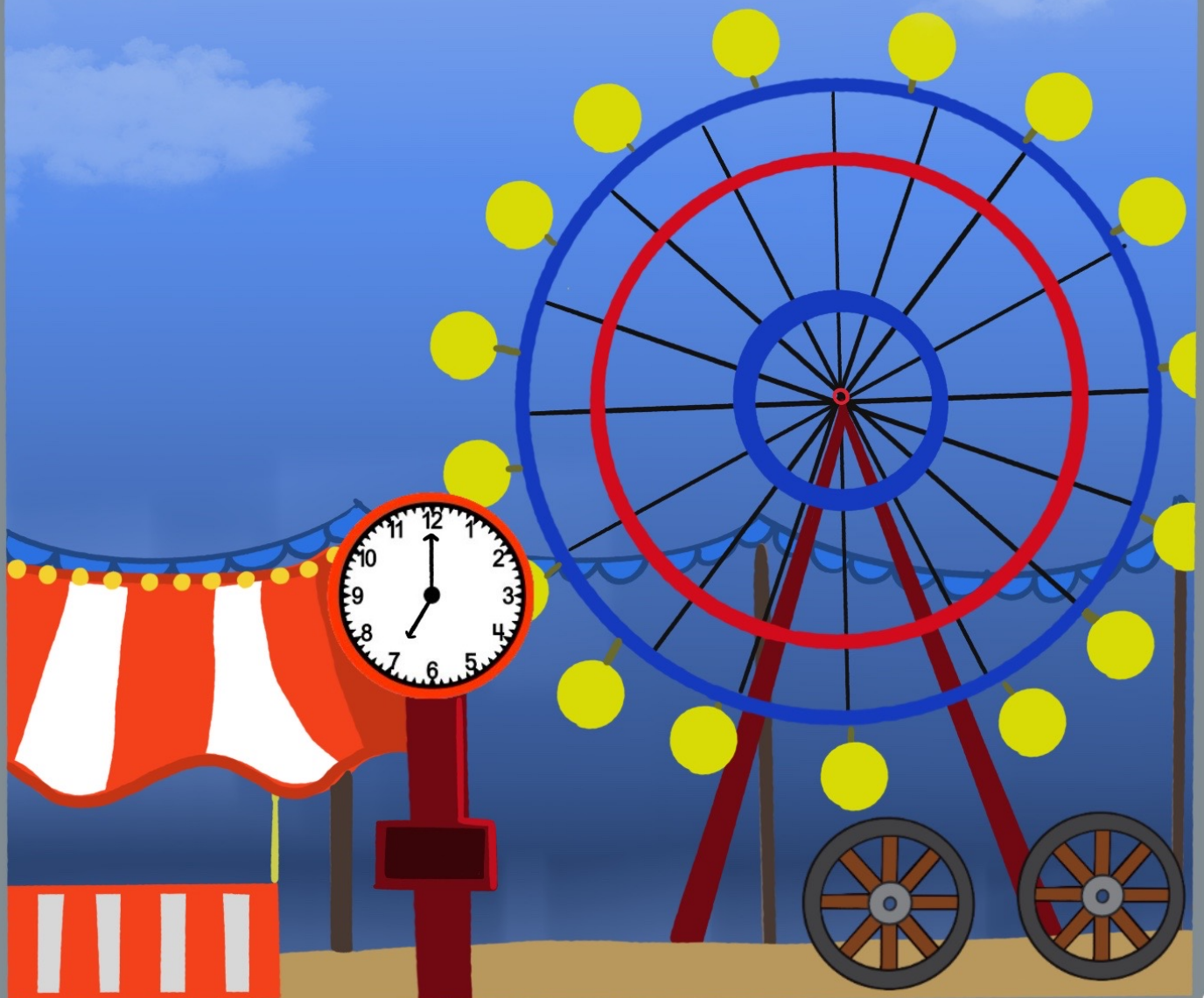# Circle

Question 1

AB is an arc of a circle, centre O, radius $9\,\text{cm}$.
The length of the arc AB is $6\pi\,\text{cm}$.
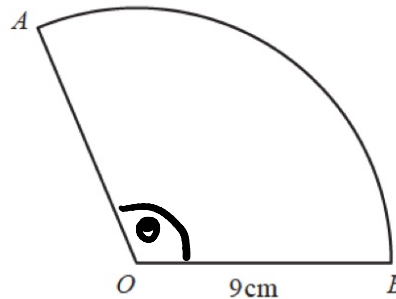The area of the sector AOB is $k\pi\,\text{cm}^2$.

Find the value of k.

NOT TO SCALE

$$\frac{\theta}{360} \times 2\pi r = 36\pi$$
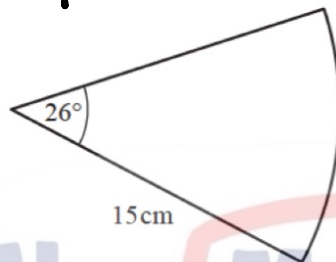
$$\theta = \frac{3 \times 360^{40}}{9} = 120°$$

$$\frac{120}{360}^{3} \times \pi r^2$$
$$= 9 \times 3\pi$$
$$= 27\pi \text{ cm}^2$$
$$\therefore k = 27$$

Question 2

NOT TO SCALE
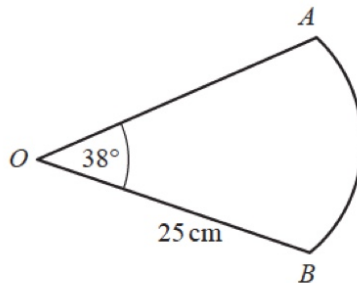
$26°$

$15\,\text{cm}$

The diagram shows a sector of a circle with radius $15\,\text{cm}$.

Calculate the perimeter of this sector.

$$\frac{26}{360} \times 2\pi r = \frac{13\pi}{6}$$

$$P = \frac{13}{6}\pi + 30 = 36.8 \text{ cm}$$
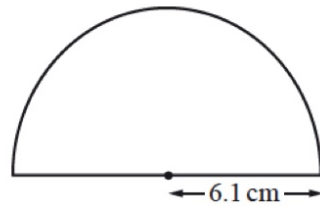
[3]

Question 3

NOT TO SCALE

O $38°$

$25\,\text{cm}$

The diagram shows a sector of a circle, centre O, radius $25\,\text{cm}$.
The sector angle is $38°$.

Calculate the length of the arc AB.
Give your answer correct to 4 significant figures.

$$\frac{38}{360} \times 2\pi \times 25 = 16.58 \text{ cm}$$

[3]

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Question 4

NOT TO SCALE

←—6.1 cm—→

A protractor is a semi-circle of radius 6.1 cm.

Calculate the **perimeter** of the protractor. [3]

Semi circle = πr = 6.1π cm

Perimeter = 6.1π + 12.2

= 31.4 cm

Question 5

The circumference of a circle is 30 cm

(a) Calculate the radius of the circle. [2]

$2\pi r$ = 30

r = 4.77 cm

(b)
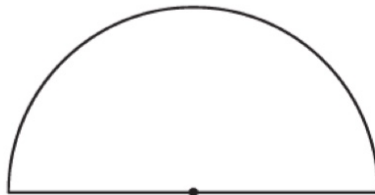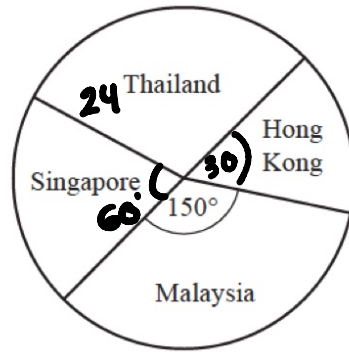

The length of the arc of the semi-circle is 15cm.

Calculate the area of the semi-circle.

πr^2 = 3.14 × 4.77^2

= 71.6 cm^2

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A travel brochure has 72 holidays in four different countries.
The pie chart shows this information.

(a) There are 24 holidays in Thailand.

Show that the sector angle for Thailand is 120°. [2]

$$\frac{24}{72} \times 360° = 120°$$
(shown)

(b) The sector angle for Malaysia is 150°.
The sector angle for Singapore is twice the sector angle for Hong Kong.

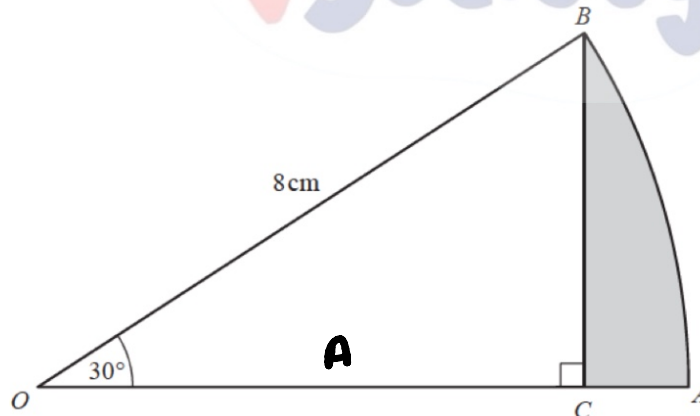Calculate the number of holidays in Hong Kong. [3]

$$120° = 24$$
$$60° = 12 \leftarrow \text{holidays in HK}$$

Question 7

OAB is the sector of a circle, centre O, with radius 8cm and sector angle 30°.
BC is perpendicular to OA.

Calculate the area of the region shaded on the diagram. [5]

A of sector $= \frac{30}{360} \times \pi r^2 = 16.76 \text{ cm}^2$

OC $= 8\cos 30°$
$= 6.93$ cm

A of $\triangle = \frac{1}{2} \times 6.93 \times 8 \times \sin 30° = 13.86 \text{ cm}^2$

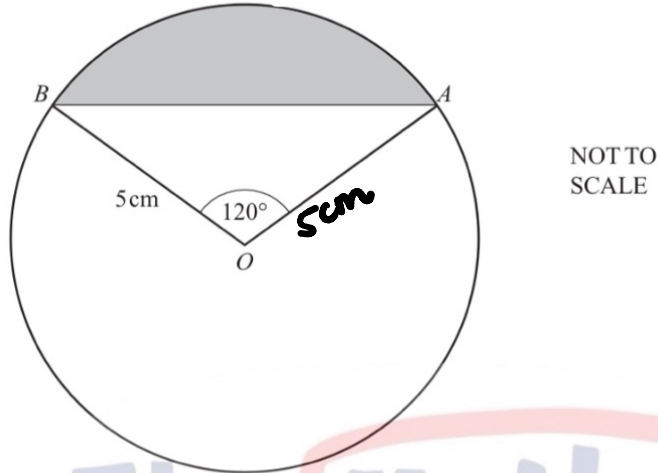shaded A $= 16.76 - 13.86$
$= 2.9 \text{ cm}^2$

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Question1

Find the circumference of a circle of radius 2.5 cm.

$$2\pi r = 15.7 \text{ cm}^2$$

[2]

Question 2

NOT TO SCALE

A and B lie on a circle centre O, radius 5 cm.
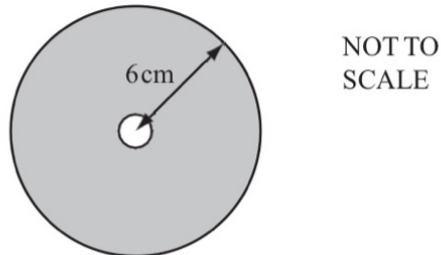Angle AOB = 120°.

Find the area of the shaded segment.

[4]

Area of $\Delta = \frac{1}{2} \times 25 \times \sin 120°$
$$= 10.83 \text{ cm}^2$$

Area of sector $= \frac{120}{360} \times \pi \times 25 = 26.18 \text{ cm}^2$

shaded $= 26.18 - 10.83$
$$= 15.35 \text{ cm}^2$$

Question 3

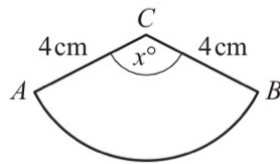NOT TO SCALE

The diagram shows a circular disc with radius 6 cm.
In the centre of the disc there is a circular hole with radius 0.5 cm.

Calculate the area of the shaded section.

[3]

$$36\pi - 0.25\pi = 112.3 \text{ cm}^2$$

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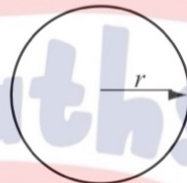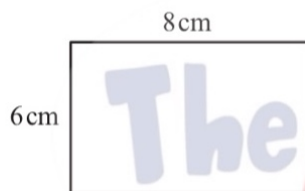## Question 4

C

4 cm $x°$ 4 cm   NOT TO SCALE

A B

ABC is a sector of a circle, radius 4 cm and centre C. [3]
The length of the arc AB is 8 cm and angle $ACB = x°$.

Calculate the value of x.

$$\frac{x}{360°} \times 2\pi r = 8$$

$$x = \frac{8 \times 360°}{8\pi} = 114.6°$$

Question 5

8 cm

6 cm r NOT TO SCALE

28

The perimeter of the rectangle is the same length as the circumference of the circle.

Calculate the radius, r, of the circle. [3]

$$2\pi r = 28$$
$$r = 4.46 \text{ cm}$$

Question 6

A circle has a radius of 50 cm.
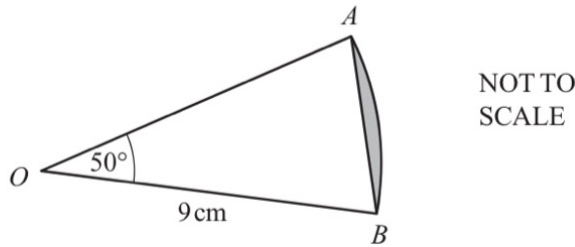
(a) Calculate the area of the circle in cm^2. [2]

$$\pi r^2 = 2500\pi$$
$$= 7854 \text{ cm}^2$$

(b) Write your answer to part (a) in m^2. [1]

$$7854 \div 100 \div 100$$
$$= 0.7854 \text{ m}^2$$

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A

NOT TO
SCALE

50°

O

9 cm

B

The diagram shows a sector *AOB* of a circle, centre *O*, radius 9 cm with angle *AOB* = 50°.
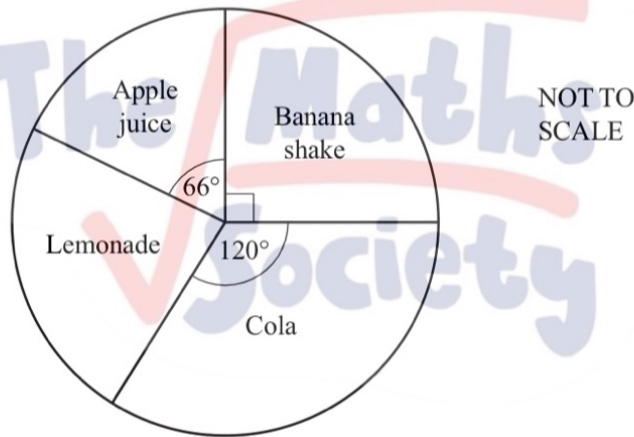
Calculate the area of the segment shaded in the diagram. [4]

$$\Delta = \frac{1}{2} \times 9 \times 9 \times \sin 50° = 31.02 \text{ cm}^2$$

$$\text{sector} = \frac{50}{360} \times \pi \times 81 = 35.34 \text{ cm}^2$$

Question8 $$\text{shaded} = 4.32 \text{ cm}^2$$

60 students recorded their favourite drink.
The results are shown in the pie chart.

Apple
juice

Banana
shake

NOT TO
SCALE

66°

Lemonade   120°

Cola

(a) **Calculate** the angle for the sector labelled Lemonade. [1]

$$84°$$

(b) Calculate the number of students who chose Banana shake. [1]

$$\div 4 \left(\begin{array}{l} 360° = 60 \text{ students} \\ 90° = 15 \text{ students} \end{array} \right.$$
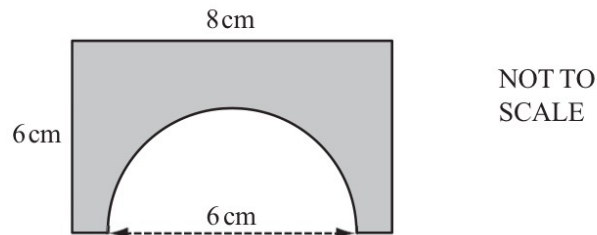
└── banana shake

(c) The pie chart has a radius of 3 cm.
    Calculate the arc length of the sector representing Cola. [2]

6

$$\frac{120}{360} \times 2 \times \pi \times 3 = 6.28 \text{ cm}$$

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Question 1

8cm

NOT TO
SCALE

6cm

6 cm

A semicircle of diameter 6 cm is cut from a rectangle with sides 6 cm and 8cm.

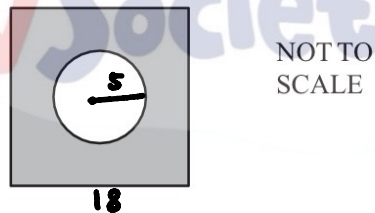Calculate the perimeter of the shaded shape, correct to 1 decimal place. [3]

$\square = 48\,cm^2$

$\bigcirc = \dfrac{\pi r^2}{2} = \dfrac{\pi \times 9}{2} = 14.14\,cm^2$

shaded $= 33.9\,cm^2$

Question 2

5

NOT TO
SCALE

18

The diagram shows a circle of radius 5cm in a square of side 18cm.
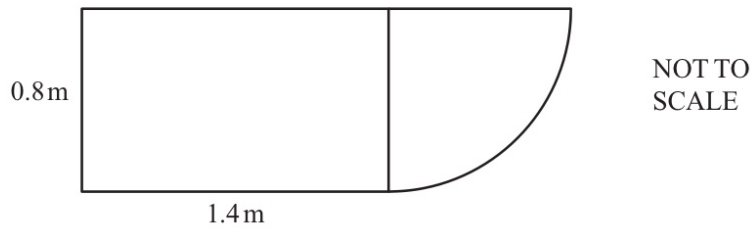
Calculate the shaded area. [3]

$\square = 324\,cm^2$

$\bigcirc = \pi r^2$
$= 78.54\,cm^2$

shaded $= 324 - 78.54$
$= 245.5\,cm^2$

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0.8 m

1.4 m

NOT TO SCALE

The top of a desk is made from a rectangle and a quarter circle.
The rectangle measures 0.8m by 1.4m.

Calculate the surface area of the top of the desk. [3]

$$\square = 1.12\, m^2$$

$$\square = \frac{1}{4} \times \pi r^2 = \frac{1}{4} \times \pi \times 0.8 \times 0.8$$

$$= 0.5027\, m^2$$

total surface area $= 1.62\, m^2$

Question 4

A spacecraft made 58 376 orbits of the Earth and travelled a distance of 2.656×10^9 kilometres.

(a) Calculate the distance travelled in 1 orbit correct to the nearest kilometre. [2]

$$58376 = 2.656 \times 10^9$$

$$1\ orbit = 45498\ km$$

(b) The orbit of the spacecraft is a circle.

Calculate the radius of the orbit. [2]

$$2\pi r = 45498$$

$$r = 7241\ km$$

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Question 5

A large conference table is made from four rectangular sections and four corner sections.
Each rectangular section is 4 m long and 1.2 m wide.
Each corner section is a quarter circle, radius 1.2 m.
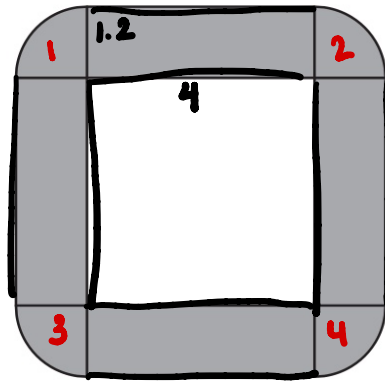
NOT TO
SCALE

Each person sitting at the conference table requires one metre of its outside perimeter.
Calculate the greatest number of people who can sit around the **outside** of the table.
Show all your working. [3]

$$2\pi r = 2 \times 3.14 \times 1.2$$
$$= 7.536$$

$$\text{Total } P = 7.536 + 16$$
$$= 23.536$$

Greatest number = 23

Question 6

The radius of the Earth at the equator is approximately 6.4×10^6 metres.
Calculate the circumference of the Earth at the equator. Give your answer in standard form, correct to
2 significant figures. [3]

$$2\pi r = 2 \times \pi \times 6.4 \times 10^6$$
$$= 40.21 \times 10^6$$
$$= 4.021 \times 10^7$$

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