Circle

From Latin: circus - "ring, a round arena"

A line forming a closed loop, every point on which is a fixed distance from a center point.

A circle is a type of line. Imagine a straight line segment that is bent around until its ends join. Then arrange that loop until it is exactly circular - that is, all points along that line are the same distance from a center point.

There is a difference between a circle and a disk. A circle is a line, and so, for example, has no area - just as a line has no area. A disk however is a round portion of a plane which has a circular outline. If you draw a circle on paper and cut it out, the round piece is a disk.

Properties of a circle

Center	A point inside the circle. All points on the circle are equidistant (same distance) from the center point.
Radius	The radius is the distance from the center to any point on the circle. It is half the diameter. See Radius of a circle.
Diameter	The distance across the circle. The length of any chord passing through the center. It is twice the radius. See Diameter of a circle.
Circumference	The circumference is the distance around the circle. See Circumference of a Circle.
Area	Strictly speaking a circle is a line, and so has no area. What is usually meant is the area of the region enclosed by the circle. See Area enclosed by a circle .

Chord	A line segment linking any two points on a circle. See Chord definition
Tangent	A line passing a circle and touching it at just one point. See Tangent definition
Secant	A line that intersects a circle at two points. See Secant definition

Pi

In any circle, if you divide the circumference (distance around the circle) by it's diameter (distance across the circle), you always get the same number. This number is called Pi and is approximately 3.142. See Definition of pi.

Relation to ellipse

A circle is actually a special case of an ellipse. In an ellipse, if you make the major and minor axis the same length, the result is a circle, with both foci at the center. See Ellipse definition

Alternate definitions

There are several definitions of a circle that you may come across. Below are some of the alternative ones.

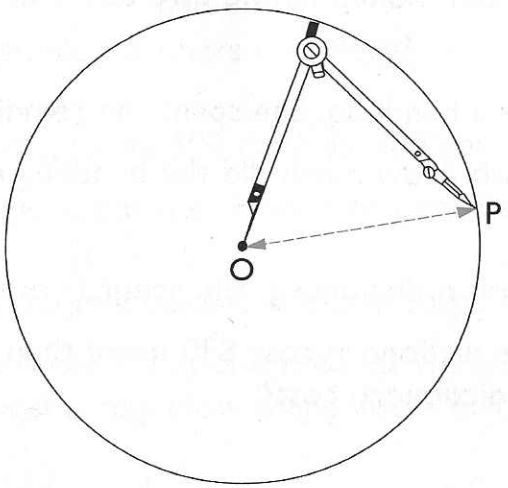
- *"The set of all points equidistant from the center"*. This assumes that a line can be defined as an infinitely large set of points.
- *"The locus of all points a fixed distance from a given (center) point"*. This definition assumes the plane is composed of an infinite number of points and we select only those that are a fixed distance from the center. A similar definition to the one above. (See locus definition.)

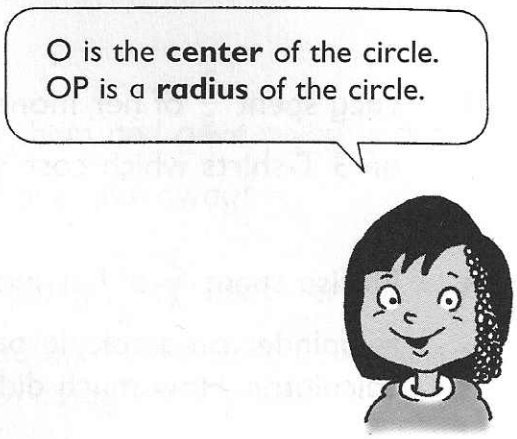
2 Circles

1 Radius and Diameter

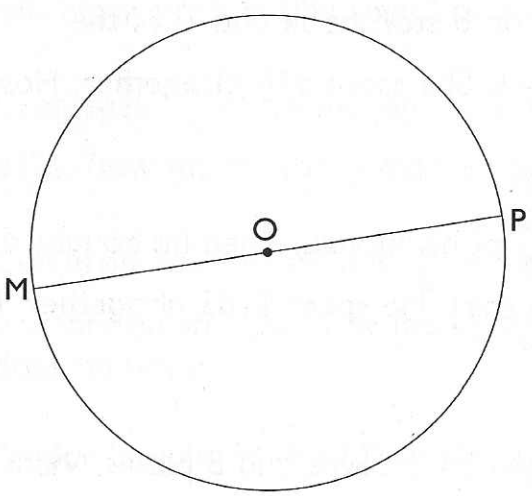
definition of ⊙

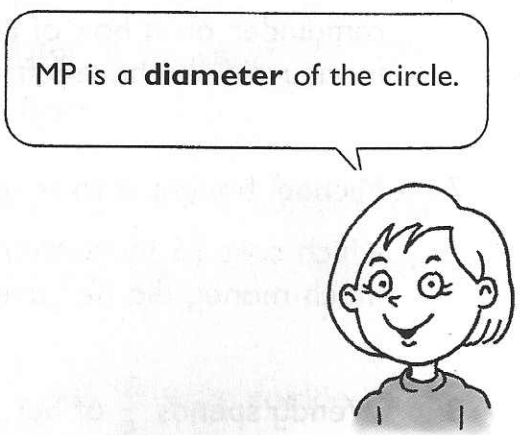
Draw a circle using a pair of compasses.





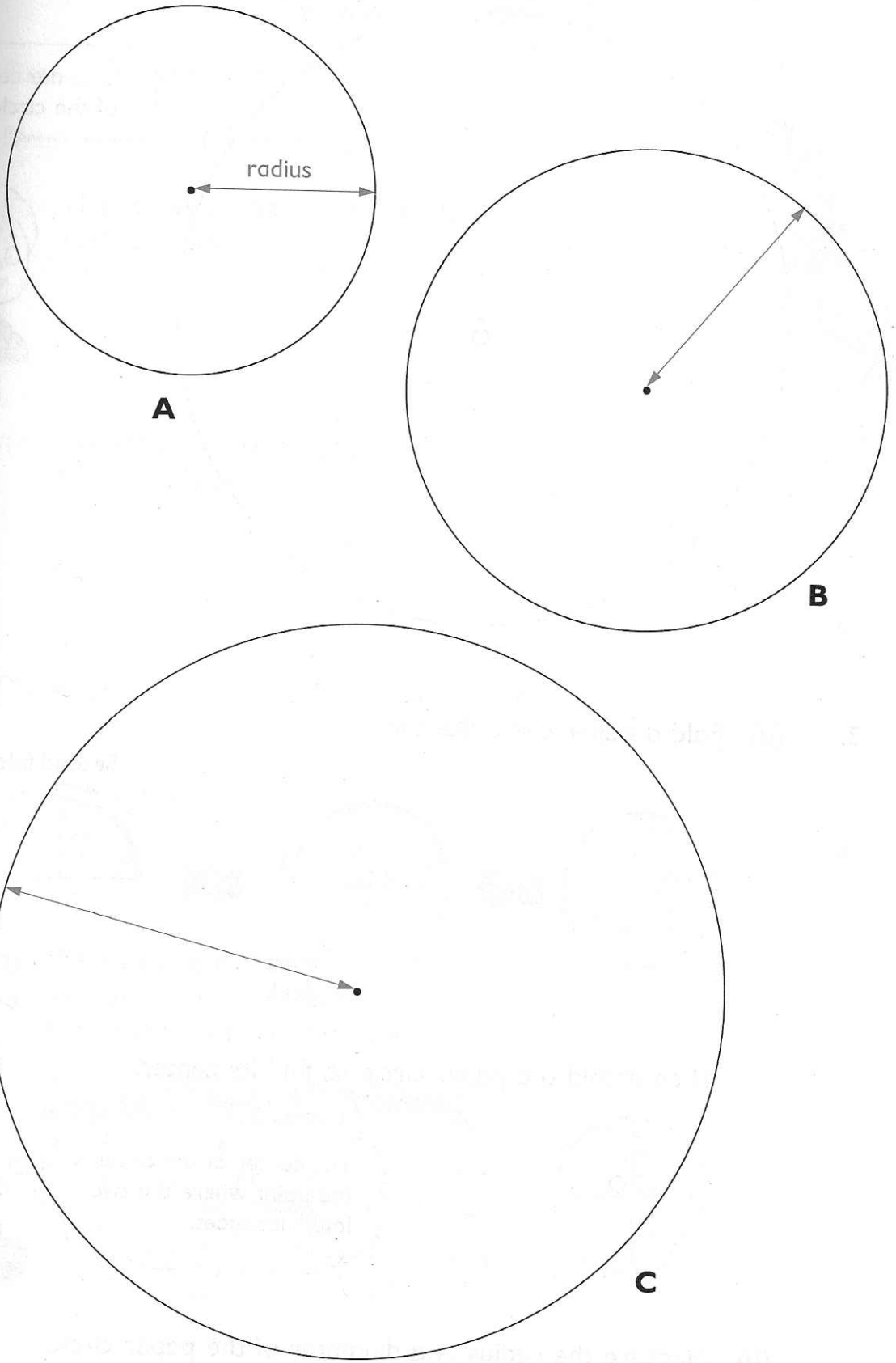
Then draw a straight line MP which passes through the center of the circle.



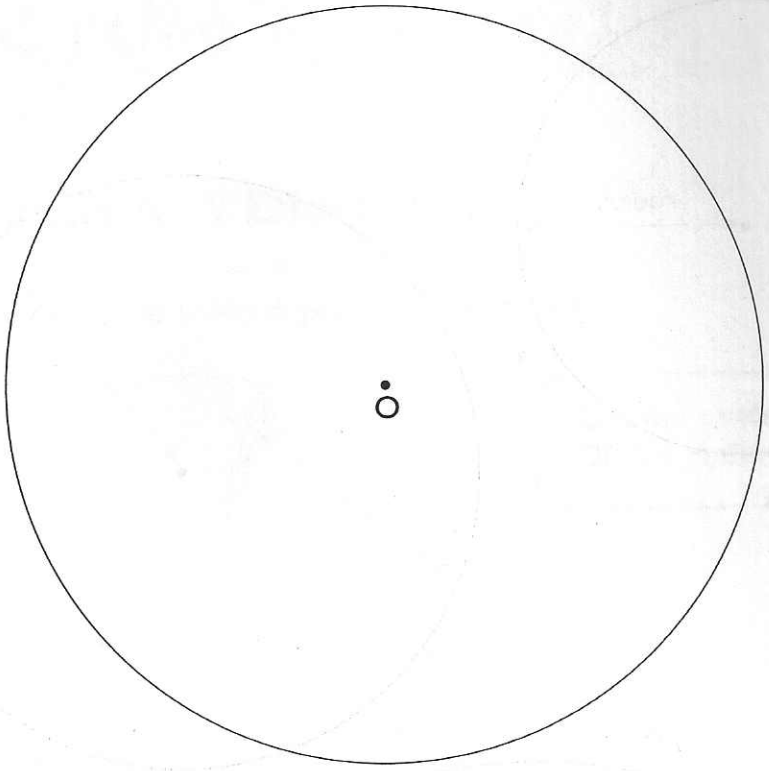


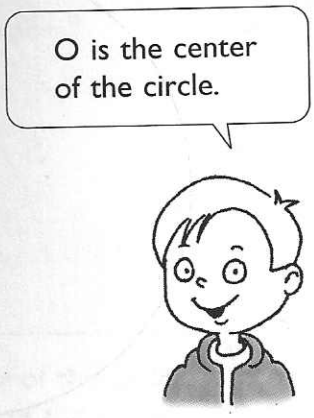
Is MP twice as long as OP?

1. Measure the radius of each circle.

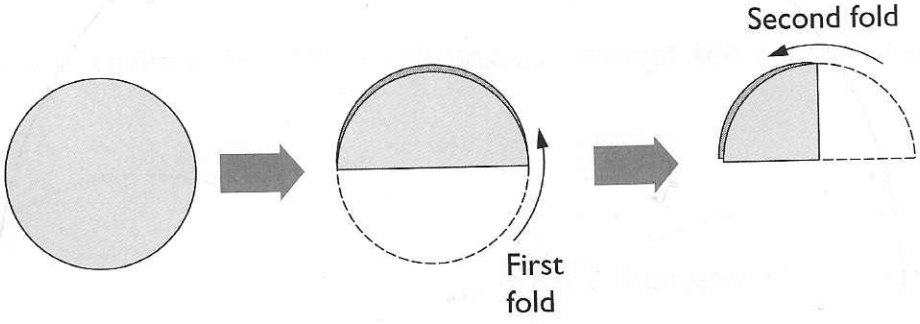


2. Measure the radius and diameter of the circle.

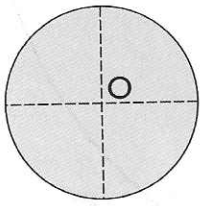


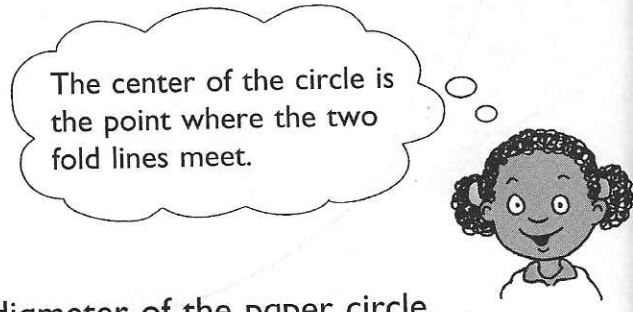


3. (a) Fold a paper circle like this:



Then unfold the paper circle to find its center.





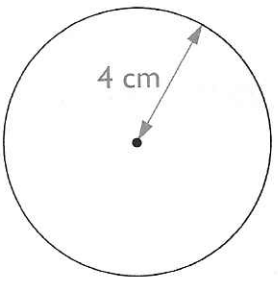
(b) Measure the radius and diameter of the paper circle.

Diameter = 2 × Radius
Radius = Diameter ÷ 2

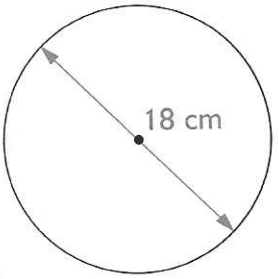
4. Draw a circle of radius 5 cm.

5. Draw a circle of diameter 8 cm.

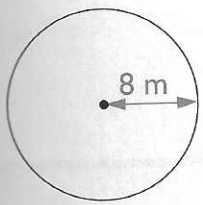
6. (a) The radius of the circle is 4 cm.
Find its diameter.



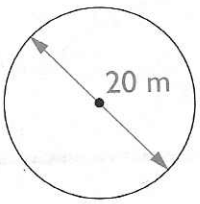
(b) The diameter of the circle is 18 cm.
Find its radius.



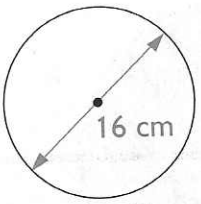
7. The following circles are not drawn to scale.



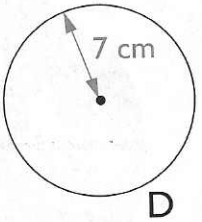
A



B



C



D

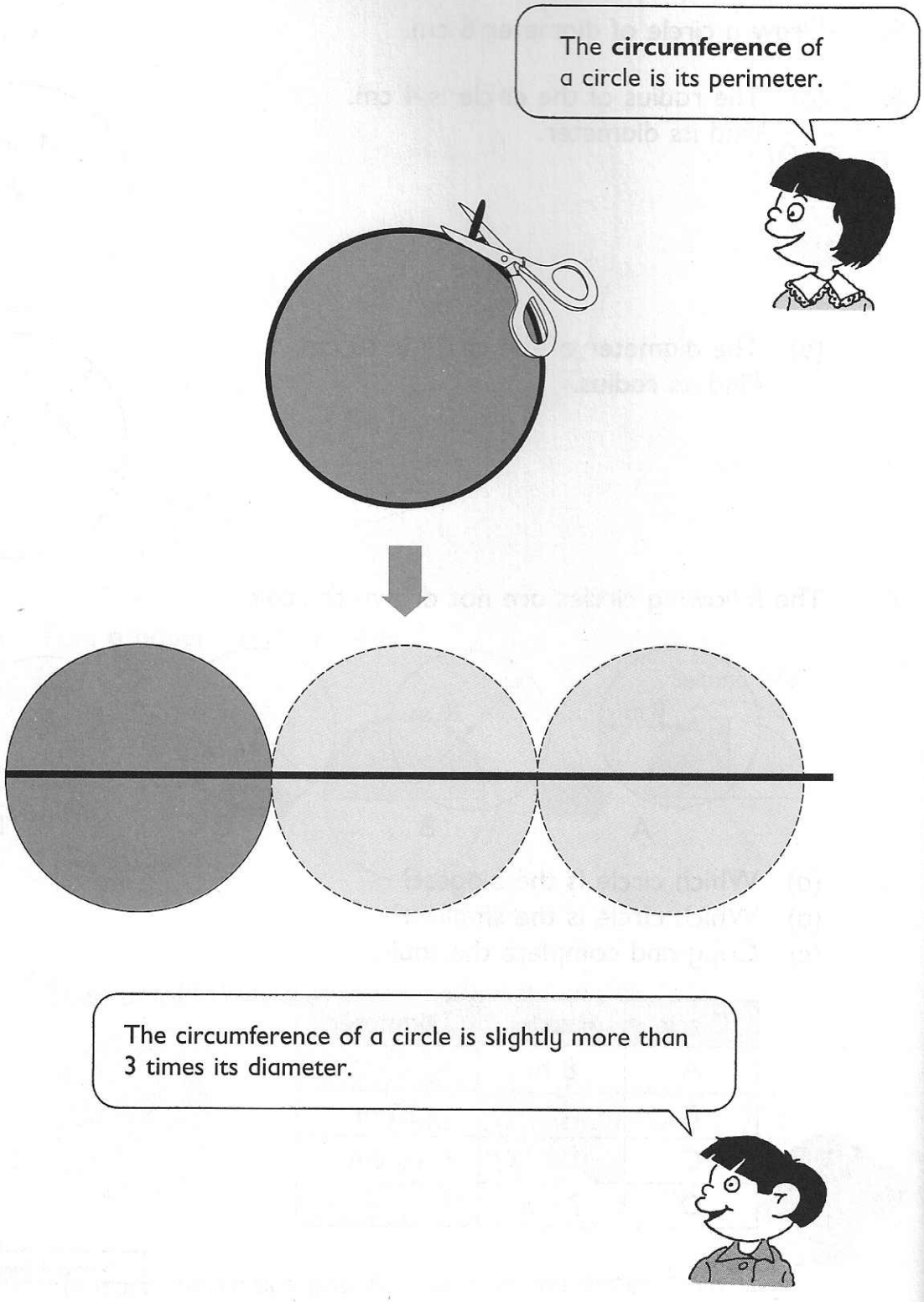
(a) Which circle is the biggest?
(b) Which circle is the smallest?
(c) Copy and complete the table:

Circle	Radius	Diameter
A	8 m	
B		20 m
C		16 cm
D	7 cm	

Workbook Exercise 9

2 Circumference

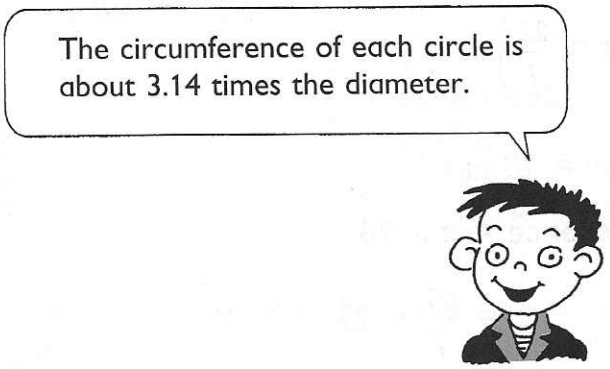
Use a string to measure the **circumference** of a circle like this:



1. Aziz measured the diameter and the circumference of three circles. He recorded the results as follows:

Circle	Diameter	Circumference
A	5 cm	15.7 cm
B	7 cm	22 cm
C	10 cm	31.4 cm

Find the value of **circumference ÷ diameter** for each circle. What do you notice?

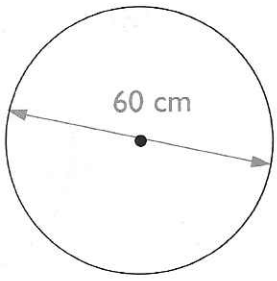


The value of **circumference ÷ diameter** is the same for any circle. This value is represented by π.

$\pi \approx 3.14$ or $\frac{22}{7}$

Circumference of circle = $\pi \times$ Diameter

2. The diameter of a hoop is 60 cm. Find its circumference. (Take $\pi = 3.14$)

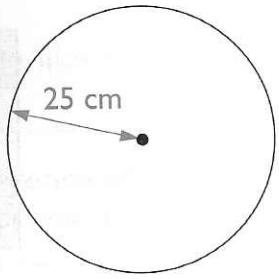


Circumference = $\pi \times 60$

= 3.14×60

= ■ cm

3. The radius of a disc is 25 cm. Find its circumference. (Take $\pi = 3.14$)



Diameter $= 2 \times 25$

$= 50$ cm

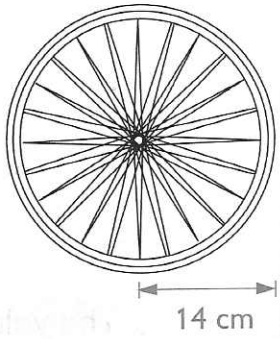
Circumference $= \pi \times 50$

$= 3.14 \times 50$

$=$ ■ cm

4. The radius of a wheel is 14 cm. Find its circumference.

$\left(\text{Take } \pi = \frac{22}{7}\right)$



Diameter $= 28$ cm

Circumference $= \pi \times 28$

$= \frac{22}{7} \times 28$

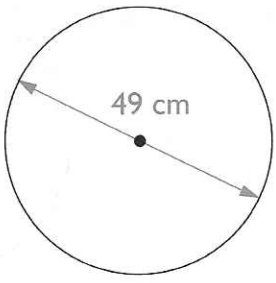
$=$ ■ cm

5. Find the circumference of a circle of diameter 70 cm. $\left(\text{Take } \pi = \frac{22}{7}\right)$

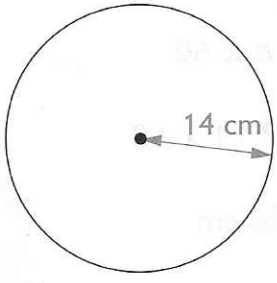
6. Find the circumference of a circle of radius 4 m. (Take $\pi = 3.14$)

7. Find the circumference of each circle. $\left(\text{Take } \pi = \frac{22}{7}\right)$

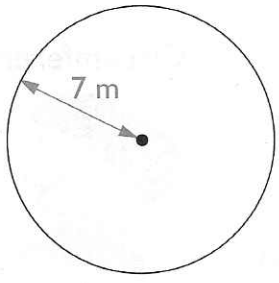
(a)



(b)

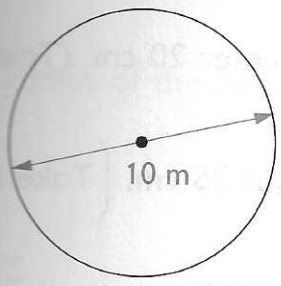


(c)

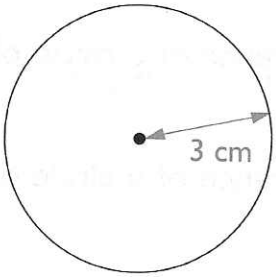


8. Find the circumference of each circle. (Take $\pi = 3.14$)

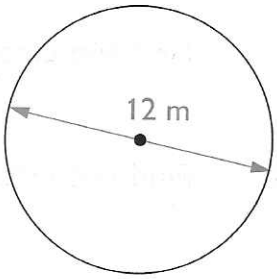
(a)



(b)

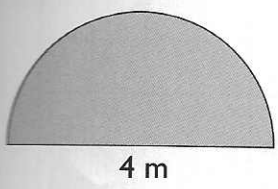


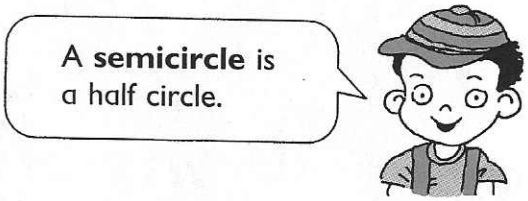
(c)



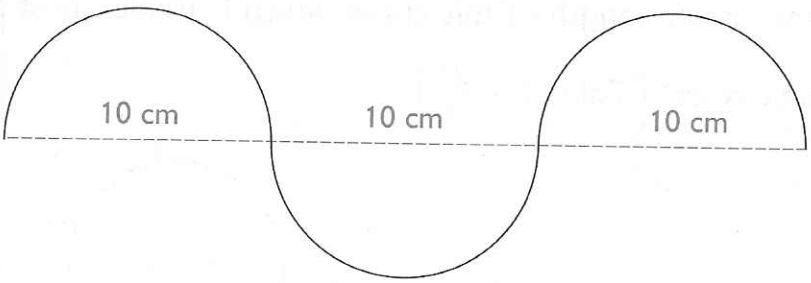
Workbook Exercise 10

9. The figure shows a flowerbed which has the shape of a **semicircle**. Find its perimeter. (Take $\pi = 3.14$)



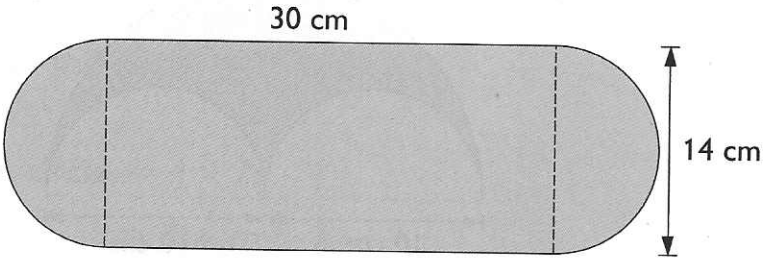


10. A wire is bent to form three semicircles as shown. Find the length of the wire in terms of π.



Workbook Exercise 11

11. The figure is made up of a rectangle and two semicircles. Find its perimeter. $\left(\text{Take } \pi = \frac{22}{7}\right)$



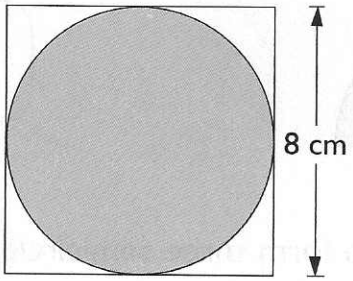
PRACTICE 2A

1. Find the circumference of a circle of diameter 20 cm. (Take $\pi = 3.14$)

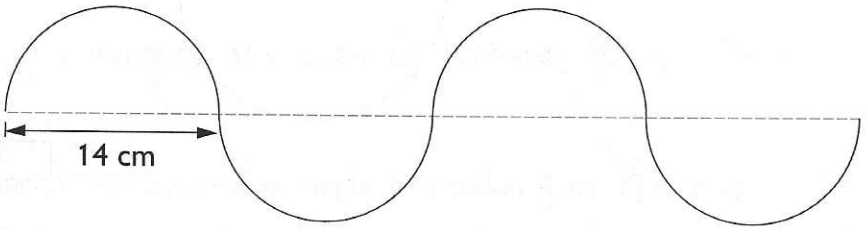
2. Find the circumference of a circle of radius 35 cm. $\left(\text{Take } \pi = \frac{22}{7}\right)$

3. The diameter of a circular plate is 23 cm. What is its circumference? Give your answer correct to 1 decimal place. (Take $\pi = 3.14$)

4. The figure shows a circle within a square. Find the circumference of the circle. (Take $\pi = 3.14$)



5. What is the length of this curve which is made up of four equal semicircles? $\left(\text{Take } \pi = \frac{22}{7}\right)$



6. The figure is made up of 3 semicircles. Find its perimeter in terms of π.