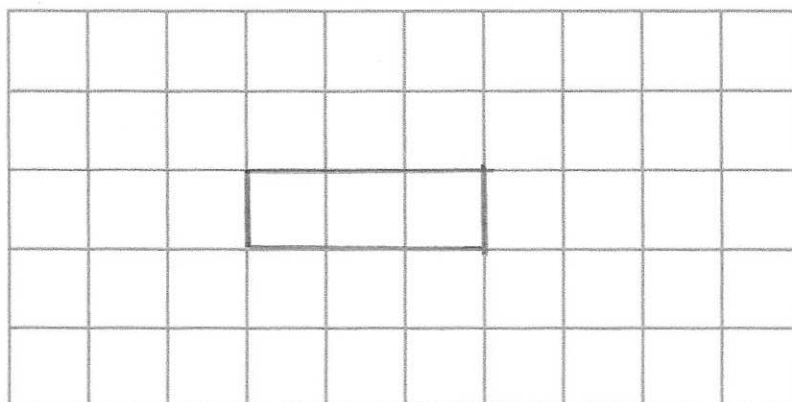81. The diagram below shows a shape made with centimetre cubes.

Front

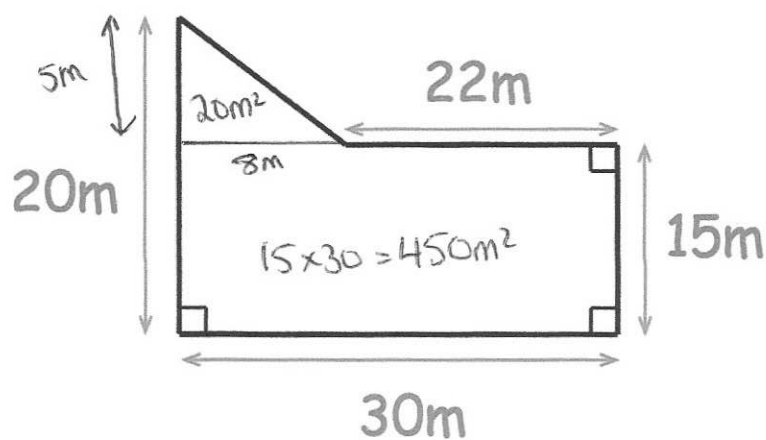(a) On the centimetre square grid, draw the front elevation.

(2)

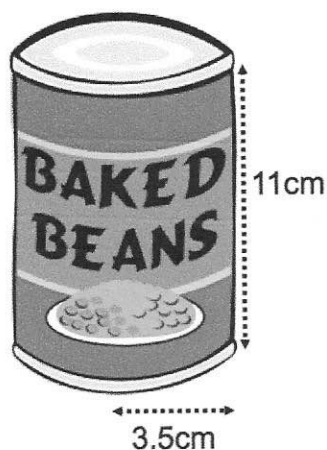(b) On the centimetre square grid, draw the plan view.

(2)

82.

5m
20m²
22m
8m
20m
15×30 = 450m²
15m
30m

Calculate the area of the field.

450 + 20 = 470m²

.........470..... m²

(2)

83.

11cm

3.5cm

Calculate the volume of the can.

$$\pi \times 3.5^2 \times 11$$
$$= 423.3296\ldots$$

423.33 cm³

(3)

84.

9cm
h

x

7.4cm
O
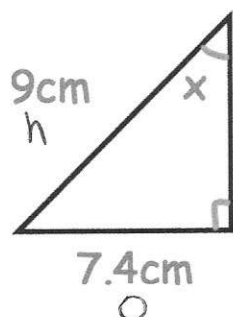
Find the size of angle x

$$\sin x = \frac{7.4}{9}$$

$$x = \sin^{-1}\left(\frac{7.4}{9}\right)$$

$$x = 55.3078\ldots$$

55.31°

(3)

85.

120°

15cm

Calculate the perimeter.
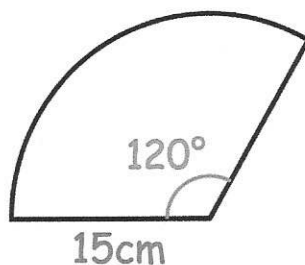
$P = 15 + 15 + 31.4159...$

$P = 61.4159...$

$$\frac{120}{360} \times \pi \times 30$$

$$= \frac{1}{3}\pi \times 30$$

$$= 31.4159...$$

.............61.42... cm

(3)

86.

6cm
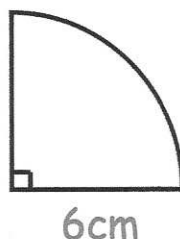
Calculate the area.

$$\frac{90}{360} \times \pi \times 6^2$$

$$\frac{1}{4}\pi \times 36$$

$$= 28.27$$

.............28.27 cm²

(3)

87. Shown is a sphere with radius 8cm.

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

8cm
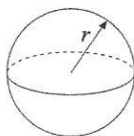
$SA = 4\pi(8)^2$

$SA = 804.2477193$

Calculate the surface area of the sphere.

.............804.25 cm²

(3)

88. A cone has base diameter 8cm.
The height of the cone is 9cm.

Calculate the volume of the cone.

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

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

9cm

8cm
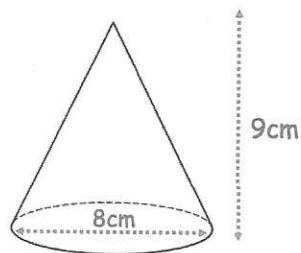
$$V = \frac{1}{3}\pi(4)^2 \times 9$$

$$V = 150.796\ldots$$

.......150.8....... cm³

(3)

---

89. Given $\mathbf{a} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2 \\ 7 \end{pmatrix}$

Work out $2\mathbf{a} + \mathbf{b}$

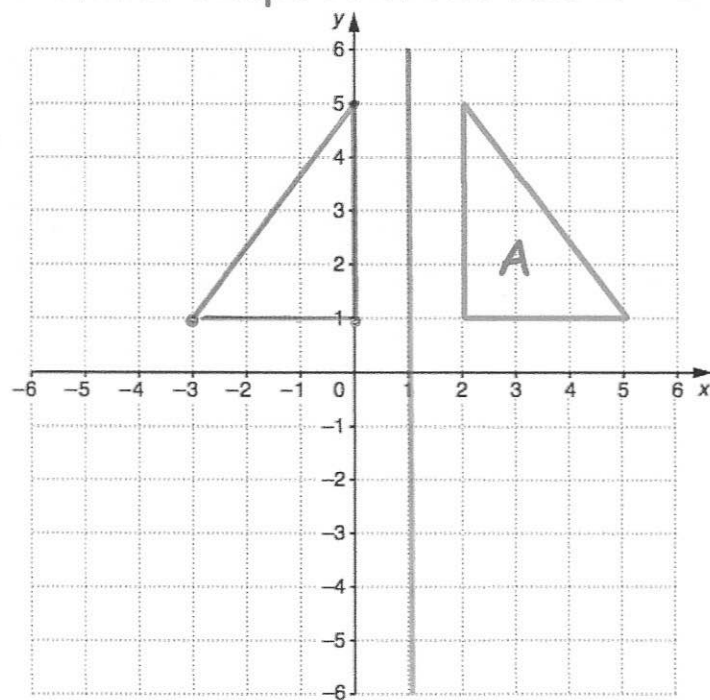$$\begin{pmatrix} 6 \\ 0 \end{pmatrix} + \begin{pmatrix} 2 \\ 7 \end{pmatrix}$$

$$= \begin{pmatrix} 8 \\ 7 \end{pmatrix}$$

$\begin{pmatrix} 8 \\ 7 \end{pmatrix}$

(3)

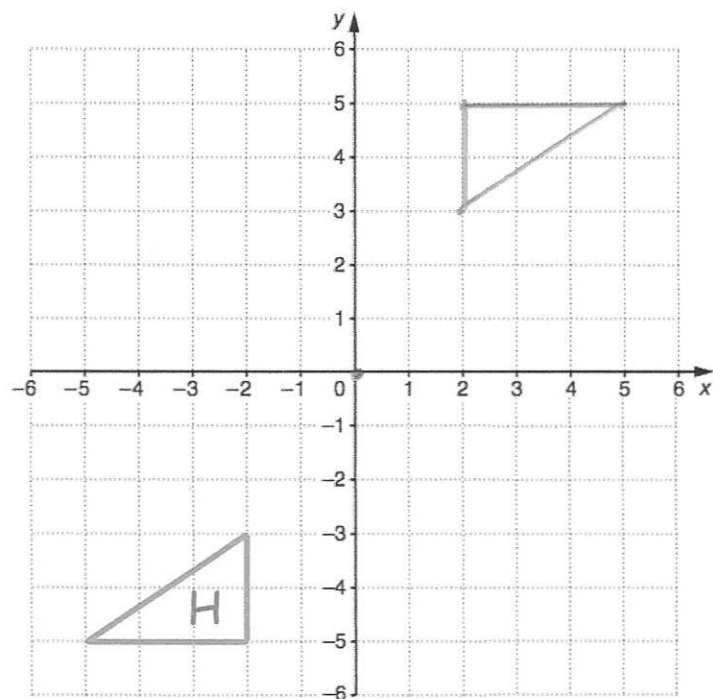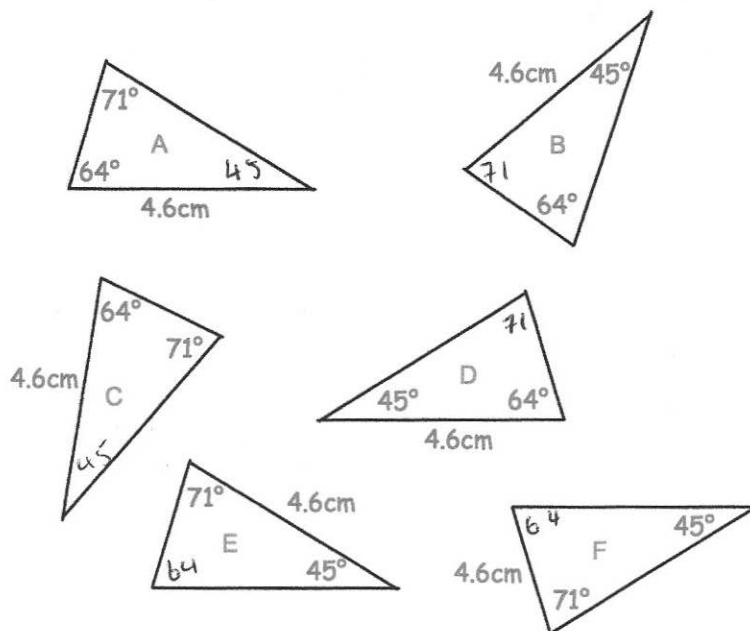90.

Reflect shape A in the line x = 1

91.

rotate 180° about (0, 0)
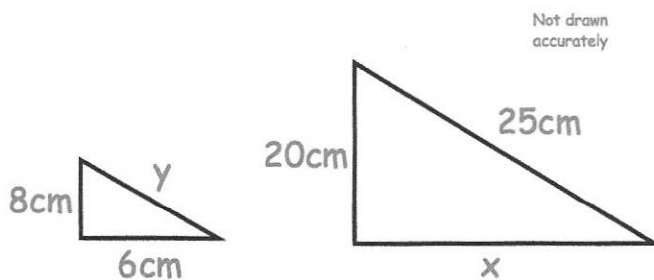
92. Shown below are six triangles that are not drawn accurately.

71°
64°   A   45
       4.6cm

4.6cm 45°
       B
       71
       64°

64°
    71°
4.6cm   C
   45

        71
        D
45°   64°
    4.6cm

71°   4.6cm
    E
64   45°

        64   45°
4.6cm   F
        71°

Which two triangles are congruent to triangle A?

...........C........ and ....D...........

(2)

93. Shown below are two similar triangles.

Not drawn
accurately

25cm
20cm

8cm   y

6cm   x

(a) Find the size of x.

$$\frac{20}{8} = \frac{x}{6} \qquad x = 15$$

$$8x = 120$$

.............15....cm

(2)

(b) Find the size of y.
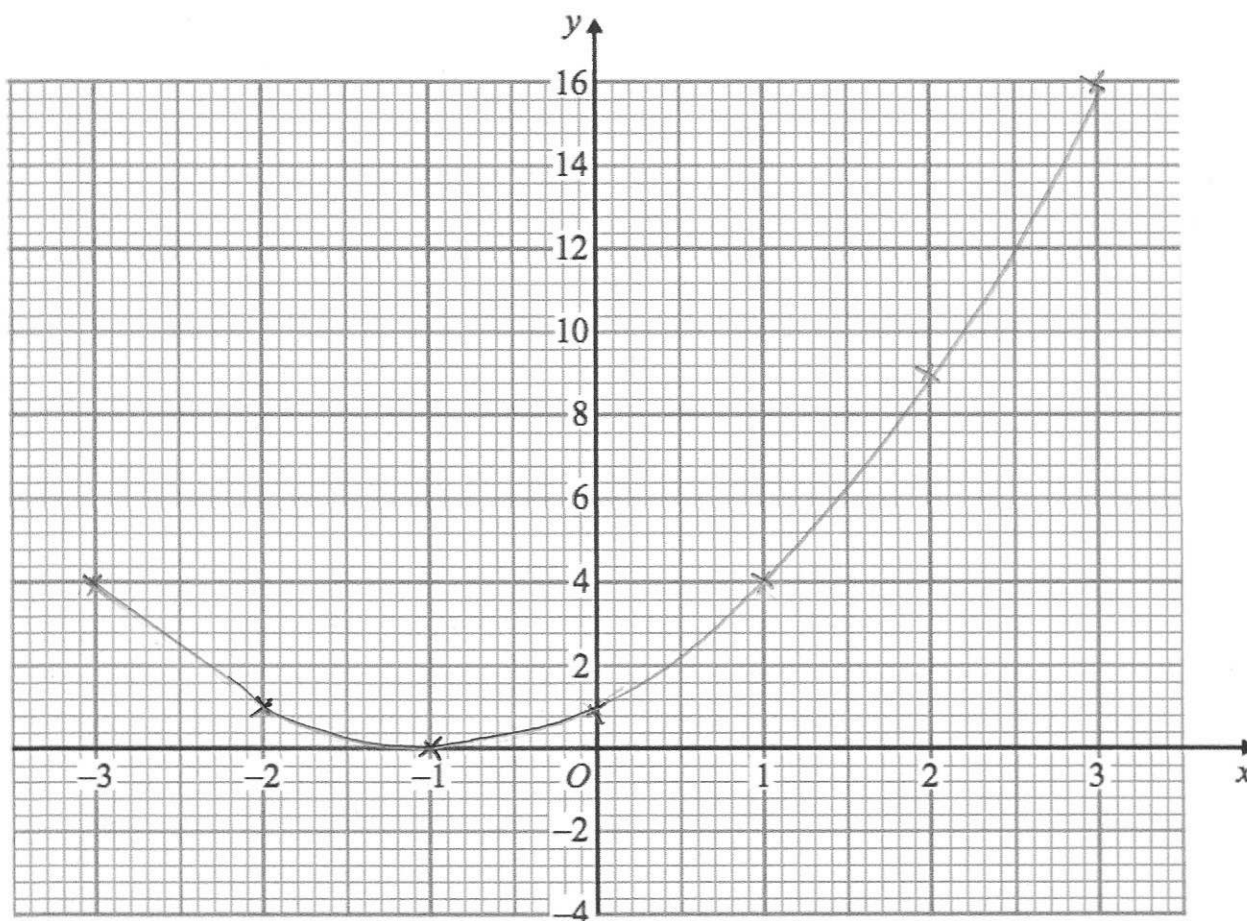
$$\frac{20}{8} = \frac{25}{y} \qquad 20y = 200$$

$$y = 10$$

...........10.....cm

(2)

94. (a) Complete the table of values for $y = x^2 + 2x + 1$

x	-3	-2	-1	0	1	2	3
y	4	1	0	1	4	9	16

(2)

(b) On the grid, draw the graph of $y = x^2 + 2x + 1$ for the values of x from -3 to 3.

(2)

95.   Solve the simultaneous equations

$$3x + 2y = 16 \;①\; \times 2$$
$$2x - 3y = 2 \;②\; \times 3$$

Do not use trial and improvement

$$6x + 4y = 32$$
$$(-) \; 6x - 9y = 6$$
$$\overline{13y = 26}$$
$$y = 2$$

$$3x + 2(2) = 16$$
$$3x = 12$$
$$x = 4$$

x = ...4.............. y = ...2..............

(4)

96.   Make v the subject of

$$t = \frac{v}{4} + 1$$

$$\frac{v}{4} = t - 1$$

$$v = 4(t-1)$$

v = ...4(t-1)........

(2)

or

$$v = 4t - 4$$

97. Sarah is x years old.
    Thomas is 3 years older than Sarah.
    David is twice as old as Sarah.
    The total of their ages is 51.

    (a) Write an expression for Thomas's age in terms of x.

    $x + 3$

    (1)

    (b) Write an expression for David's age in terms of x.

    $2x$

    (1)

    (c) Form an equation in x and solve it to work out Sarah's age.

    $x + x + 3 + 2x = 51$

    $4x + 3 = 51$

    $4x = 48$

    $x = 12$

    12

    (2)

---

98. Write down the equation of the line that is parallel to y = 6x + 1 and passes through (0, 8).

    ~~6x + 1 = 8~~

    $8 = c$

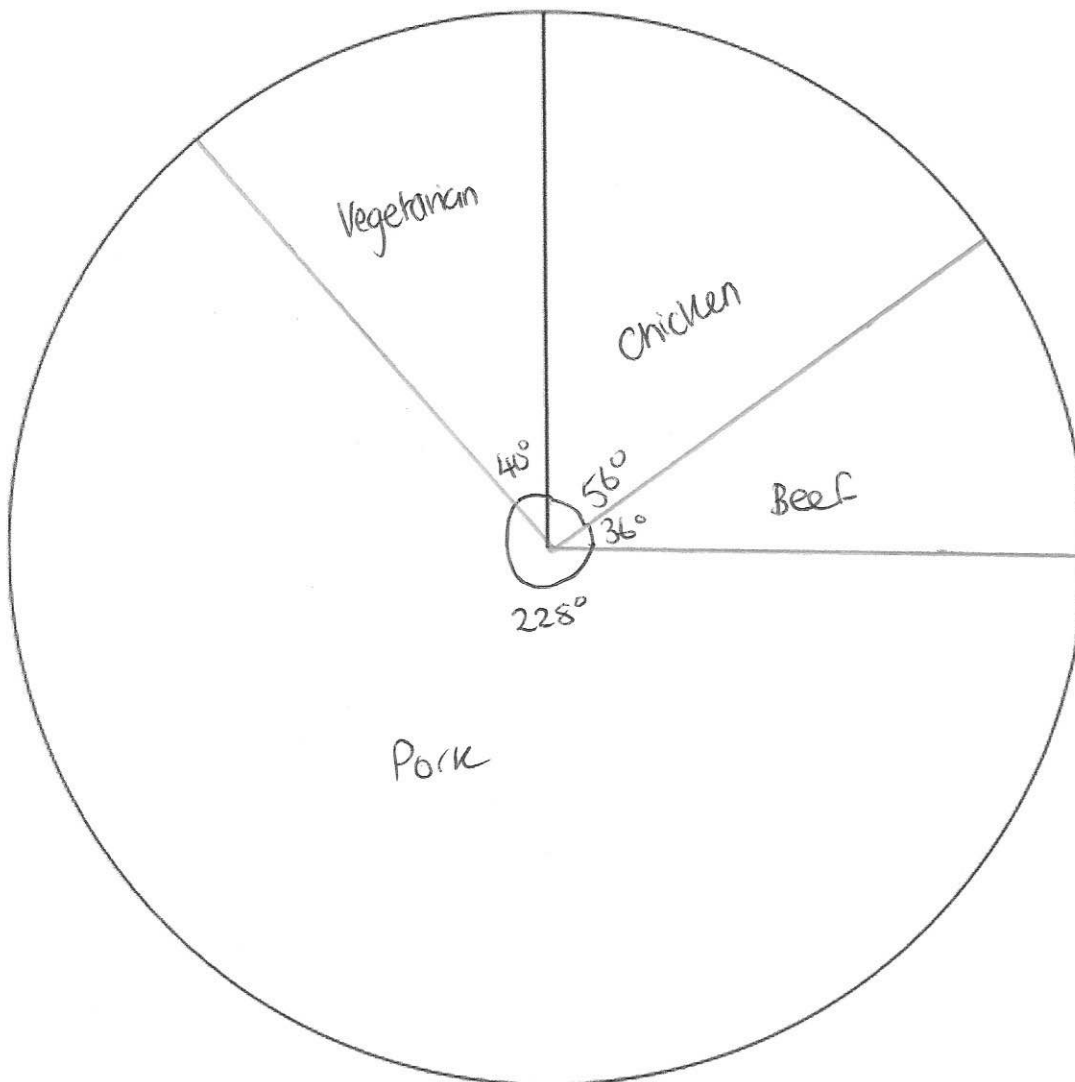 $y = 6x + 8$

    $y = 6x + 8$

    (2)

99. The table gives information about the meals ordered on a Sunday.

Meal	Frequency		Angle
Chicken	14	×4	56°
Beef	9	×4	36°
Pork	57	×4	228°
Vegetarian	10	×4	40°

90

$360 \div 90 = 4°$

Draw an accurate pie chart to show this information.

(4)

100. Simplify the following.

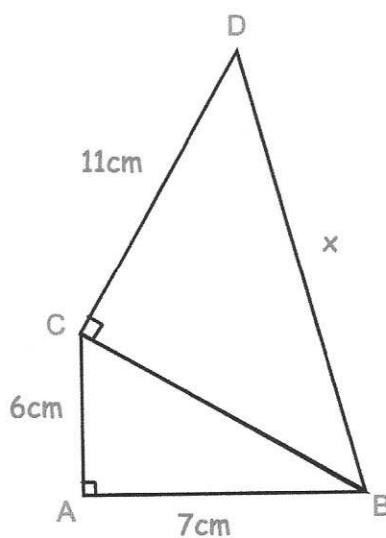$$\frac{s^3 \times s^4}{s^2}$$

$$\frac{s^7}{s^2} = s^5$$

........s^5........

(2)

---

101. Write down the exact value of Sin 60°

$$\frac{\sqrt{3}}{2}$$

........(1)

---

102. Below are two triangles, ABC and BCD.

Find x

$$6^2 + 7^2 = BC^2$$
$$85 = BC^2$$
$$BC = \sqrt{85}$$

$$BC^2 + 11^2 = BD^2$$
$$206 = BD^2$$
$$\sqrt{206} = BD$$

........14·35....cm

(4)

103. Shown is a circle with radius 5cm.

5cm
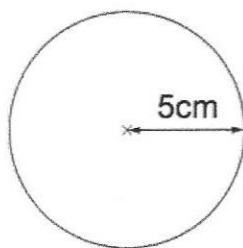
Work out the area of the circle.

State the units for your answer.
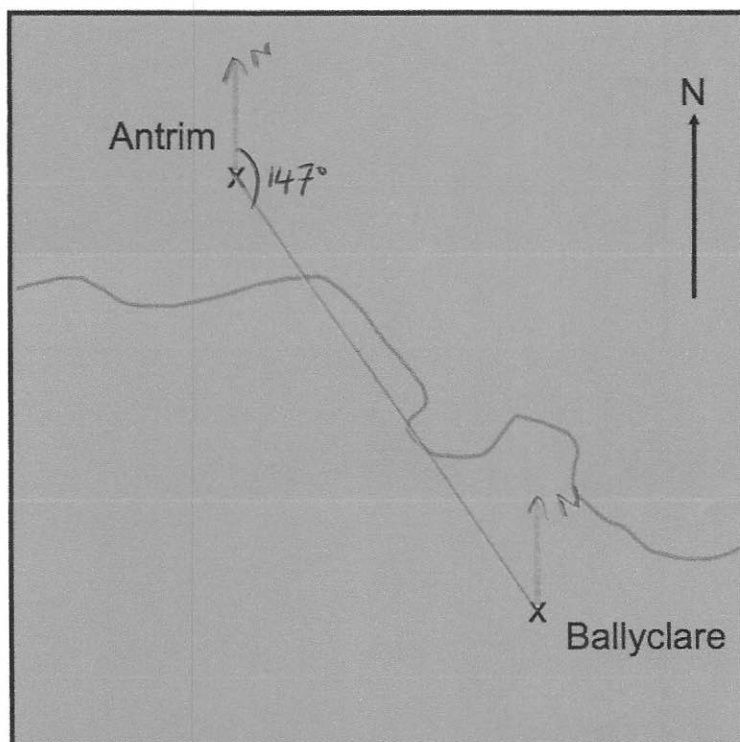Give your answer to 2 decimal place.

$A = \pi r^2$

$A = \pi(25)$

$A = 78.5398$

78.54 cm² ....

(3)

104. The map below shows the position of two towns.

Antrim

X) 147°

N

X
Ballyclare

Find the bearing of Ballyclare from Antrim.

147° .... °

(1)

105.

6cm

4cm

x cm
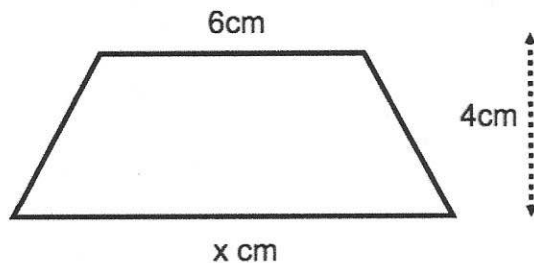
The area of the trapezium is 34cm².

Work out the value of x.

$$\frac{1}{2}(a+b) \times h$$

$$\frac{1}{2}(6+x) \times 4 = 34$$

$$(6+x) \times 4 = 68$$

$$6 + x = 17$$

$$x = 11$$

..............11........cm

(2)

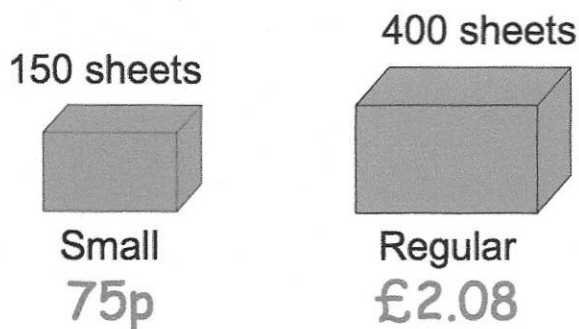106. A number, n, is rounded to 1 decimal place.
The result is 1.8

Using inequalities, write down the error interval for n.

$$1.75 \leq n < 1.85$$

.................$1.75 \leq n < 1.85$.................

(3)

107. There are two different packets of the same type of paper in a shop.

400 sheets

150 sheets

Small
75p

Regular
£2.08

Which of the two packets gives the better value for money?
You must show your working.

LCM of 150 and 400 = 1200

£0.75 × 8 = £6   } Therefore the small packet
£2.08 × 3 = £6.24   }   is better value.

(4)

108. Use your calculator to work out the value of

$$\sqrt[3]{(25.4 - 5.9)^2}$$

Give your answer to 3 decimal places.

7.245

(3)

109. Geraint has 2p and 50p coins in the ratio 20 : 3

Write the ratio of the value of the 2p coins to the value of 50p coins in its simplest form.

$$2 \times 20 = 40$$
$$50 \times 3 = 150$$

$$40 : 150 \div 10$$
$$\div 10 \quad 4 : 15$$

4:15

(3)