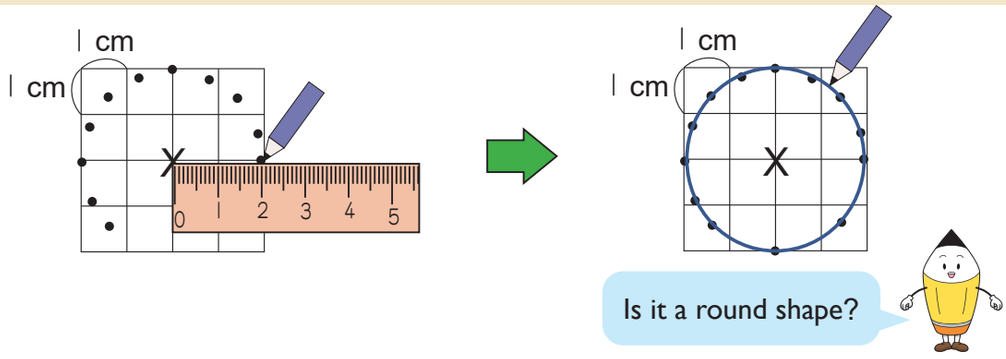
9 - 1 Circles and Spheres

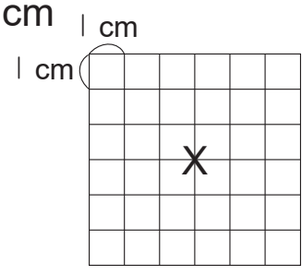
Circles (1)

Example 1 From the X, measure 2 cm with your ruler and draw dots. Turn the ruler and keep drawing dots. Then connect these dots together. What shape is formed?

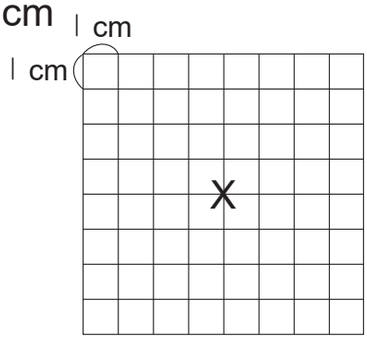


1 From the X, measure with your ruler the following lengths and draw dots together. Turn the ruler and keep drawing dots. Then connect these dots.

1 3 cm

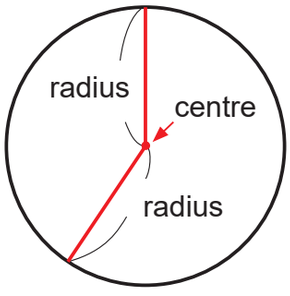


2 4 cm

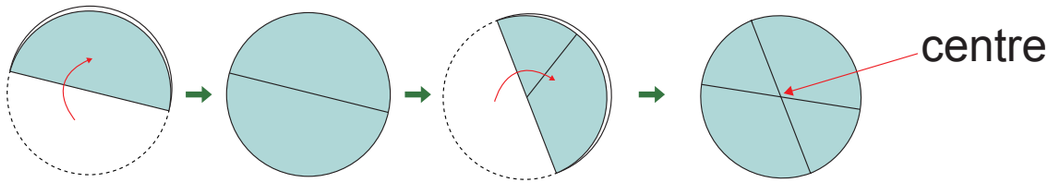


Instruction Circle

- A round shape consists of points that have the same distance from the middle point. This is called a **circle**.
- The middle point is called the **centre**.
- A straight line from the centre to any point on the circle is called the **radius**.

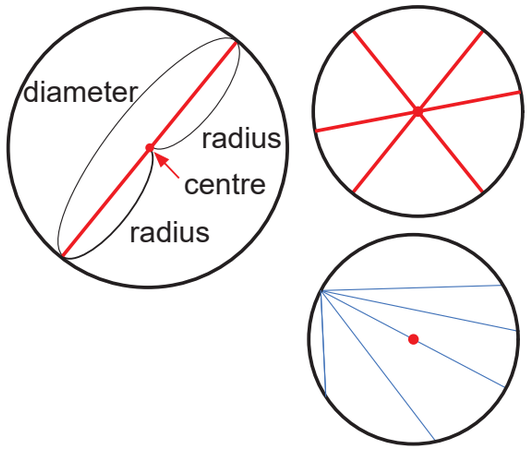


How do you find the centre of a circle?



Cut out a circle from paper. Fold it in half then unfold it. Repeat this several times. Where do the fold marks overlap?

- Any straight line that passes through the center of the circle and whose endpoints lie on the circle is called a **diameter**.
- The length of the diameter is twice the length of the radius.
- There are many diameters that pass through the center.
- Diameter is the longest straight line drawn between two points on the surrounding circle.



Example 2 Fill in the ☐ with words or numbers.

1. A circle consists of points that have the same distance from the centre .
2. A diameter is 2 times its radius.
3. There are many diameters that pass through the center.

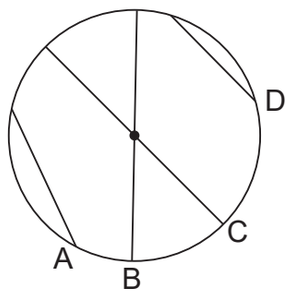
2 Fill in the ☐ with words or numbers.

1. The length of the ☐ is twice the length of the radius.
2. All the diameters go through the ☐ of the circle.
3. The straight line from the centre to any point on the circle is called the ☐ .
4. ☐ is the longest straight line drawn between two points on the surrounding circle.

9 - 2 Circles and Spheres

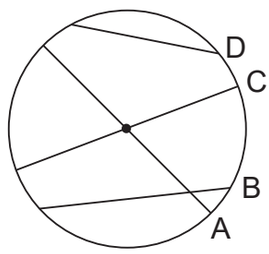
Circles (2)

Example 1 Find a diameter of the circle below.



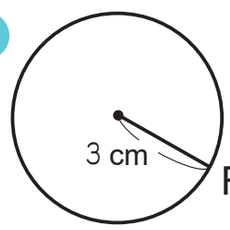
B, C

1 Find a diameter of the circle below.



Example 2 How many cm are the radius and diameter of the following circles?

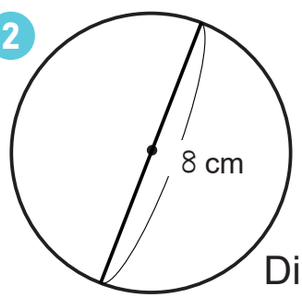
1



Radius 3 cm

Diameter 6 cm

2



Radius 4 cm

Diameter 8 cm

3 If a circle has a 6 cm radius, the diameter is 12 cm.

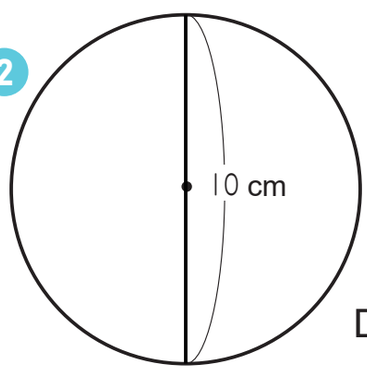
2 How many cm are the radius and diameter of the following circles?

1

Radius ☐ cm

Diameter ☐ cm

2

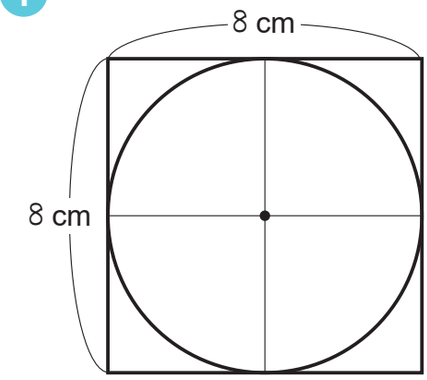


Radius ☐ cm

Diameter ☐ cm

Example 3 How many cm are the diameter and radius of the following circles?

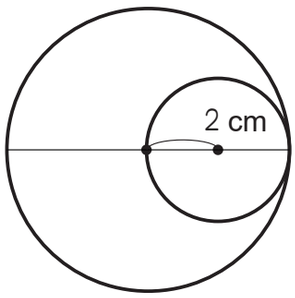
1



Diameter is 8 cm.

Radius is 4 cm.

2

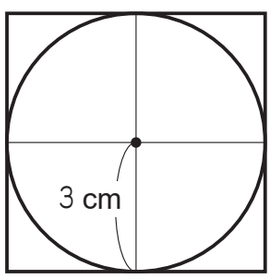


Diameter of the larger circle is 8 cm.

Diameter of the smaller circle is 4 cm.

3 How many cm are the diameter and radius of the following circles?

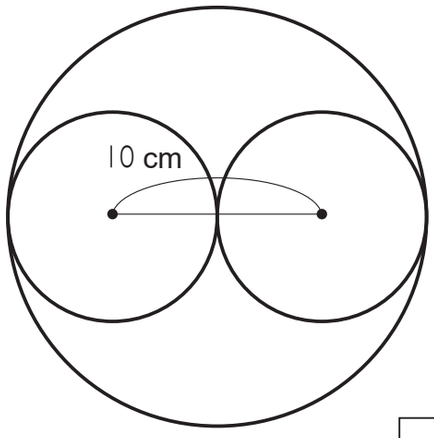
1



Diameter is ☐ cm.

Radius is ☐ cm.

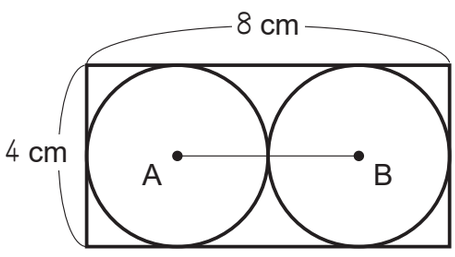
2



Diameter of the larger circle is ☐ cm.

Diameter of the smaller circle is ☐ cm.

3 How long is the length of AB?

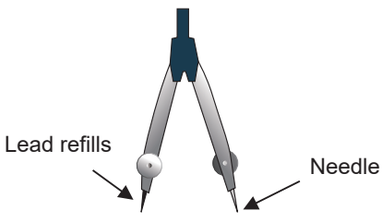


The length of AB is ☐ cm.

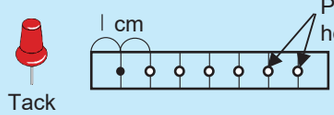
9 - 3 Circles and Spheres

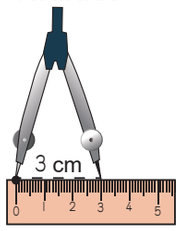
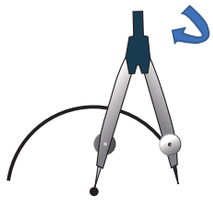
Circles (3)

Instruction Let's draw a circle with a radius of 3 cm using a compass.

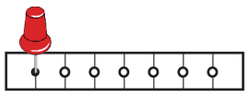
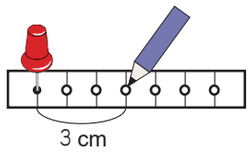
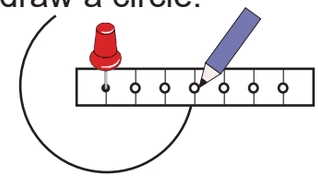


If you don't have a compass, you can create an instant compass.

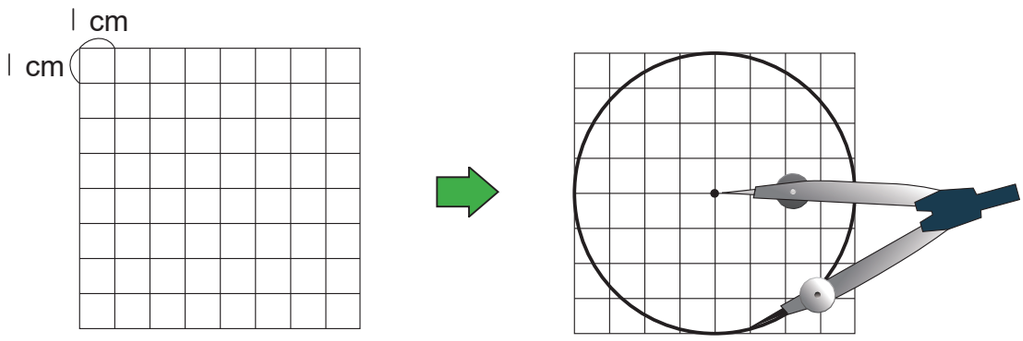


1. Open the compass based on the length of the radius.	2. Place the compass needle at the centre.	3. Start turning the compass towards you and draw a circle.
		

Drawing with an instant compass

1. Place the tack at the centre.	2. Place a pencil in the third hole.	3. Hold the tack down firmly and spin the pencil towards you to draw a circle.
		

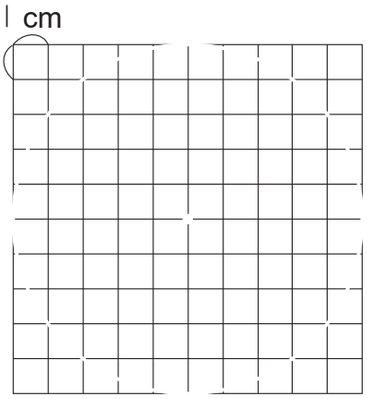
Example Draw a circle with a radius of 4 cm using a compass.



1 Draw a circle with the following radius lengths using a compass.

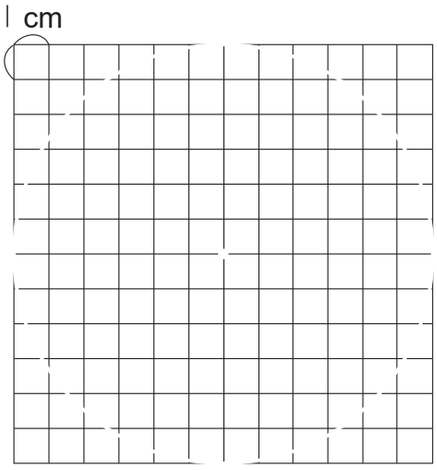
1. With a 5 cm radius

1 cm
1 cm



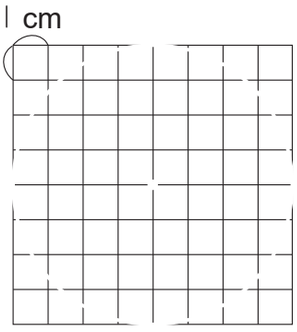
2. With a 6 cm radius

1 cm
1 cm



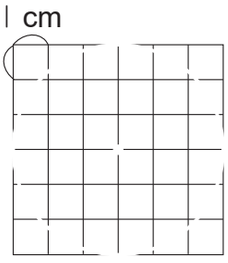
3. With a 4 cm radius

1 cm
1 cm



4. With a 3 cm radius

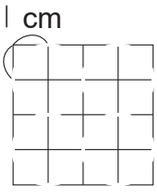
1 cm
1 cm



2 Draw circles with the following lengths using a compass.

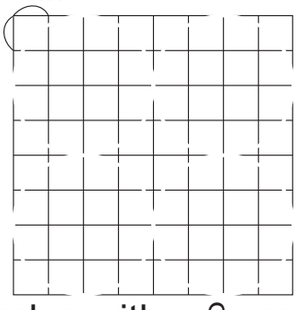
1. With a 14 cm diameter

1 cm
1 cm



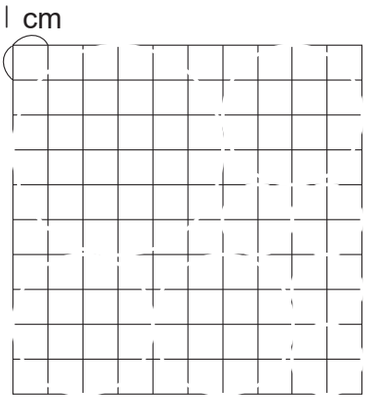
2. 4 circles with a 6 cm diameter without overlapping each other

1 cm
1 cm



3. One circle with a 3 cm radius, 3 circles with a 2 cm radius, and 4 circles with a 1 cm radius.

1 cm
1 cm

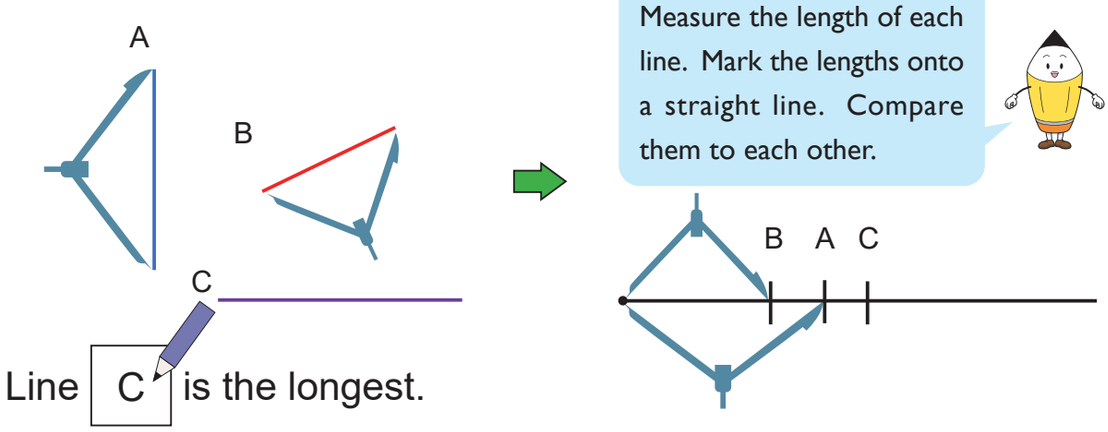


The answer is not only one. Let's think several answers.

9 - 4 Circles and Spheres

Ways to Use a Compass

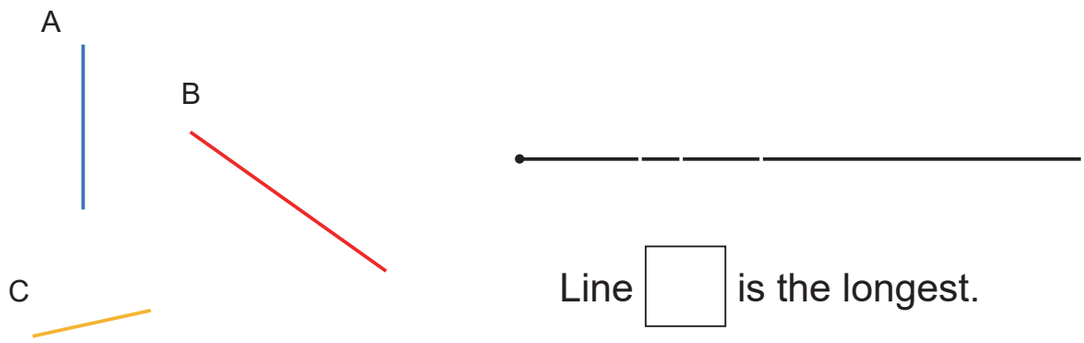
Example 1 Compare the lengths of the lines using a compass. Which of the three straight lines below is the longest?



Line C is the longest.

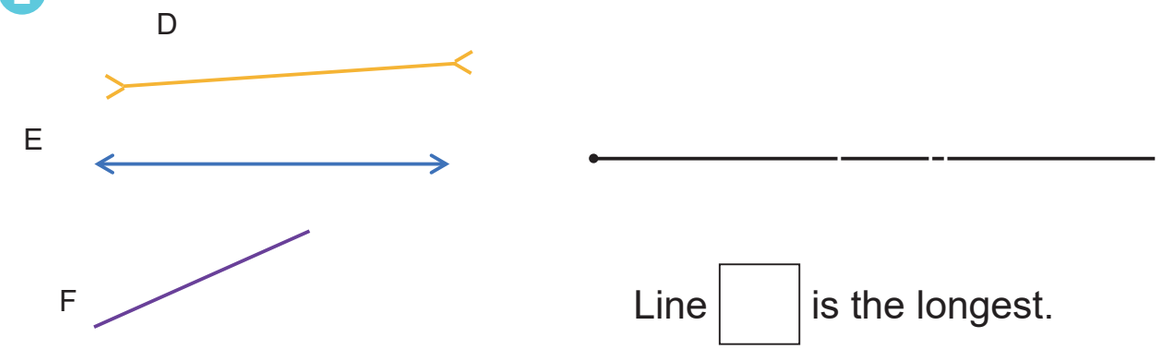
1 Compare the lengths of the lines. Which of the following three straight lines below is the longest?

1



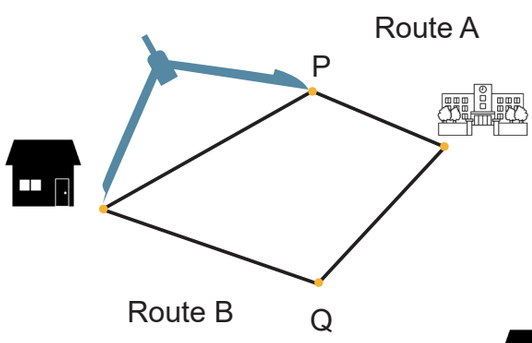
Line ☐ is the longest.

2

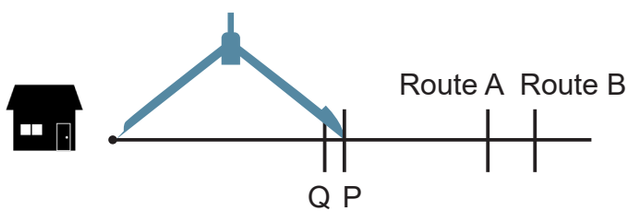


Line ☐ is the longest.

Example 2 Measure the travel distance from the house to the school. Which route is closer to the house?

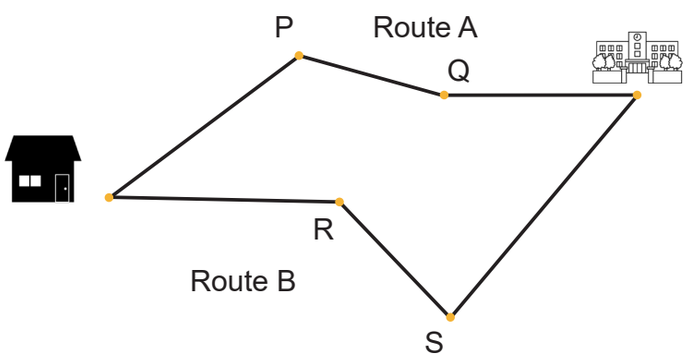


① Measure the distance from the house to Point P and then from Point P to the school.
② Measure the distance from the house to Point Q and then from Point Q to the school.



Route [A] is closer to the house.

2 Measure the travel distance from the house to the school. Which route is closer to the house?

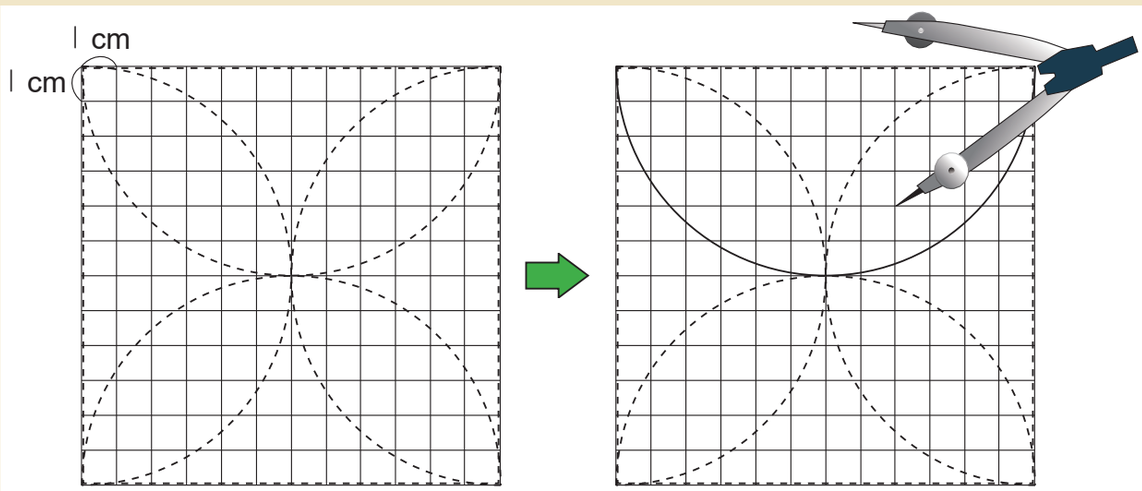


Route [ ] is closer to the house.

9 - 5 Circles and Spheres

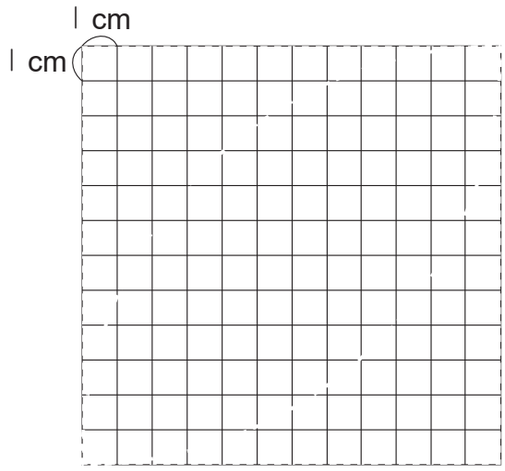
Practicing How to Use a Compass

Example 1 Using a compass, let's make a pattern by tracing over the dotted line.

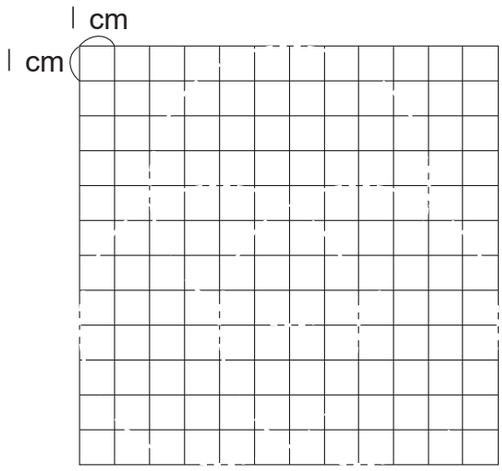


1 Using a compass, let's make a pattern by tracing over the dotted line.

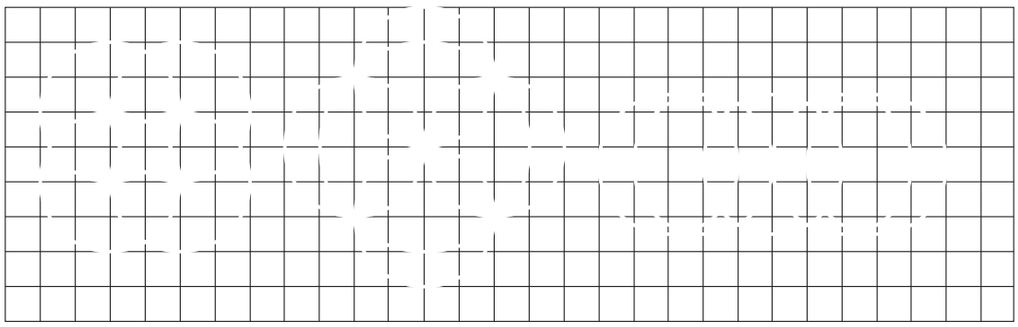
1



2

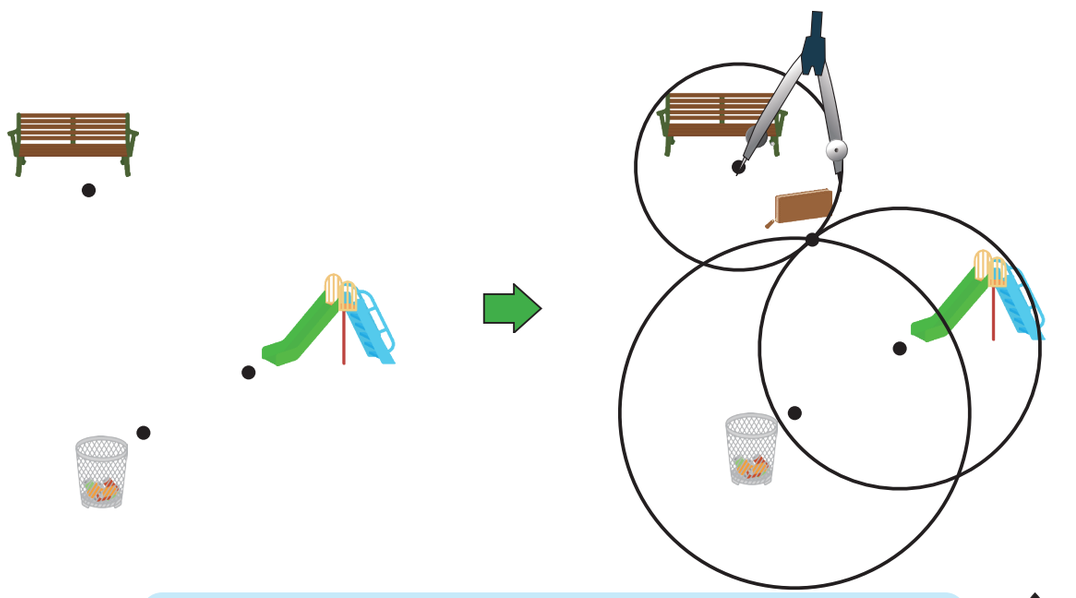


2 Using a compass, let's make patterns.



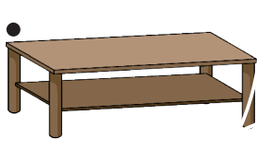
For example, let's draw such a pattern on a notebook using a compass.

Example 2 A girl is playing a game. Find the answer by using the following hints and a compass.
The wallet is 3 cm from the bench, 4 cm from the slide, and 5 cm from the trash bin on the map below.



Draw the three circles. The point the three circles intersect each other is the place where she dropped her wallet.

A boy is playing game. Find the answer using the following hints and a compass.
The key is 6 cm from the chest, 9 cm from the sofa, and 7 cm from the table on the map below.



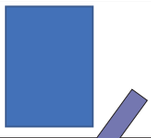
9 - 6 Circles and Spheres

Spheres

Example 1 Look at the following objects from directly above or from the side. What kind of shapes do you see? Match the objects to the shapes they make.

1  2  3 

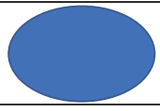
4 

From directly above			
From the side			
Item	2, 4	1	3

1 Look at the following objects from directly above or from the side. What kind of shapes do you see? Match the objects to the shapes they make.

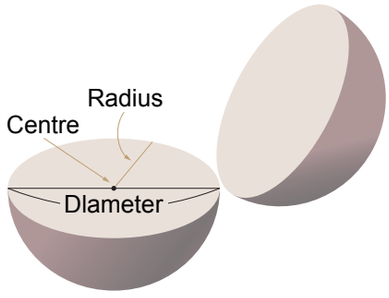
1 

2  3  4 

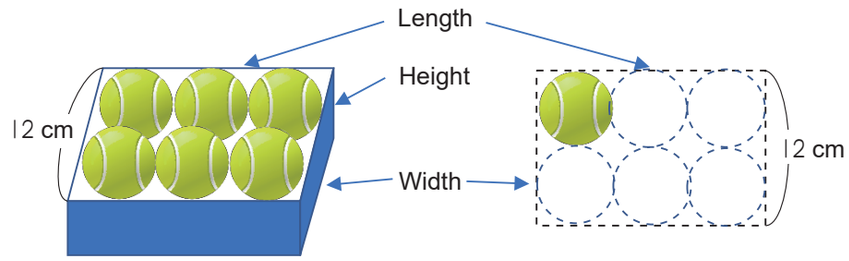
From directly above			
From the side			
Item			

Instruction Sphere

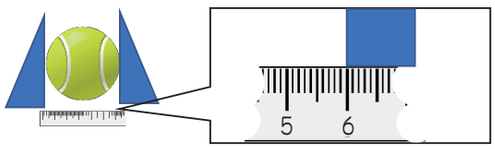
- An object that looks like a circle from any direction is called a **sphere**.
- When a sphere is cut in half, the centre, radius, and diameter of the cross-section are the same as the centre, radius, and diameter of the sphere.



Example 2 The balls are placed inside a box in rows as shown below.



1 How many cm is the diameter of one ball?



The diameter is 6 cm.

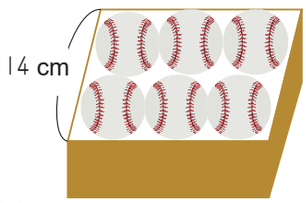
2 Find the length of the box.

The length is 18 cm.

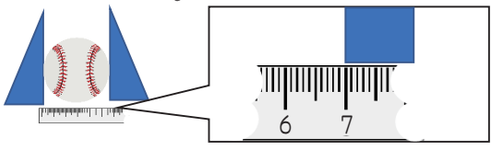
3 Find the height of the box.

The height of the box is 6 cm.

2 The balls are placed inside a box in rows as shown below.



1 How many cm is the diameter of one ball?



The diameter is ☐ cm.

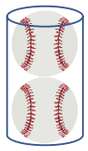
2 Find the length of the box.

The length is ☐ cm.

3 Find the total length around the bottom of the box.

The total length is ☐ cm.

4 If you can put balls into the following container. Find the height of container.



The height is ☐ cm.

9 - 7 Circles and Spheres

Review

1 Fill in the ☐ with words or numbers.

1 A circle consists of points that have the same ☐ from the centre.

2 A ☐ is twice its radius.

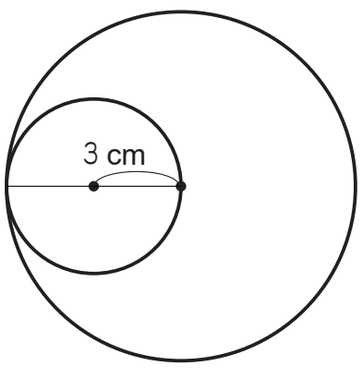
2 How many cm are the radius and diameter of the following circles?

1 If a circle has a 4 cm radius, the diameter is ☐ cm.

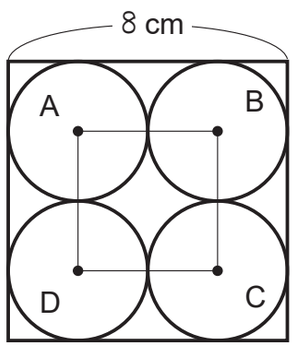
2 If a circle has a 24 cm diameter, the radius is ☐ cm.

3 How many cm are the diameter and radius of the following circles?

1



2

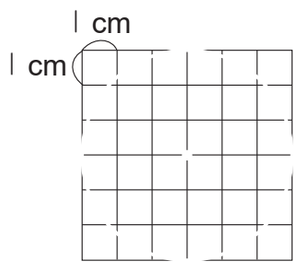


Radius of the larger circle is ☐ cm. The length of AB is ☐ cm.

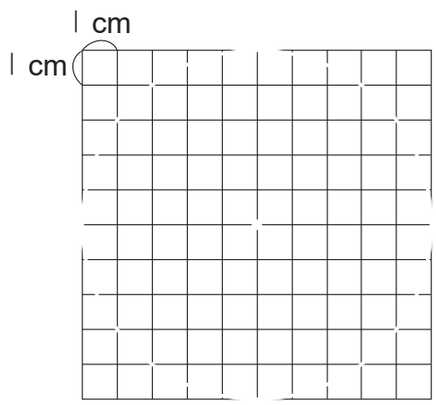
Diameter of the smaller circle is ☐ cm. The length of ABCD is ☐ cm.

4 Draw a circle with the following length of radius using a compass.

1 With a 3 cm radius



2 With a 9 cm diameter



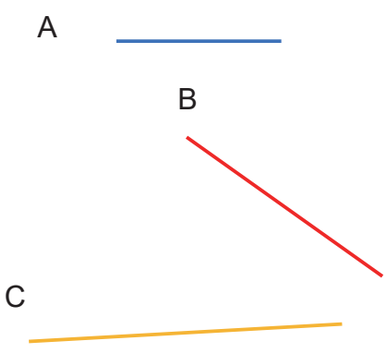
5 Mark the straight lines into the following lengths from the point.

1 Lengths of 4 cm.

2 Length of 3 cm.

6 Compare the lengths of the lines. Which of the following three straight lines below is the longest?

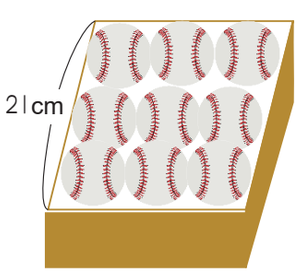
1



Measure the length of each line. Mark the lengths onto a straight line. Compare them to each other.

Line ☐ is the longest.

7 The balls are placed inside a box in rows as shown below.



1 How many cm is the diameter of a ball?

The diameter is ☐ cm.

2 Find the total length around the bottom of the box.

The total length is ☐ cm.