
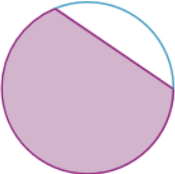
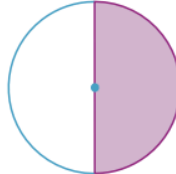
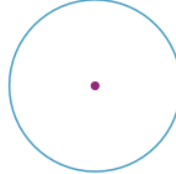
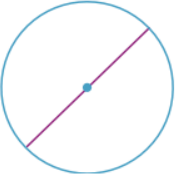
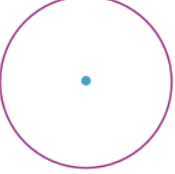
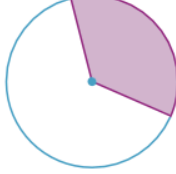
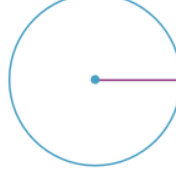





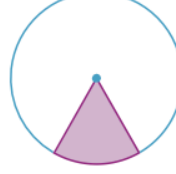
Do Now - draw and label the parts of circle

Exercise 8A

1 Name the features shown in purple for each of these circles.

a  **b**  **c**  **d** 

e  **f**  **g**  **h** 

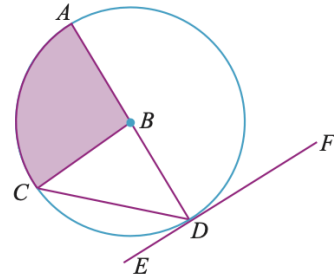
i  **j**  **k**  **l** 

Check your answers

- | | | |
|------------------|------------------------|------------------------|
| 1 a Chord | b Major segment | c Semicircle |
| d Centre | e Diameter | f Circumference |
| g Sector | h Radius | i Minor segment |
| j Tangent | k Arc | l Sector |

Use the names from the parts of circle

- 3 a** Name the feature shown by these intervals.
- i** AB **ii** AD **iii** EF
iv AC **v** CD **vi** DB
- b** Which feature is represented by the shaded region?



Check your answer

- a** Centre, circumference, radius
- 3 a** **i** Radius **ii** Diameter **iii** Tangent
iv Arc **v** Chord **vi** Radius
- b** Sector

Use your calculator find what do you notice

- 5** Complete the following table by filling in the third column. Round your answers correct to 1 decimal place.

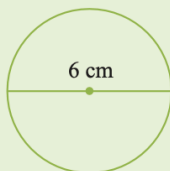
	Circumference	Diameter	$C \div d$
a	6.3 cm	2 cm	
b	22.0 cm	7 cm	
c	28.3 cm	9 cm	
d	15.7 cm	5 cm	
e	34.6 cm	11 cm	

	Circumference	Diameter	$C \div d$
f	4.7 cm	1.5 cm	
g	7.2 cm	2.3 cm	
h	18.2 cm	5.8 cm	
i	29.5 cm	9.4 cm	
j	33.3 cm	10.6 cm	

EXAMPLE 1

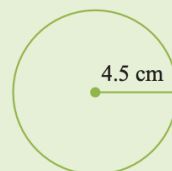
Determine the circumference of each circle to the level of accuracy stated.

- a** exact value



$$\begin{aligned} \mathbf{a} \quad C &= \pi d \\ C &= \pi \times 6 \\ &= 6\pi \text{ cm} \end{aligned}$$

- b** correct to 2 decimal places



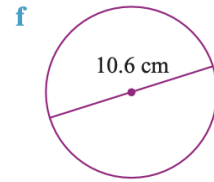
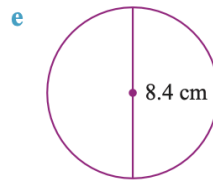
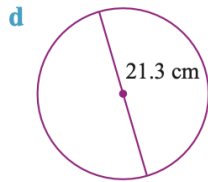
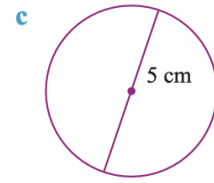
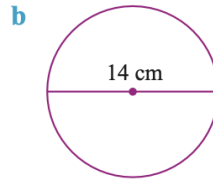
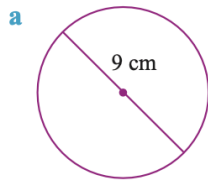
$$\begin{aligned} \mathbf{b} \quad C &= 2\pi r \\ C &= 2 \times \pi \times 4.5 \\ &= 28.27 \text{ cm} \end{aligned}$$

Find out how to access pi (π) on your calculator.

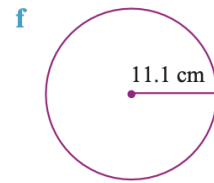
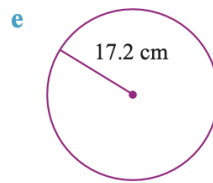
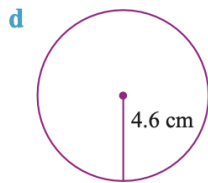
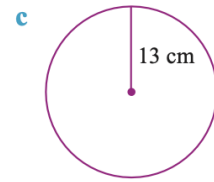
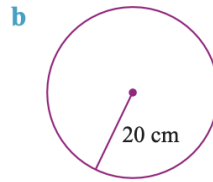
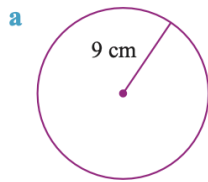
Calculator:

$$2 \times \pi \times 4.5 =$$

1 Calculate the circumference of each circle, giving both the exact answer and the answer correct to 2 decimal places.



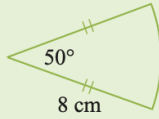
2 Calculate the circumference of each circle, giving both the exact answer and the answer correct to 2 decimal places.



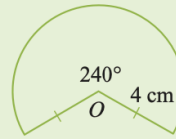
EXAMPLE 2

Calculate the length of each arc correct to 2 decimal places.

a



b



$$\mathbf{a} \text{ Fraction of circumference} = \frac{50}{360} = \frac{5}{36}$$

$$\begin{aligned} \text{Length of arc} &= \frac{5}{36} \times 2\pi r \\ &= \frac{5}{36} \times 2 \times \pi \times 8 \\ &= \frac{20\pi}{9} = 6.98 \text{ cm} \end{aligned}$$

Calculator:

$$5 \left[\frac{\text{a}}{\text{c}} \right] 36 \times 2 \times \pi \times 8 =$$

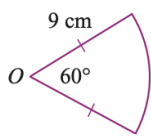
$$\mathbf{b} \text{ Fraction of circumference} = \frac{240}{360} = \frac{2}{3}$$

$$\begin{aligned} \text{Length of arc} &= \frac{2}{3} \times 2\pi r \\ &= \frac{2}{3} \times 2 \times \pi \times 4 \\ &= \frac{16\pi}{3} = 16.76 \text{ cm} \end{aligned}$$

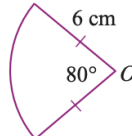
$$2 \left[\frac{\text{a}}{\text{c}} \right] 3 \times 2 \times \pi \times 4 =$$

5 Calculate the length of these arcs. Give both the exact answer and the answer correct to 2 decimal places.

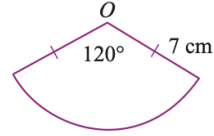
a



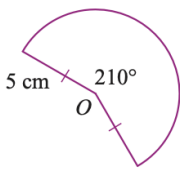
b



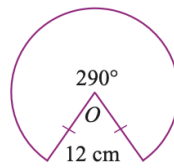
c



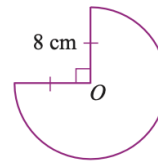
d



e



f

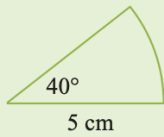


Extension work

EXAMPLE 3

Calculate the perimeter of each figure correct to 1 decimal place.

a

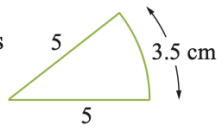


a The shape is a sector.

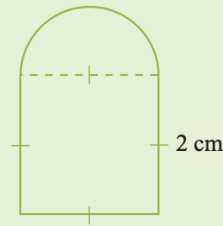
$$\text{Fraction of circumference} = \frac{40}{360} = \frac{1}{9}$$

$$\begin{aligned} \text{Length of arc} &= \frac{1}{9} \text{ of } 2\pi r \\ &= \frac{1}{9} \times 2 \times \pi \times 5 \approx 3.5 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Perimeter} &= \text{sum of all sides} \\ &= 3.5 + 5 + 5 \\ &= 13.5 \text{ cm} \end{aligned}$$



b



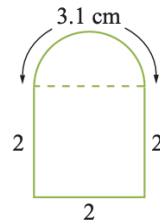
Include the straight sides in the perimeter too.

b Shape consists of a semicircle plus a square.

Circumference of semicircle is $\frac{1}{2}$ of πd .

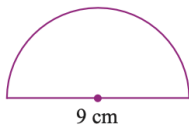
$$\begin{aligned} \text{Length of arc} &= \frac{1}{2} \text{ of } \pi d \\ &= \frac{1}{2} \times \pi \times 2 \\ &\approx 3.1 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Perimeter} &= \text{sum of all sides} \\ &= 3.1 + 2 + 2 + 2 \\ &= 9.1 \text{ cm} \end{aligned}$$



6 Calculate the perimeter of each figure correct to 1 decimal place.

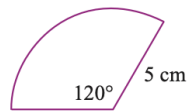
a



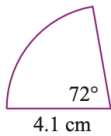
b



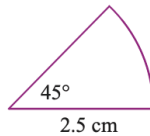
c



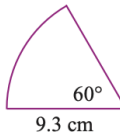
d



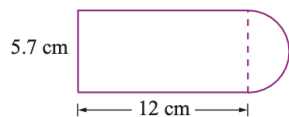
e



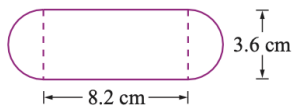
f



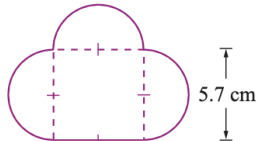
g



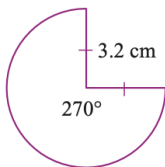
h



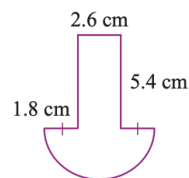
i



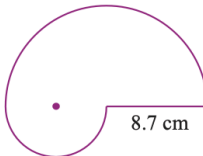
j



k



l



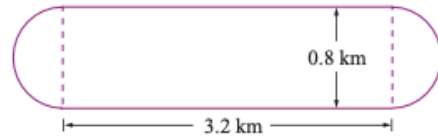
Challenge

- 7** The diameter of a bicycle tyre is 40 cm.
- Calculate the distance travelled by the tyre in one revolution. Give your answer to the nearest centimetre.
 - How far, in metres, will the tyre travel in 500 revolutions? (Use your answer from part a.)
 - Using your answer from part a, calculate the number of full revolutions required to travel:
 - 1 km
 - 7 km
 - 13 km

Hint: Number of revolutions = $\frac{\text{distance to travel (m)}}{\text{distance of revolution (m)}}$

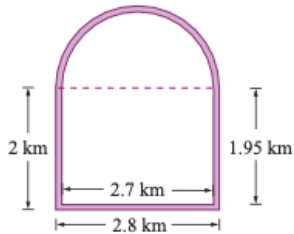


- 8 a** A cyclist cycles the track shown. Calculate the distance travelled in one lap to the nearest metre.



- b** How many complete laps would be required for the cyclist to travel:
- 100 km?
 - 175 km?
 - 234 km?

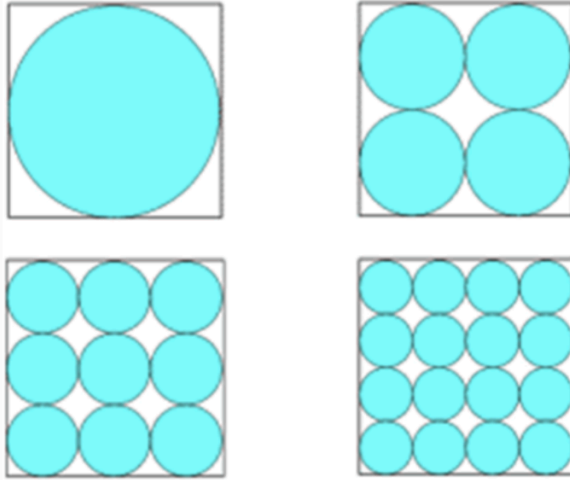
- 9** Danijella and Joan walk along a track every morning. Danijella walks along the outside perimeter of the track shown and Joan walks along the inside perimeter.



- How far does Danijella walk, in metres?
- How far does Joan walk, in metres?
- How much further does Danijella walk than Joan?
- If Danijella walks to a speed of 1 km/10 min, how long should it take her to complete her morning walk? (Approximate your answer to the nearest minute.)



In the examples below identical squares of side one unit contain some circles shaded blue.

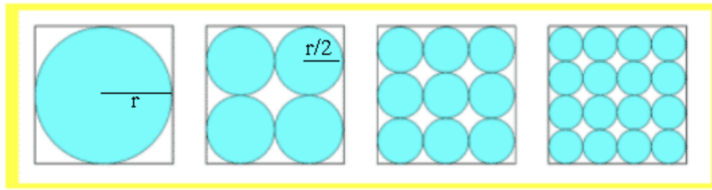


In which of the four examples is the shaded area greatest?

Answers

Exercise 8B

- 1** **a** $9\pi = 28.27$ cm **b** $14\pi = 43.98$ cm
c $5\pi = 15.71$ cm **d** $21.3\pi = 66.92$ cm
e $8.4\pi = 26.39$ cm **f** $10.6\pi = 33.30$ cm
- 2** **a** $18\pi = 56.55$ cm **b** $40\pi = 125.66$ cm
c $26\pi = 81.68$ cm **d** $9.2\pi = 28.90$ cm
e $34.4\pi = 108.07$ cm **f** $22.2\pi = 69.74$ cm
- 3** **a** 28.3 m **b** 20.1 m **c** 56.9 m
d 42.7 m **e** 39.6 m **f** 49.6 m
g 15.7 m **h** 27.1 m
- 4** **a** 12.6 cm **b** 6.3 cm **c** 11.0 cm
- 5** **a** $\frac{1}{6} \times 2 \times \pi \times 9 = 3\pi = 9.42$ cm
b $\frac{2}{9} \times 2 \times \pi \times 6 = \frac{8\pi}{3} = 8.38$ cm
c $\frac{1}{3} \times 2 \times \pi \times 7 = \frac{14\pi}{3} = 14.66$ cm
d $\frac{7}{12} \times 2 \times \pi \times 5 = \frac{35\pi}{6} = 18.33$ cm
e $\frac{29}{36} \times 2 \times \pi \times 12 = \frac{58\pi}{3} = 60.74$ cm
f $\frac{3}{4} \times 2 \times \pi \times 8 = 12\pi = 37.70$ cm
- 6** **a** 23.1 cm **b** 10.7 cm **c** 20.5 cm
d 13.4 cm **e** 7.0 cm **f** 28.3 cm
g 38.7 cm **h** 27.7 cm **i** 32.6 cm
j 21.5 cm **k** 26.7 cm **l** 49.7 cm
- 7** **a** 126 cm **b** 630 m
c **i** 794 **ii** 5556 **iii** 10 318
- 8** **a** 8.913 km
b **i** 12 **ii** 20 **iii** 27
- 9** **a** 11 198 m **b** 10 841 m
c 357 m **d** 1 h 52 min



With one circle in the square the diameter is the length of one side of the square. The shaded area is πr^2 where r = radius of the largest circle.

With four circles in the square, the diameter of one circle is half that of the large circle. The area of each small circle is $\pi(r/2 \times r/2)$. The total shaded area is $4(\pi r^2/4)$. This can be simplified to πr^2 . \par With nine circles in the square, the diameter of one circle is a third that of the large circle. The area of each small circle is $\pi(r/3 \times r/3)$. The total shaded area is $9(\pi r^2/9)$. This can be simplified to πr^2 .

We can go one step further by saying that with n circles the area is $n(\pi r^2/n)$ - which can again be simplified to πr^2 . Therefore the answer is that the shaded area is the same in each picture.