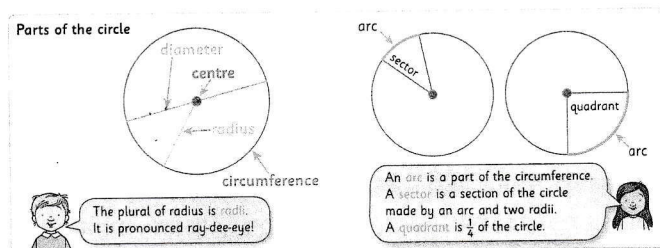# The circle

Your child will be learning about *the circle* in much greater detail than in Chapter 10 (2-D Shapes) over the coming days. S/he needs to know some of the mathematical language associated with the circle: circle, centre, circumference, radius, radii, diameter, sector, quadrant, arc, straight lines, perimeter, $\frac{1}{4}$, right angle, straight angle, protractor, length, shorter, combined, compass, ruler, swivel, point, estimate, area, centimetre squares (cm^2), approximate, full, half, more/less, construct, cost, discount, pattern, continue, small, medium, large, extra large.

Properties of a circle

Activity 1:

Have your child label the different properties of the circle on a paper plate. (If you don't have a paper plate, ask your child to place a large, circular plate on a piece of paper. Trace around the plate to make a circle, then ask him/her to cut out the circle.)

> **Notes:**
> - *A circle can have many radii (the plural of radius is radii). Each radius is identical in length.*
> - *A diameter divides a circle in half. A diameter must pass through the centre of the circle.*
> - *A circle can have many diameters.*
> - *The circumference is another name for the perimeter of the circle.*

Circle hunt

With your child, search for as many different circular shapes and objects around the home as you can find, e.g. CDs, plates, mirrors, clock, bowls.

Activity 2: Help your child measure the radius and diameter of each circle.

Activity 3: Encourage your child to trace around the different circular objects to create 2-D circles. S/he can then make a pattern or design using the circles.

Using a compass
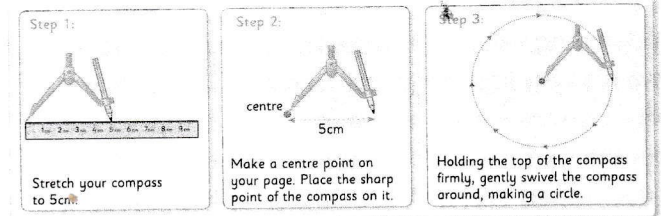
Many children find it difficult to use a compass. Encourage your child to be extremely careful when using a compass – it can be a dangerous implement! Help your child use a compass properly by doing the following:

1. Place a sharpened pencil into a compass and secure it tightly.
2. Stretch the compass as wide as you wish – this will determine the length of the radius.
3. Place a small amount of pressure on the point of the compass.
4. Pinching the top of the compass with your thumb and index finger, swivel the pencil around, drawing a circle.
5. The point of the compass must remain stationary at all times.

Invite your child to make interesting circle patterns and pictures similar to the following.
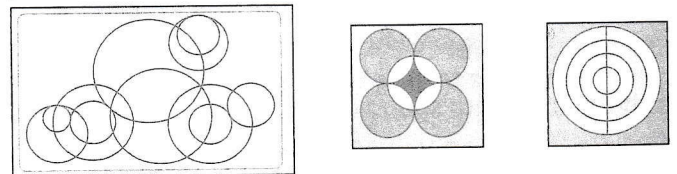
Approximate area of a circle

Encourage your child to draw circles onto centimetre square paper (copybook squares will work equally well, but emphasise that each square represents $1cm^2$). To find the approximate area, s/he simply counts up all the complete squares. S/he needs to count all parts of squares that are at least half of a full cm^2.
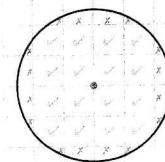

Measuring the circumference of a circle

Your child will work out a formula for calculating the circumference of any circle, which is: diameter $\times$ 3·14.

✓CJFallon

Prior knowledge

The pupil should be able to:
- Identify the circle and semi-circle.
- Identify the circle within 3-D shapes.
- Identify examples of circles in the environment/real life.
- Identify lines of symmetry.
- Use a protractor to measure angles.
- Know the properties of the circle from 5th Class: diameter, centre, radius, circumference, sector, quadrant.
- Understand that the radius is half the length of the diameter.
- Draw a circle using a compass.
- Estimate the approximate area of a circle by counting the centimetre squares (cm²).

Home/School links
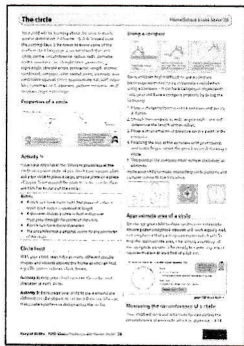
Home/School Links Sheet 28 can be sent home to parents when teaching pages 146–150. For maximum benefit, you may prefer to send it home at the start of the section, which deals with the properties of the circle. It encourages parents to become actively involved in the learning process.

Collaborative work/Active learning 1
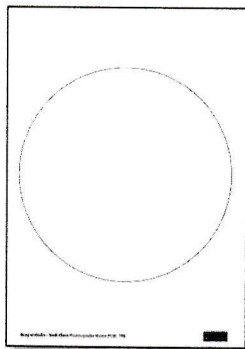
Properties of a circle

Organisational setting: Children work individually or in pairs

Materials required: Paper plates or **PCM 104**, glue stick, coloured paper or card, ruler, colours
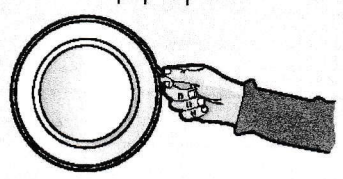
Give each child or pair a paper plate. Instruct the children to fold the plate in half. Ask: *What line are you creating?* (A line of symmetry.) Encourage the children to fold the plate in half again (creating four quadrants). The children can fold along a few more lines of symmetry – this will create a variety of diameters and radii, which the children can use later in this activity.

Invite the children to unfold their paper plate. They must glue it onto a larger piece of coloured paper or card. Using a ruler, ask them to mark the following properties on the paper plate: centre, radius, diameter, sector, quadrant, arc. They should use a different colour for each property.
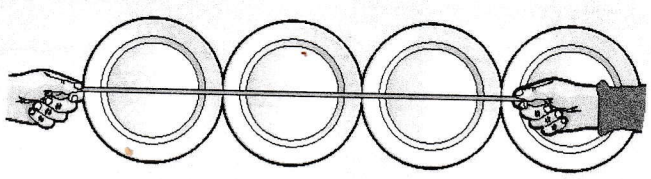
Note: If you don't have paper plates, use **PCM 104** instead.
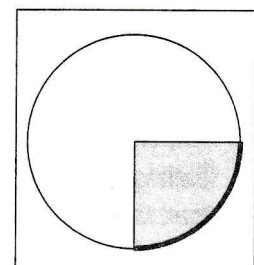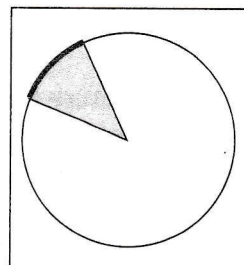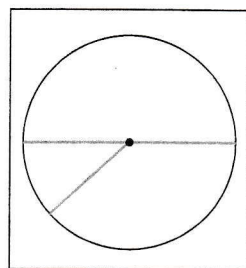
Step 1: Using string, measure the circumference of a paper plate.

**Step 2:** Unravel the measured piece of string and stretch it across four such paper plates.

Findings: The circumference of a circle measures a little more than three times the diameter.

Rule: circumference = diameter × 3·14

Extension: To test the theory, carry out the experiment using four identical tins (e.g. tins of beans or fruit) or four CDs rather than paper plates. Once the children see that the pattern holds, you can introduce the rule for measuring the circumference of a circle as:

diameter x 3·14

Collaborative work/Active learning 5
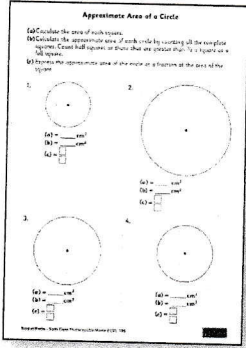
### Approximate area of a circle

Organisational setting: Children work in pairs

Materials required: PCM 105

On page 149 of the textbook, the children are given the rule that the approximate area of a circle is ³/₄ of the area of its own square. However, we want the children to realise that this rule is only approximate. In the example shown on page 149, the rule works out neatly and precisely, but this is not always the case. **PCM 105** encourages the children to challenge the rule. They will discover that the area of a circle is often not exactly ³/₄ the area of its own square, but the fraction will usually be close to ³/₄, which is why we continue to use the rule.

Give each pair a copy of **PCM 105**. The children must calculate the area of each square and the approximate area of the circle that fits perfectly inside the square. They must then express the approximate area of the circle as a fraction of the square. In doing so, they will discover whether the approximate area is close to ³/₄, as outlined in the rule.

Collaborative work/Active learning 2
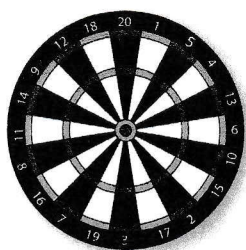
Circle hunt – radius and diameter

Organisational setting: Children work in pairs or small groups

Materials required: Circular objects from the environment (e.g. CDs, bowls, plates, bottle lids, paper plates), ruler, paper or copies

Explain to the children that you want them to find different objects around the classroom or school that have a circular outline. They must trace around these objects. Instruct them to measure the radius and diameter of each circle. These measurements should be marked onto the drawings.

Collaborative work/Active learning 3
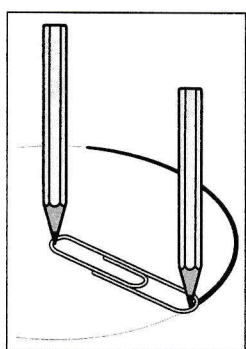
Draw a circle without a compass

Organisational setting: Children work in pairs

Materials required: Pencils, elastic band, paper, drawing pin, paperclip

Activity 1: Give each pair two pencils, a paperclip and paper to draw on. The children must place a sharp pencil at each end of the paperclip. One pencil must remain stationery and will mark the centre of the circle. The other pencil must be swivelled around the point of the stationary pencil, tracing a circular path around the centre point.
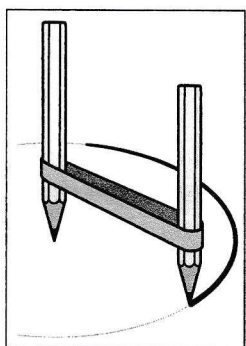
Activity 2: Give each pair two sharp pencils, a piece of paper and an elastic band. One child must hold Pencil A in a stationary position, marking the centre of the circle. (Alternatively, you could use a drawing pin in this position.) An elastic band should be placed near the bottom of this pencil. Pencil B should pull the elastic band, creating a radius of the circle. Keeping the elastic band taut, the child should swivel this pencil around the centre point, drawing a circle as s/he goes.

> **Note:** The difficulty with this method is that you must keep an even tension on the elastic band the whole time. This is quite difficult to do. The final result is often a somewhat 'bumpy' circle. This shows the children that a compass as a much more reliable tool.

Collaborative work/Active learning 4

Measure the circumference

Organisational setting: Children work in pairs or small groups

Materials required: Paper plates, string, tins of beans (or other tins), CDs

Encourage the children to measure the circumference of one paper plate using string. The children must then unravel the string and stretch it across four such paper plates (being careful not to stretch too hard and distort the string). The children should see that the circumference is equal to a little more than three times the diameter.