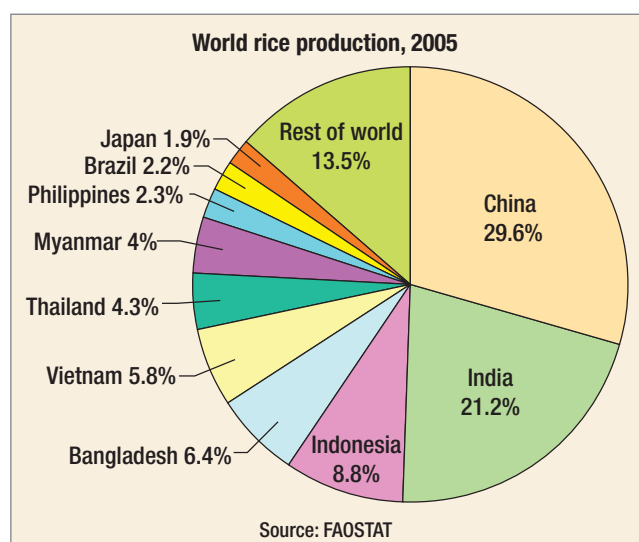# Pie graphs

A **pie graph**, also known as a **divided circle graph** or **sector graph**, is a circle that is divided into a number of parts or sectors by lines radiating out from the centre. Each sector in the circle looks like a slice from a pie, and represents the value of that sector. All the 'slices' combined make up the total of the 'pie'.

Pie graphs are used to show the relative importance of each sector as a part of the total. The size of each sector is proportional to the value of the sector.

Unlike column, bar and line graphs, pie graphs do not have a scale. Instead, we compare the actual size of each sector with other sectors in the graph.

Interpreting a pie graph

6.14 World rice production in 2005

Step by step

STEPS IN INTERPRETING A PIE GRAPH

1. What is the title of this graph? What is the graph about?
2. Where has the data come from?
3. Into what categories or classes is the total data divided?
4. Describe your visual impression of the data graphed.
5. Describe the relative importance of the sectors of the pie graph. Which parts are of greater or lesser importance? What do the sectors show you about the data and the importance of the parts to the total?
6. Suggest reasons for the pattern shown. What is likely to happen in the future? Give reasons for your answer.

Now do this

Study Figure 6.15, which shows the regions of birth of the Australian people in 2006.

1. Complete Steps 1 to 5 of the Steps in interpreting a pie graph for Figure 6.15.
2. In the mid-20th century, most of Australia's population was born in either Australia or Europe. What do you think a pie graph for this period would look like?

Drawing a pie graph

The first step in drawing a pie graph is to determine the categories to be included. The value for each category or sector is converted to a percentage of the total, then the percentage is converted to degrees of a circle.

Since a full circle is 360 degrees, each percentage point is converted to 3.6 degrees. The sectors of the pie graph must add up to both 100 per cent and 360 degrees in total.

If there are too many categories, the pie graph will appear cluttered. As a general rule, plan to:
- include no more than 10 sectors
- combine sectors of less than 6 degrees into a larger 'other' sector, which is graphed last.
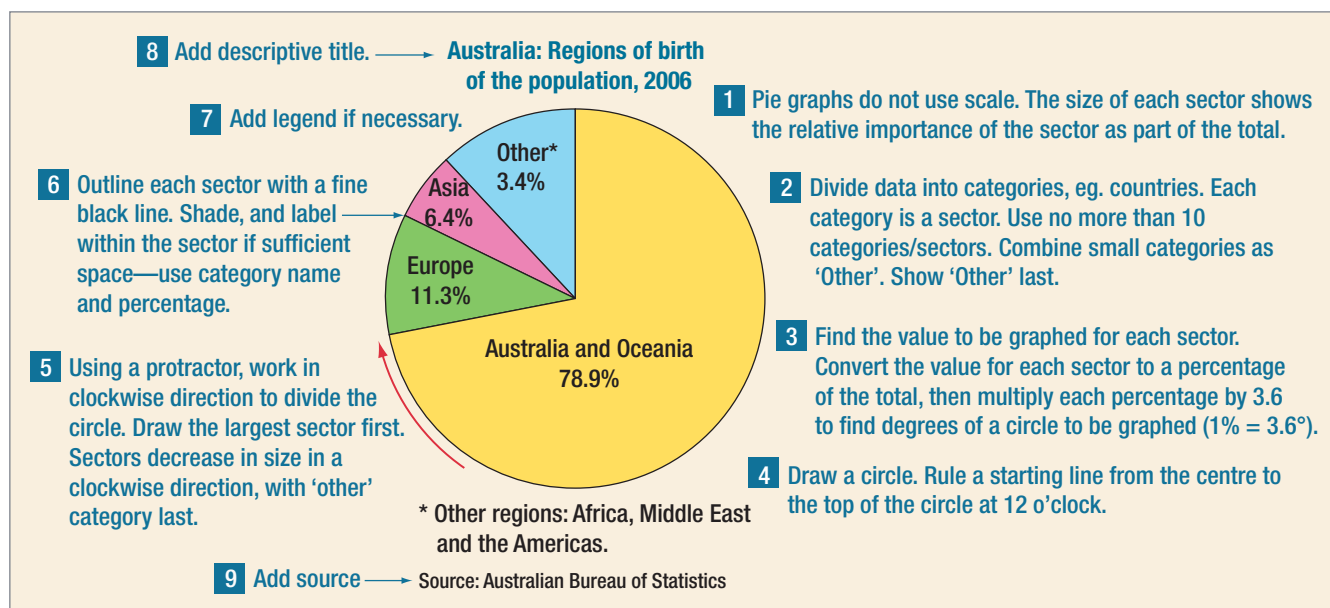
Now do this

1. Read the labels on Figure 6.15, which show the Steps in drawing a pie graph. Make certain that you understand the information in each label.
2. Consider the following information: in a class of 20 students, two have red hair, four have blond hair, seven have black hair and seven have brown hair. Draw a pie graph to show the distribution of hair colours in this class.
3. Make a list of every step that you use to complete this activity. Number each step.
4. Next, consider whether the writen description or the pie graph provides a better impression of the distribution of different hair colours. Give reasons for your answer.
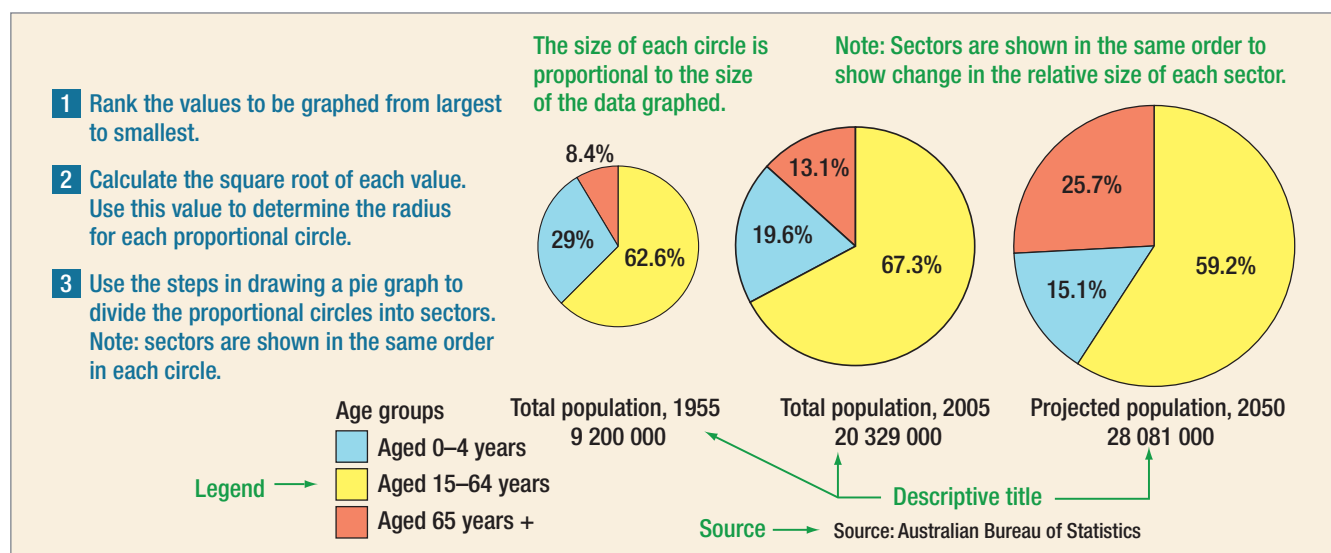
Proportional pie graphs

Proportional pie graphs are used to make visual comparisons between totals of the same data—for instance, population size in 1960, 1980 and 2000—and the relative importance of the categories that make up that data.

The area of each pie shows its total size or value in comparison with other pie graphs drawn nearby.

8 Add descriptive title. ——► **Australia: Regions of birth of the population, 2006**

7 Add legend if necessary.

6 Outline each sector with a fine black line. Shade, and label —► within the sector if sufficient space—use category name and percentage.

5 Using a protractor, work in clockwise direction to divide the circle. Draw the largest sector first. Sectors decrease in size in a clockwise direction, with 'other' category last.

Other* 3.4%
Asia 6.4%
Europe 11.3%
Australia and Oceania 78.9%

1 Pie graphs do not use scale. The size of each sector shows the relative importance of the sector as part of the total.

2 Divide data into categories, eg. countries. Each category is a sector. Use no more than 10 categories/sectors. Combine small categories as 'Other'. Show 'Other' last.

3 Find the value to be graphed for each sector. Convert the value for each sector to a percentage of the total, then multiply each percentage by 3.6 to find degrees of a circle to be graphed (1% = 3.6°).

4 Draw a circle. Rule a starting line from the centre to the top of the circle at 12 o'clock.

* Other regions: Africa, Middle East and the Americas.

9 Add source ——► Source: Australian Bureau of Statistics

6.15 Steps in drawing a pie graph. Source: 3412.0—*Migration, Australia, 2005–06*

1 Rank the values to be graphed from largest to smallest.

2 Calculate the square root of each value. Use this value to determine the radius for each proportional circle.

3 Use the steps in drawing a pie graph to divide the proportional circles into sectors. Note: sectors are shown in the same order in each circle.

The size of each circle is proportional to the size of the data graphed.

Note: Sectors are shown in the same order to show change in the relative size of each sector.

8.4%
29% 62.6%

13.1%
19.6% 67.3%

25.7%
15.1% 59.2%

Age groups
Legend ——► Aged 0–4 years
Aged 15–64 years
Aged 65 years +

Total population, 1955
9 200 000

Total population, 2005
20 329 000

Projected population, 2050
28 081 000

Descriptive title

Source ——► Source: Australian Bureau of Statistics

6.16 Proportional pie graphs—the ageing of the Australian population. Source: 4102.0—*Australian Social Trends, 2006*

The slices of the pie show the same sectors in each pie graph. Note how the sectors are drawn in the same order even though their sizes may vary.

📌 Now do this

1 Study Figure 6.16 and complete Steps 1 to 4 of the Steps in interpreting a pie graph.

2 What happened to the size of the Australian population between 1955 and 2005? What is projected to happen by 2050?

3 Compare the percentage of the population in the three age groups in 1955 and 2005, and the projection for 2050. What is expected to happen to the Australian population by 2050?

4 How useful are proportional pie graphs for showing this information? Give reasons for your answer.

5 Suggest another topic for which proportional pie graphs would be a good way to show data. Conduct an Internet search to find statistical data to be graphed on this topic. Make certain you have data to draw two or three pie graphs, each divided into the same three to six sectors.

6 Draw your proportional pie graphs, making a checklist of the steps used to draw the pie graphs.

7 Review your proportional pie graphs. What do they show? Do they tell you anything about change? Are they useful for showing this information? Give reasons for your answers. Share your graphs and your answers with your class.

Extension CW *Material*