

Calculators must **not** be used in this paper.

1



Write down the order of rotational symmetry of the diagram.

..... 2 [1]

- 2 At noon the temperature in Maseru was  $21^{\circ}\text{C}$ .  
At midnight the temperature had fallen by  $26^{\circ}\text{C}$ .

Work out the temperature at midnight.

..... -5  $^{\circ}\text{C}$  [1]

- 3 Work out.

(a)  $0.3 \times 0.07$

$$\frac{3}{10} \times \frac{7}{100} = \frac{21}{1000}$$

..... 0.021 [1]

(b)  $8 \div 0.2$

$$\frac{8}{1} \div \frac{2}{10} = 4\frac{8}{1} \times \frac{10}{2} =$$

..... 40 [1]

- 4 Write down

(a) a square number greater than 10

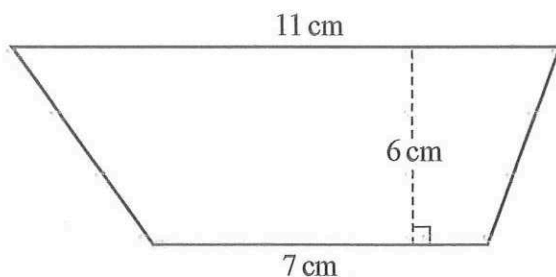
..... 16 [1]

(b) the reciprocal of 20.

.....  $\frac{1}{20}$  0.05 [1]

4

5

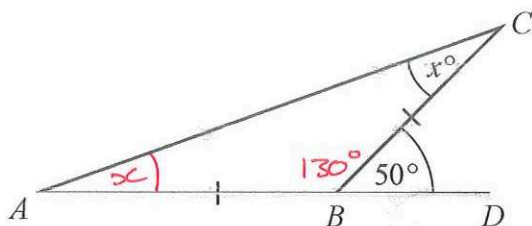
NOT TO  
SCALE

Work out the area of the trapezium.

$$\frac{7+11}{2} \times 6 = 9 \times 6$$

$$\dots\dots\dots 54 \dots\dots \text{cm}^2 [2]$$

6

NOT TO  
SCALE $AB = BC$  and  $ABD$  is a straight line.Find the value of  $x$ .

$$180 - 130^\circ = 50^\circ$$

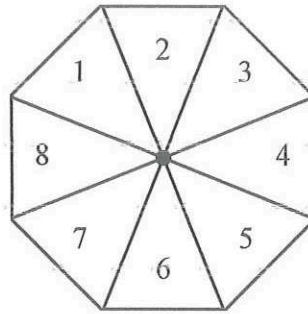
$$\frac{50}{2} = 25$$

$$x = \dots\dots\dots 25^\circ \dots\dots [2]$$

7 Write 0.00067 in standard form.

$$\dots\dots\dots 6.7 \times 10^{-4} \dots\dots [1]$$

- 8 Jude has a fair 8-sided spinner numbered 1 to 8.



- (a) Jude spins the spinner once.

Find the probability that the spinner lands on

- (i) a number greater than 6

$$\frac{2}{8} \text{ or } \frac{1}{4} \text{ or } 25\% \quad [1]$$

- (ii) an even number or a multiple of 7.

$$4 + 1$$

$$\frac{5}{8} \quad 62.5\% \quad [1]$$

- (b) Jude spins the spinner 240 times.

Work out the expected number of times the spinner lands on a number greater than 6.

$$240 \times \frac{1}{4} = 60$$

$$60 \quad [1]$$

- 9 Using a ruler and pair of compasses only, construct a rhombus with side length 6 cm and a diagonal of length 9.5 cm.

One side has been drawn for you.

[3]

- 10 The time that Rafiq works is divided into meetings, planning and working on a computer.

One day, Rafiq is

- in meetings for  $\frac{3}{4}$  of the time
- planning for  $\frac{1}{5}$  of the time
- working on a computer for the remaining 25 minutes of the time.

Work out the total time that Rafiq works this day.

Give your answer in hours and minutes.

$$5 \times \frac{3}{4} + \frac{1}{5} \times 4$$

$$\frac{15}{20} + \frac{4}{20} = \frac{19}{20}$$

$$\frac{1}{20} = 25 \text{ minutes.}$$

$$15 \times 25 \text{ min}$$

$$4 \times 25 \text{ min} = 100 \text{ min}$$

$$\frac{20}{20} = 20 \times 25 = 500 \text{ min}$$

|     |   |
|-----|---|
| 60  | 1 |
| 120 | 2 |
| 180 | 3 |
| 240 | 4 |
| 300 | 5 |
| 360 | 6 |
| 420 | 7 |
| 480 | 8 |

.....8..... hours .....20..... minutes [5]

11 (a) Expand.

$$2x(3x^2 - 8x)$$

$$6x^3 - 16x^2$$

$$\underline{6x^3 - 16x^2} \quad [2]$$

(b) (i) Factorise.

$$x^2 - 19^2$$

$$\underline{(x - 19)(x + 19)} \quad [1]$$

(ii) Work out.

$$81^2 - 19^2$$

$$\begin{array}{r} 81 \\ - 19 \\ \hline 62 \end{array} \quad \begin{array}{r} 81 \\ + 19 \\ \hline 100 \end{array} \quad \begin{array}{l} (81 - 19)(81 + 19) \rightarrow 62 \times 100 \\ (9^2 - 19)(9^2 + 19) \\ (9 - 19)(9 + 19)(100) \end{array}$$

$$\underline{6200} \quad [2]$$

(c) Factorise.

$$3x(a + 4y) - ay - 4y^2$$

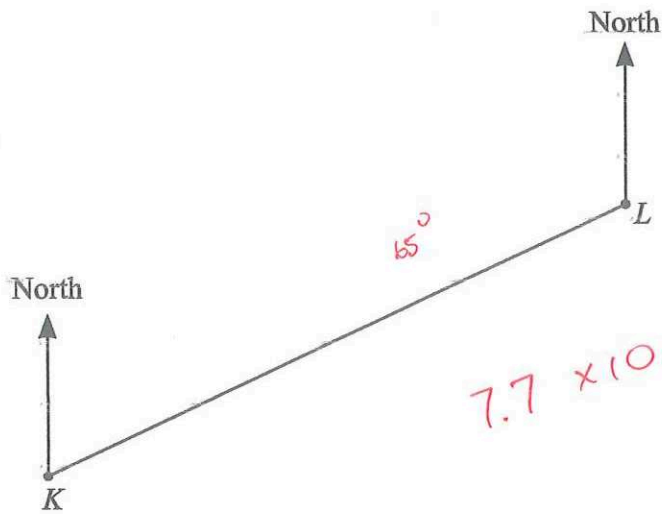
~~3x~~

$$3x(a + 4y) - y(a + 4y)$$

$$(a + 4y)(3x - y)$$

$$\underline{(a + 4y)(3x - y)} \quad [1]$$

- 12 The scale drawing shows the positions of town  $K$  and town  $L$ .  
The scale is 1 cm represents 10 km.



Scale : 1 cm to 10 km

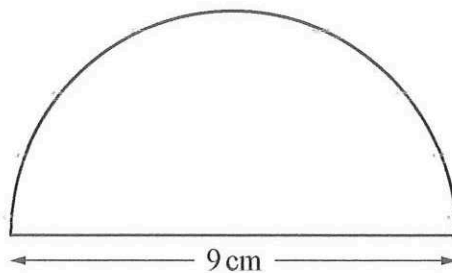
- (a) Find the actual distance between town  $K$  and town  $L$ .

..... 77 km [2]

- (b) Measure the bearing of town  $L$  from town  $K$ .

..... 065 [1]

★ 13



NOT TO  
SCALE

The diagram shows a semicircle with diameter 9 cm.

Calculate the total perimeter of this semicircle.  
Give your answer in exact form.

$$\frac{1}{2} \times 2\pi r + 9$$

$$\pi(4.5) + 9$$

$$4.5\pi + 9$$

mark? 3? [ ]

- 14 Point  $A$  has coordinates  $(-4, 1)$  and  $\vec{BA} = \begin{pmatrix} -5 \\ -12 \end{pmatrix}$ .

(a) Find the coordinates of point  $B$ .

*revise*

$A (-4, 1)$   $B (1, 13)$   
 $\vec{BA} = \begin{pmatrix} -5 \\ -12 \end{pmatrix}$

$(\dots\dots\dots 1 \dots\dots\dots, \dots\dots\dots 13 \dots\dots\dots)$  [2]

(b) Point  $C$  has coordinates  $(5, -2)$ .

Find the vector  $\vec{CA}$ .

$\vec{CA} = \begin{pmatrix} -9 \\ 3 \end{pmatrix}$  [2]

(c)  $\vec{EF} = 3\vec{BA}$

Find  $|\vec{EF}|$ .

$3 \begin{pmatrix} -5 \\ -12 \end{pmatrix} = \begin{pmatrix} -15 \\ -36 \end{pmatrix}$

$|\vec{BA}| = \sqrt{25 + 144}$   
 $= \sqrt{169}$   
 $= 13$

$$\begin{array}{r} 13 \\ \times 13 \\ \hline 39 \\ 130 \\ \hline 169 \end{array}$$

$3 \times 13 = 39 \rightarrow$

$\dots\dots\dots 39 \dots\dots\dots$  [3]

✓

15 Work out.

$$\frac{2}{5} + 0.\dot{3}\dot{7}$$

Give your answer as a fraction in its simplest form.

$$\begin{aligned} x &= 0.\dot{3}\dot{7} \\ \rightarrow 10x &= 3.\dot{7} \\ \rightarrow 100x &= 37.\dot{7} \end{aligned}$$

$$\frac{2 \times 9}{5 \times 9} = \frac{18}{45}$$

$$90x = 34$$

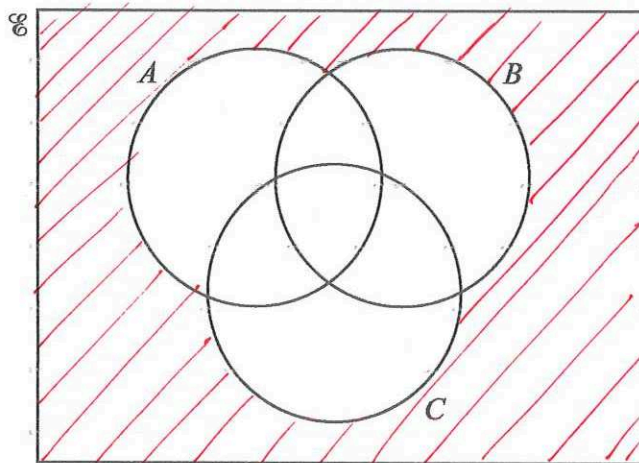
$$\begin{aligned} x &= \frac{34}{90} \\ &= \frac{17}{45} \end{aligned}$$

$$\frac{17}{45} + \frac{18}{45} = \frac{35}{45} = \frac{7}{9}$$

$$\frac{7}{9}$$

[4]

16

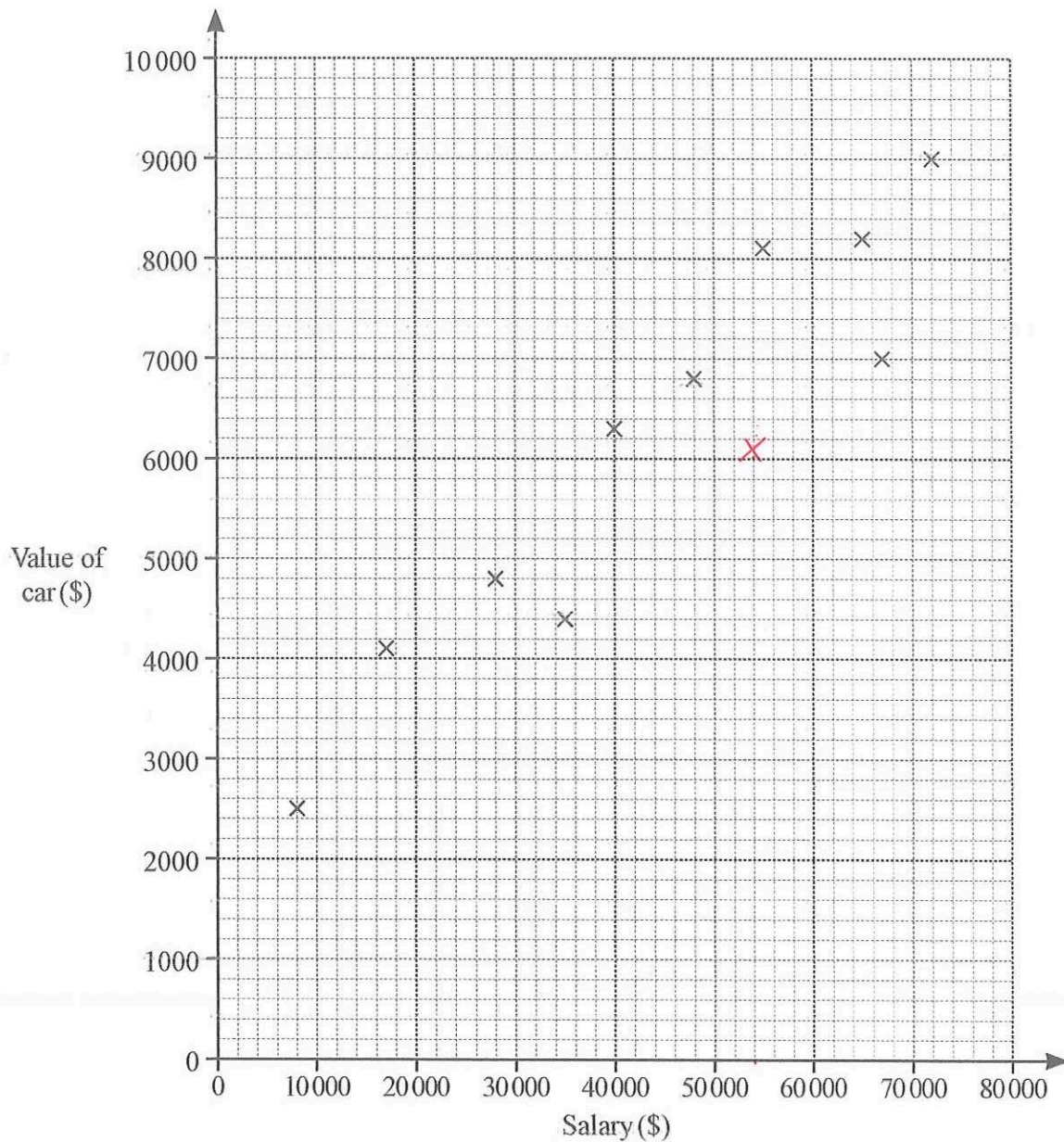
In the Venn diagram, shade the region  $(A \cup B \cup C)'$ .

[1]

5



- 17 For each of 10 people working in an office, the scatter diagram shows their salary and the value of their car.



- (a) One of these people has a salary of \$28 000.

Find the value of their car.

\$ ..... 4800 ..... [1]

- (b) Another person starts to work in the office.  
Their salary is \$54 000 and the value of their car is \$6100.

Plot this information on the scatter diagram.

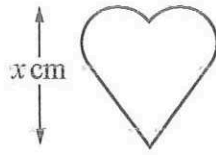
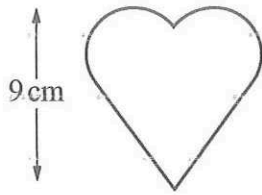
[1]

- (c) What type of correlation is shown in the scatter diagram?

..... Positive ..... [1]

13

18

NOT TO  
SCALE

The two shapes are mathematically similar.

The area of the larger shape is  $36 \text{ cm}^2$  and the area of the smaller shape is  $25 \text{ cm}^2$ .

The height of the larger shape is  $9 \text{ cm}$  and the height of the smaller shape is  $x \text{ cm}$ .

Find the value of  $x$ .

$$\sqrt{\frac{36}{25}} = \frac{6}{5} = 1.2$$

$$\frac{5}{6} = 0.8$$

$$\frac{39}{1} \times \frac{5}{62} = \frac{15}{2}$$

$$x = \dots\dots\dots 7.5 \dots\dots\dots [3]$$

19 (a) Simplify.

$$\sqrt{300} + \sqrt{48}$$

$$\sqrt{100}\sqrt{3} + \sqrt{16}\sqrt{3}$$

$$= 10\sqrt{3} + 4\sqrt{3}$$

$$= 14\sqrt{3}$$

$$\dots\dots\dots 14\sqrt{3} \dots\dots\dots [2]$$

(b) Rationalise the denominator and simplify.

$$\frac{9}{2+\sqrt{7}} \times \frac{(2-\sqrt{7})}{(2-\sqrt{7})}$$

$$= \frac{9(2-\sqrt{7})}{4+2\sqrt{7}-2\sqrt{7}-7}$$

$$= \frac{39(2-\sqrt{7})}{-31}$$

$$= -3(2-\sqrt{7})$$

$$\dots\dots\dots -3(2-\sqrt{7}) \dots\dots\dots [3]$$

$$-6 + 3\sqrt{7}$$

8

- 20 (a) Write down the coordinates of the point where the graph of  $y = 5x - 3$  crosses the  $y$ -axis.

(.....<sup>0</sup>....., .....<sup>-3</sup>.....) [1]

- (b)  $A$  is the point  $(1, 7)$  and  $B$  is the point  $(5, 15)$ .

Find the equation of the perpendicular bisector of the line  $AB$ .  
Give your answer in the form  $y = mx + c$ .

$$m = \frac{15-7}{5-1} \checkmark$$

$$= \frac{8}{4}$$

$$= 2 \checkmark$$

$$y = -\frac{1}{2}x + c \checkmark$$

$$(3, 11) \quad 11 = -\frac{1}{2}(3) + c$$

$$11 + 1.5 = c$$

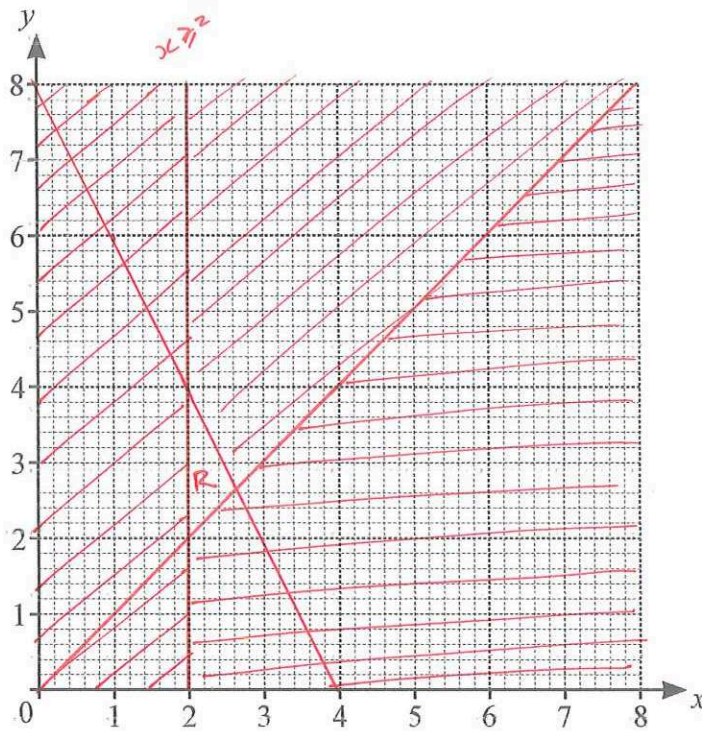
$$c = 12.5$$

$$\text{midpoint } AB = \left( \frac{1+5}{2}, \frac{7+15}{2} \right)$$

$$= (3, 11) \checkmark$$

$$y = \dots\dots\dots^{-\frac{1}{2}x + 12.5} \checkmark \quad [5]$$

6



- (a) By drawing suitable lines and shading the unwanted regions, find the region,  $R$ , where

$$x \geq 2, \quad y \geq x \quad \text{and} \quad 2x + y \leq 8.$$

$$y \leq -2x + 8$$

[5]

- (b) The point  $P$  lies in the region  $R$ .

The coordinates of  $P$  are  $(a, b)$ .

Write down the largest possible value of  $a + b$ .

check.

6

[1]

6



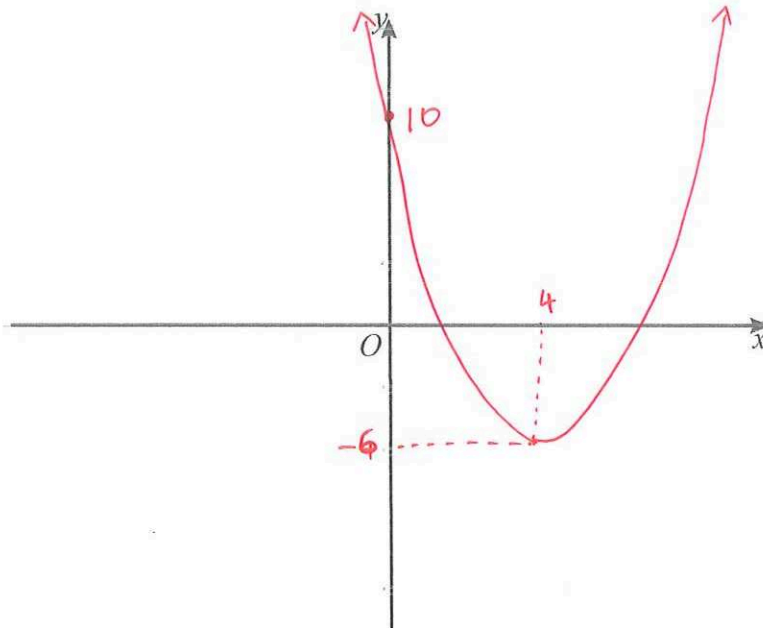
- 22 (a) (i) Write  $x^2 - 8x + 10$  in the form  $(x - a)^2 - b$ .

$$x^2 - 8x + 16 - 16 + 10$$

$$(x - 4)^2 - 6$$

$$(x - 4)^2 - 6 \dots\dots\dots [2]$$

- (ii) Sketch the graph of  $y = x^2 - 8x + 10$ .  
On the sketch, label the coordinates of the turning point and the  $y$ -intercept.



[3]

- (b) A point  $P$  lies on the graph of  $y = x^2 - 8x + 10$ .  
The gradient of the graph at  $P$  is 6.

Find the coordinates of  $P$ .

$$\frac{dy}{dx} = 2x - 8$$

$$6 = 2x - 8$$

$$2x = 14$$

$$x = 7$$

$$y = (7)^2 - 8(7) + 10$$

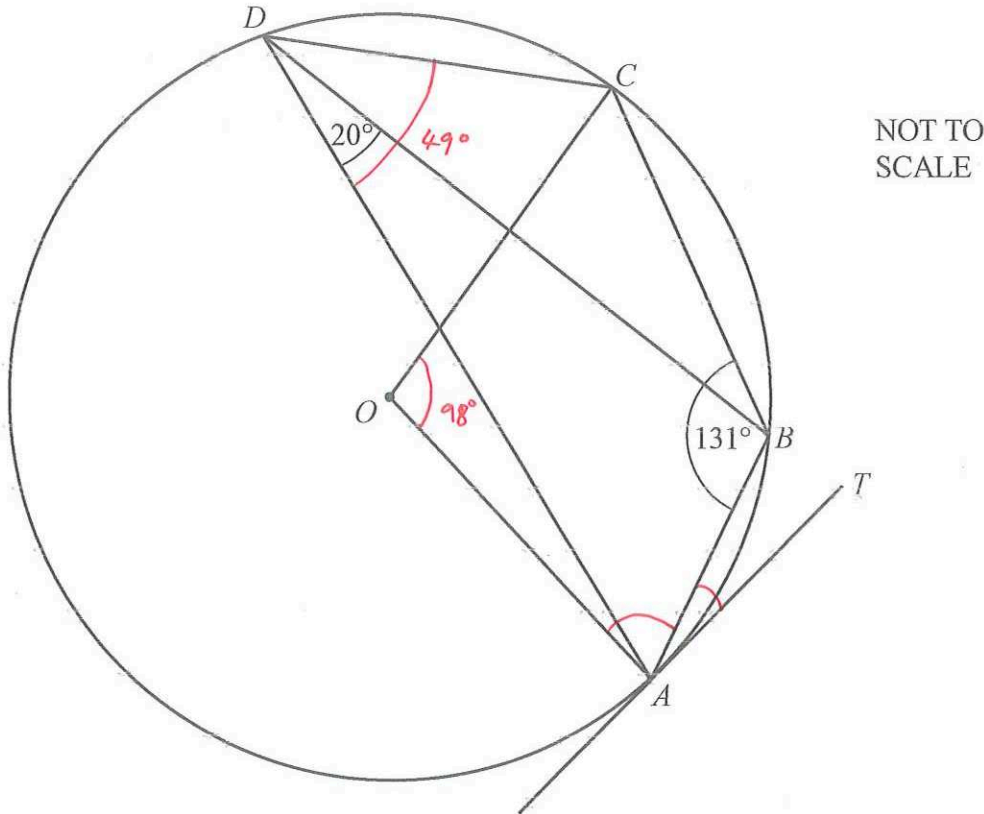
$$= 49 - 56 + 10$$

$$= 3$$

$$= 3$$

$$(\underline{7}, \underline{3}) \dots\dots\dots [4]$$

9



$A, B, C$  and  $D$  lie on the circle, centre  $O$ .  
 $TA$  is a tangent to the circle at  $A$ .  
 Angle  $ABC = 131^\circ$  and angle  $ADB = 20^\circ$ .

Find

(a) angle  $ADC$

$$180 - 131 = 49$$

Angle  $ADC = \dots\dots\dots 49^\circ \dots\dots\dots [1]$

(b) angle  $AOC$

$$49 \times 2$$

Angle  $AOC = \dots\dots\dots 98^\circ \dots\dots\dots [1]$

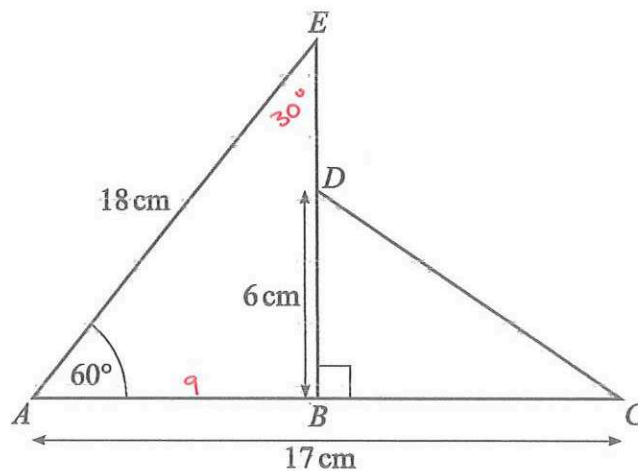
(c) angle  $BAT$

Angle  $BAT = \dots\dots\dots 20^\circ \dots\dots\dots [1]$

(d) angle  $OAB$ .

$$90 - 20 = 70$$

Angle  $OAB = \dots\dots\dots 70^\circ \dots\dots\dots [1]$

NOT TO  
SCALE

The quadrilateral  $ACDE$  is formed by two right-angled triangles  $ABE$  and  $BCD$ .  
 $AC = 17$  cm,  $AE = 18$  cm and  $BD = 6$  cm.

(a) Show that  $CD = 10$  cm.

$$\sin \hat{E} = \frac{o}{h}$$

$$\sin 30^\circ = \frac{AB}{18} \quad \checkmark$$

$$0.5 = \frac{AB}{18}$$

$$AB = 9 \text{ cm} \quad \checkmark$$

$$\therefore BC = 8 \text{ cm} \quad (17 - 9) \quad \checkmark$$

$$DC^2 = BD^2 + BC^2 \quad (Pyth)$$

$$= 36 + 64 \quad \checkmark$$

$$= 100 \quad \checkmark$$

$$DC = 10 \quad \rightarrow$$

[5]

(b) Find the perimeter of the quadrilateral  $ACDE$ .  
 Give your answer in the form  $p + k\sqrt{q}$ .

$$\begin{aligned} P &= AE + AC + CD + DE \\ &= 18 + 17 + 10 + (BE - 6) \\ &= 45 + (\sqrt{18^2 - 9^2} - 6) \\ &= 45 + (9\sqrt{3} - 6) \\ &= 39 + 9\sqrt{3} \end{aligned}$$

$$\begin{aligned} &\sqrt{(18-9)(18+9)} \\ &\sqrt{9 \times 27} \\ &\sqrt{9 \times 3 \times 9} \\ &3 \times 3 \\ &9\sqrt{3} \end{aligned}$$

$$\dots 39 + 9\sqrt{3} \dots \text{ cm} \quad [4]$$

9

- 25 Solve  $2\sin x - 1 = 0$  for  $0^\circ < x < 360^\circ$

$$2\sin x = 1$$

$$\sin x = \frac{1}{2}$$

$$\sin 30^\circ = \frac{1}{2}$$

$$x = 30^\circ$$

$$\sin \theta = \sin (180^\circ - \theta)$$

$$\sin 30^\circ = \sin 150^\circ$$

$$x = 30^\circ \text{ or } x = 150^\circ \quad [3]$$

- 26 (a) Simplify  $\left(\frac{x^2}{4}\right)^{\frac{3}{2}}$ .

$$\left(\frac{x^2}{2^2}\right)^{\frac{3}{2}}$$

$$= \frac{x^3}{2^3}$$

$$\frac{x^3}{8}$$

$$\dots\dots\dots [2]$$

- (b)  $16^x \times \left(\frac{1}{2}\right)^x = 4^{x+3}$

Find the value of  $x$ .

$$(2^4)^x \times (2^{-1})^x = (2^2)^{x+3}$$

$$2^{4x} \cdot 2^{-x} = 2^{2x+6}$$

$$2^{3x} = 2^{2x+6}$$

$$3x = 2x + 6$$

$$x = 6$$

$$x = 6$$