

# ACTIVE MATHS

## 9

Australian Curriculum edition

SAMPLE PAGES

Homework Program

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# Data 1

Name: .....

Due date: ...../...../.....

For 1–3, complete the sentence.

**1**  
[Definition] In statistics, an entire group with at least one characteristic in common is called a \_\_\_\_\_.

**2**  
[Definition] A portion of the entire group selected for the purpose of studying a characteristic of that group is called a \_\_\_\_\_.

**3**  
[Definition] When a survey covers the entire group, it is called a \_\_\_\_\_.

**4**  
[Definition] Is the following an example of a census or a sample?  
‘Three hundred randomly selected students from a school are selected to take part in a questionnaire about their favourite breakfast cereals.’  
\_\_\_\_\_

**5**  
[Definition] Is the following an example of a biased or unbiased survey?  
‘Students enrolling in the first year of a degree at university are surveyed about their results from Year 12.’  
\_\_\_\_\_

For 6–7, state whether the data is categorical or numerical.

**6**  
[Data type] A supermarket records the number of loaves of bread it sells each day.  
\_\_\_\_\_

**7**  
[Data type] A teacher surveys students in a class by asking, ‘In what month were you born?’  
\_\_\_\_\_

For 8–9, state whether the categorical data is ordinal or nominal.

**8**  
[Categorical data type] The income categories low, medium and high.  
\_\_\_\_\_

**9**  
[Categorical data type] The colours of cars in a car yard.  
\_\_\_\_\_

For 10–11, state whether the numerical data is continuous or discrete.

**10**  
[Numerical data type] The shoe sizes of a group of toddlers.  
\_\_\_\_\_

**11**  
[Numerical data type]

The heights of a group of toddlers.

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For **12–14**, Susan is conducting a survey of what the students at her school think of the changes to the school uniform policy. She decides to do a sample where the proportion of students in each year asked is the same as the proportion of students in each year.

**12**  
[Type of sample]

What sort of sample is this?

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**13**  
[Stratified sampling]

Susan decides to do a sample of 75 students. Complete the table below to show the number of students in each year in the sample.

Embecca High School		
Year	Number of students in school	Number in Sample
7	240	
8	191	
9	198	
10	282	
11	214	
12	125	
Total		

**14**  
[Stratified sampling]

Susan found out that there were only 60 boys in Year 9. How many boys should she survey in Year 9 if she decided to factor this into her calculations?

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**15**  
[Type of sample]

Paul wanted to do the same survey at his school but he decided to just go through the school roll and get every 10th student to do the survey. What type of sampling is this? Is this considered to be a random sample?

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For **16–17**, Scott and John recorded the points that their basketball teams scored in the first 14 games of basketball:

<b>Scott</b>	45	37	54	26	42	46	46	45	52	57	38	55	57	48
<b>John</b>	44	36	28	70	29	37	43	29	36	28	46	28	38	26

**16**  
[Analysis of data]

Complete the following table.

	Scott	John
Mean		
Median		
Highest score		
Lowest score		
Range		

**17**  
[Analysis of data]

What can you say about the performance of the two teams throughout the season?

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For **18–26**, use the following weights, in kilograms, of 25 students.

43, 48, 49, 56, 71, 58, 54, 58, 62, 53, 42, 39, 51, 51, 59, 47, 42, 51, 74, 56, 68, 52, 54, 49, 55

**18**  
[Stem-and-leaf plot]

Construct a stem-and-leaf plot of the data with groupings of 5 kg.

**19**  
[Frequency  
table]

Complete the class interval, tally and frequency ( $f$ ) columns below.

Class interval (kg)	Tally	$f$	$cf$
35–<40			
40–<45			
Total			

**22**  
[Cumulative  
frequency]

Fill in the cumulative frequency ( $cf$ ) column in the table in **19**.

For **23–25**, use the table in **19**.

**23**  
[Analysis  
of data]

What percentage of students weighed 65 kg or more?

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**24**  
[Analysis  
of data]

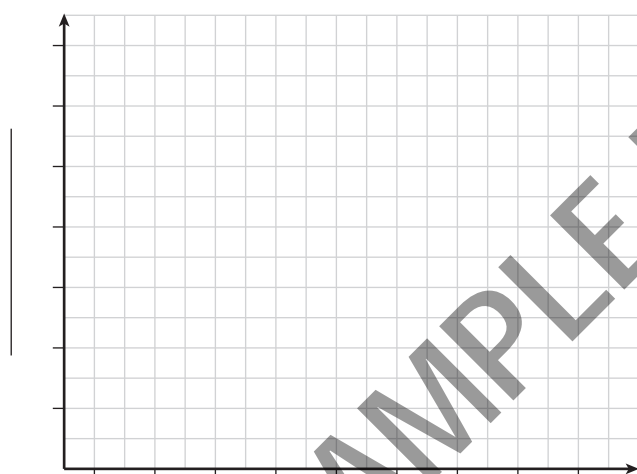
In which class interval would you find the 50th percentile.

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**20**  
[Histogram]

Draw a histogram to represent this data.

Weight of Year 10 students



**25**  
[Analysis  
of data]

In which class interval would you find the 25th percentile.

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For **26–30**, use these survey results, where  $x$  is the number of weeks' holiday taken.

$x$	$f$	$f \times x$
1	5	
2	4	
3	1	
4	9	
5	3	
6	2	
7	1	
8	2	
9	0	
10	3	
Total	30	

**21**  
[Stem-and-  
leaf plot]

What is the advantage of the stem-and-leaf plot over the histogram in this instance?

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**26**  
[Frequency  
table]

Complete the third column ( $f \times x$ ) in the table.

**27**  
[Mean]

Calculate the mean of the number of weeks' holiday taken, to 1 decimal place.

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**28**  
[Mode]

What is the modal number of weeks' holiday?

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**29**  
[Median]

Find the median number of weeks' holiday.

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**30**  
[Median]

True or false? The majority of people surveyed took fewer than 5 weeks' holiday.

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SAMPLE PAGES

Student comment	Guardian comment/signature	Teacher feedback



# Data 2

Name: .....

Due date: ...../...../.....

For **1–4**, Jessica owns a strawberry farm. She wanted to know which growing conditions were better for her strawberries. She planted 20 seedlings in two different patches and then recorded the total number of strawberries that each plant produced in its second season.

Patch A: 41, 43, 43, 43, 43, 44, 44, 44, 45, 45, 45, 46, 47, 47, 49, 49, 49, 50, 51, 52

Patch B: 6, 28, 33, 33, 33, 34, 36, 37, 38, 44, 46, 46, 46, 47, 49, 48, 49, 49, 58, 60

**1** Calculate the mean for each patch.

[Mean]

\_\_\_\_\_

**2** Calculate the median for each patch.

[Median]

\_\_\_\_\_

**3** Calculate the range for each patch.

[Range]

\_\_\_\_\_

**4** What conclusion could Jessica make concerning the better patch for the strawberries? Explain.

[Analysis of data]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

For **5–6**, the ages of people in a coffee shop at one time were recorded.

17, 34, 24, 11, 45, 14, 34, 26, 24, 27, 32, 24.

**5**

[Analyse data]

Calculate the values in the left-hand column of the table below.

	Question 5	Question 6
Mean		
Mode		
Median		
Range		

**6**

[Analyse data]

There was a mistake in recording the data. The 11 should have been a 31. What effect would this have for each of the values calculated in question **5**? Explain, writing your answers in the table in question **5**.

**7**

[Mean]

Kim wants to get an A in history. She knows that to get an A she needs at least a 90% average in her test results. She has scored 85, 94, 84 and 88 in the first four tests. With one test to go, is it possible for her to get an A overall? If so, what will she need to score in her last test?

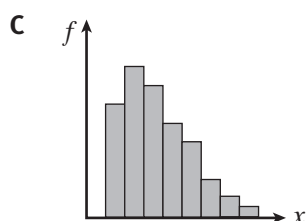
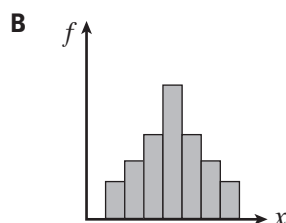
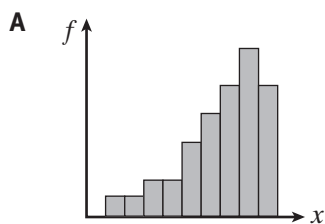
\_\_\_\_\_  
\_\_\_\_\_

For **8–10**, match the following diagrams and names to the most appropriate description.

Negatively skewed

Positively skewed

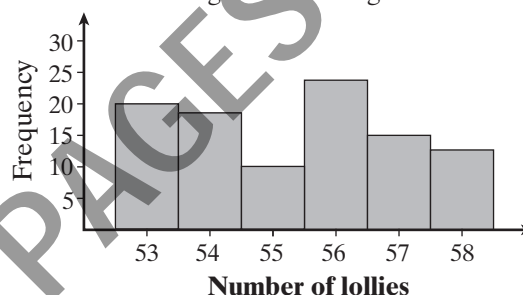
Symmetrical



**12**  
[Distribution:  
bi modal]

Draw a sketch of a distribution that is bi modal.

For **13–15**, a lolly manufacturer claims that the average number of lollies in each packet is 56. Peter doesn't believe this claim so he takes a sample of the lollies and records how many are in each packet. He records his findings in the histogram below.



**8**  
[Distribution:  
shape]

The results of an exam that was really easy and most students did well.

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**13**  
[Mean]

Calculate the mean of his sample.

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**9**  
[Distribution:  
shape]

The shoe sizes of all of the students in Year 9.

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**14**  
[Analyse  
data]

What can Peter conclude about the manufacturer's claim from his sample? Explain.

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**10**  
[Distribution:  
shape]

The ages of people at a day-care centre.

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**11**  
[Bi modal]

A data set is said to be bi modal. Explain what this means.

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15

[Appropriate sample]

Write two questions that you would need to ask Peter to determine if his findings are fair.

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16

[Histogram: draw]

Represent this data as a histogram.

Score	Frequency
8	7
9	10
10	6
11	4
12	2
13	0
14	1

17

[Distribution]

Petra says 'The mean of positively skewed data is always less than or equal to the median.' Do you agree? Use the data in question 16 to support your answer.

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For 18–24, use this back-to-back stem-and-leaf plot, which shows the heights of 20 boys and 20 girls.

Boys	Stem	Girls
	12	3 5
9 4	13	0 0 4 6 6
8 7 7 6 4 2	14	1 2 2 3 8 8 9
9 9 8 5 5 1 1	15	0 1 3 4 9
4 3 3 0	16	5

Key: 15|4 = 154 cm

18

[Distribution]

True or false? The heights of the girls are evenly distributed.

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19

[Distribution]

True or false? The heights of the boys are positively skewed.

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20

[Median]

Find the median height of the boys.

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21

[Mean]

Calculate the mean height of the boys.

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22

[Median]

Find the median height of the girls.

---

23

[Mean]

Calculate the mean height of the girls.

---

24

[Compare data sets]

Write a short statement comparing the heights of the boys and girls.

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For **25–30**, Saul wanted to know which method of teaching was better for a particular topic. He had two classes of 25 students with the same ability level so he decided to teach each class with a different method. The results for each of the students are recorded below.

Class A: 62, 73, 75, 94, 55, 77, 84, 56, 76, 65, 66, 85, 89, 88, 92, 85, 56, 60, 71, 75, 69, 95, 88, 75, 62, 77

Class B: 51, 90, 92, 71, 87, 85, 91, 56, 94, 63, 83, 83, 43, 80, 30, 80, 45, 62, 83, 84, 71, 92, 95, 91, 73, 75

**25**  
[Range]

Calculate the range in the marks for each class.

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**26**  
[Stem-and-leaf plot]

Construct a back-to-back stem-and-leaf plot showing the marks for each class.

**27**  
[Mean]

Calculate the mean in the marks for each class.

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**28**  
[Median]

Calculate the median in the marks for each class.

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**29**  
[Distribution]

Comment on the shape of the distribution of each class.

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**30**  
[Analyse data]

What conclusion could Saul make concerning the better method for teaching that topic?

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Student comment	Guardian comment/signature	Teacher feedback

# The good life

Name: .....

Due date: ...../...../.....

Telemarketers Inc. has conducted an independent survey to compare the incomes of young people in the capital cities of two neighbouring countries, Roseland and Petunia. In each capital, 50 citizens aged between 20 and 30 were randomly selected and surveyed by phone. The cities are similar in size and the countries use the same currency, petals (\*). Your company, StatisticiansRus, has been contracted to compare the incomes.



- 1** The individual incomes of survey respondents in each city, rounded to the nearest 500 petals, are listed below.  
[Make a table]

Income (*) in Roseland sample				
12 000	57 500	14 000	98 000	92 500
98 500	74 000	49 000	61 000	24 000
18 500	64 000	46 000	25 500	97 500
76 000	96 000	135 000	24 500	62 000
7 500	98 000	37 500	47 500	93 500
1 500	45 000	53 500	56 500	77 000
92 000	98 500	46 500	81 000	36 000
47 000	24 500	77 500	51 000	36 500
98 000	38 000	97 500	98 500	36 000
58 500	44 500	13 000	19 000	86 000

Income (*) in Petunia sample				
98 000	121 500	134 000	80 000	75 500
57 000	72 000	146 500	116 000	83 000
58 500	54 500	131 000	119 500	70 000
50 500	87 000	111 000	145 500	55 000
145 500	133 500	87 000	68 000	100 000
78 500	120 000	127 500	132 500	110 500
50 500	92 000	138 500	146 000	135 000
84 000	142 500	124 500	92 500	119 500
71 000	133 500	68 000	61 000	90 000
117 500	110 500	77 500	98 000	133 000

- a** What was the minimum income:
- i in Roseland? \_\_\_\_\_
  - ii in Petunia? \_\_\_\_\_
- b** What was the maximum income:
- i in Roseland? \_\_\_\_\_
  - ii in Petunia? \_\_\_\_\_

- c Group the data by completing the frequency tables below.

Annual income (¥) in Roseland	Tally	Frequency (f)
0–<15 000		
15 000–<30 000		
30 000–<45 000		
45 000–<60 000		
60 000–<75 000		
75 000–<90 000		
90 000–<105 000		
105 000–<120 000		
120 000–<135 000		
135 000–<150 000		
		$\Sigma f =$

Annual income (¥) in Petunia	Tally	Frequency (f)
0–<15 000		
15 000–<30 000		
30 000–<45 000		
45 000–<60 000		
60 000–<75 000		
75 000–<90 000		
90 000–<105 000		
105 000–<120 000		
120 000–<135 000		
135 000–<150 000		
		$\Sigma f =$

- d What is the modal income class:

i for Roseland? \_\_\_\_\_

ii for Petunia? \_\_\_\_\_

- e What is the median income for a resident:

i in Roseland? \_\_\_\_\_

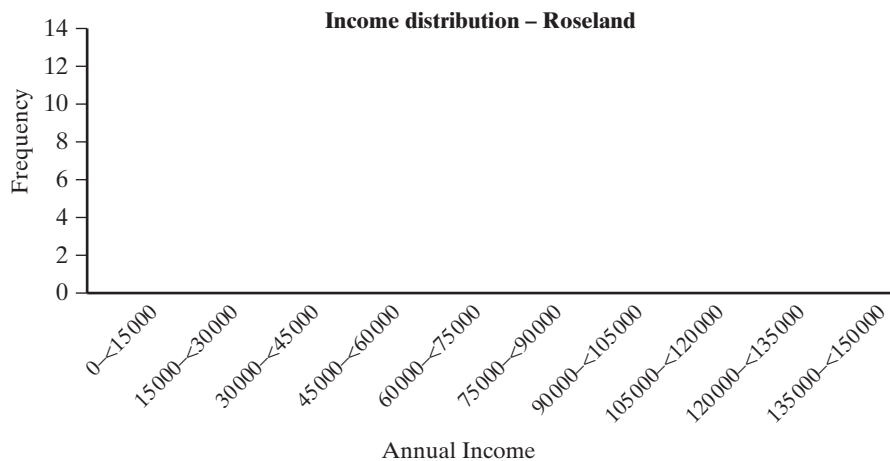
ii in Petunia? \_\_\_\_\_

2

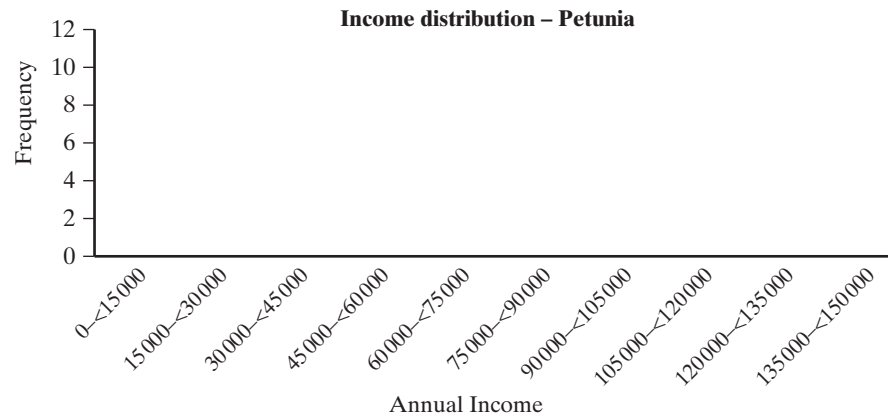
[Draw a graph]

The distribution of incomes for the two cities can be represented using histograms.

- a Use your frequency table from question 1 to construct a histogram of the incomes for Roseland below.



- b** Use your frequency table from question 1 to construct a histogram of the incomes for Petunia below.



**3**  
[Interpret  
graphs]

Use your histograms in question 2 to help you answer the following questions.

- a** Describe the distribution of annual incomes for Roseland including the use of terms such as 'positive skew', 'negative skew', 'symmetric' or 'bi-modal', if appropriate.

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- b** Describe the distribution of annual incomes for Petunia including the use of terms such as 'positive skew', 'negative skew', 'symmetric' or 'bi-modal', if appropriate.

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**4**  
[Summarise  
data]

Use the grouped data to calculate the average income for young adults in each city.

- a** Complete each table below, using your frequency data from 1c.

Annual income (*) in Roseland	Midpoint (x)	Frequency (f)	Frequency × midpoint (xf)
0–15 000	7 500	5	37 500
15 000–30 000		6	
30 000–45 000			
45 000–60 000			
60 000–75 000		4	270 000
75 000–90 000	82 500	5	412 500
90 000–105 000		12	
105 000–120 000			
120 000–135 000			
135 000–150 000	142 500		142 500
		$\Sigma f =$	$\Sigma xf =$

Annual income (*) in Petunia	Midpoint (x)	Frequency (f)	Frequency × midpoint (xf)
0–15 000	7 500	0	0
15 000–30 000			
30 000–45 000			
45 000–60 000		6	315 000
60 000–75 000		6	
75 000–90 000	82 500	8	
90 000–105 000		6	
105 000–120 000			
120 000–135 000			
135 000–150 000	142 500	7	997 500
		$\Sigma f =$	$\Sigma xf =$

**b** What is the weighted mean for incomes:

- i in Roseland? \_\_\_\_\_
- ii in Petunia? \_\_\_\_\_

**5** Use the median and mean annual incomes you calculated in question **1** and question **3** to compare the typical annual income of residents in the two cities.

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**6**



[Consider  
new  
information]

This table shows the cost of three everyday items in each capital city.

	1 litre full-cream milk (*)	50 litres unleaded fuel (*)	Big H hamburger (*)
Roseland	1.19	64.50	4.50
Petunia	2.87	127.50	8.95

What effect would this data have on your analysis? What other factors might you need to consider when comparing the incomes of young adults in these two cities. Explain.

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SAMPLE PAGES

Student comment	Guardian comment/signature	Teacher feedback

# Ageing Australia

Name: .....

Due date: ...../...../.....

What is the average age of a person living in your state? Is that changing? How does your state compare with the rest of Australia? What is the distribution of ages of people living in your state? In this technology task you will use data and reports on the Australian Bureau of Statistics (ABS) website to investigate these questions.

<AW 03006c—insert cartoon here if room at first pages.  
Author's suggestion: cartoon illustration of a map of Australia with people of different ages>

1

[To show a data value for a column in a column chart, select the column and click on 'Add Data Label'.]

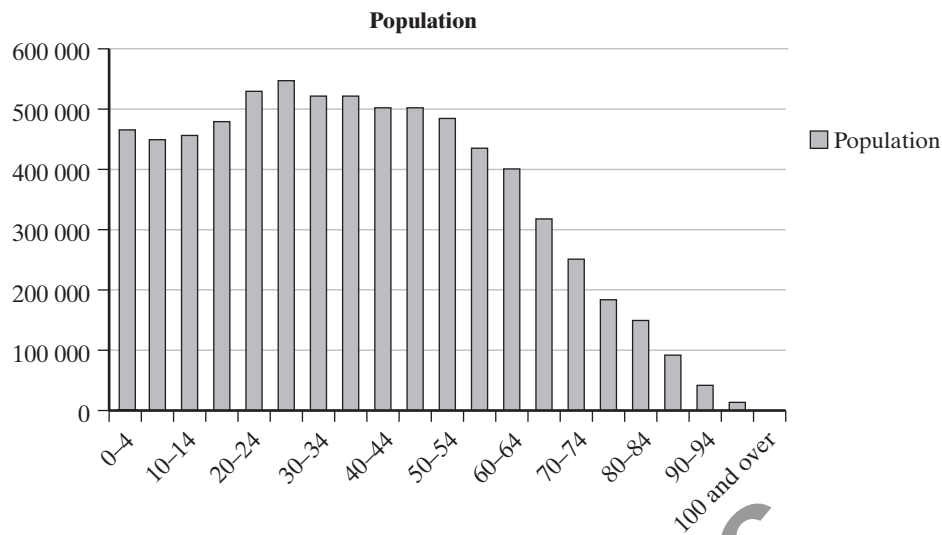
To create an age distribution by gender for your state, follow the steps below.

- On the ABS website, go to the page titled '3101.0 - Australian Demographic Statistics, Jun 2011' at this address:  
[www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Jun%202011?OpenDocument](http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Jun%202011?OpenDocument)  
(Alternatively, go to the ABS home page [www.abs.gov.au](http://www.abs.gov.au), enter '3101.0' in the search box, click search and then click on the 'Downloads' tab.)
- Scroll to the bottom of the screen then right-click on the Excel icon for the data cube (data set) for Population by Age and Sex Tables. Select 'Save Target As' and save to an appropriate folder on your computer.
- Open the Excel file and look at the spreadsheet called 'Contents' which lists the tables in the workbook. Go to table 8 which is a table of data of estimated resident population, by age and sex at 30 June 2011. As you scroll down you will see tables for 'Males', 'Females' and 'Persons'.
- Open a new Excel spreadsheet and enter the data from the 'Persons' table for your state. Part of a sample layout is shown below.

Row/Col	B	C
1	<b>Estimated resident population, by age—at 30 June 2011</b>	
2		
3	<b>Age (years)</b>	<b>Population</b>
4	0–4	
5	5–9	
6	10–14	
7	15–19	
8	20–24	
9	25–29	
10	30–34	
11	35–39	
12	40–45	
13	45–49	
14	50–54	



- Now select the headings in row 3 and the data values and insert a column chart. You should see a column chart similar to the one below, with age intervals on the horizontal axis.



- Select the columns (all of them) on the chart and choose the format option for your version of Excel. You should see a 'Format Data Series' dialog box with 'Series options' that allow you to set the Gap width to 0. Set the gap to 0 to remove the space between the columns and create a histogram. Change the border colour to a solid black line.
- Now insert an appropriate chart title. You can also delete the 'Population' legend. If you would prefer the age intervals to be vertical, reduce the chart area width until the labels move to the vertical.



- Looking at your histogram, what is the modal age group for your state?
- How many people are there in this age group?
- Describe the shape of the age distribution for your state. (Hint: Consider questions such as: Is your distribution skewed or symmetrical? Is there an even distribution of number of various age groups?)

- 2** Use table 3 of the data to help you answer the following questions about the median age of a person living in your state.
- What was the median age of a person living in your state as at 30 June 2011?  
\_\_\_\_\_
  - What was the median age of a person living in Australia at 30 June 2011?  
\_\_\_\_\_
  - How does the median age of a person in your state compare with the median age of a person in Australia?  
\_\_\_\_\_
  - Describe what happened to the median age of a person living in your state during the period 2004 to 2011.  
\_\_\_\_\_
  - Did the same thing happen across the country? Explain.  
\_\_\_\_\_  
\_\_\_\_\_

- 3** Use table 4 of the data to help you answer the following questions about the mean age of a person living in your state.
- What was the mean age of a person living in your state as at 30 June 2011?  
\_\_\_\_\_
  - What was the mean age of a person living in Australia at 30 June 2011?  
\_\_\_\_\_
  - How does the mean age of a person in your state compare with the mean age of a person in Australia at this time?  
\_\_\_\_\_
  - Describe what happened to mean age of person living in your state during the period 1988 to 2011.  
\_\_\_\_\_
  - Did the same thing happen across the country? Explain.  
\_\_\_\_\_  
\_\_\_\_\_

- 4** [Hyperlinks in spreadsheets can take you to a webpage if you are connected to the internet.] The population totals in the ABS tables are estimates. To find out the basis of the population data provided in the tables, follow these steps.
- Open the workbook you downloaded and go to the spreadsheet called 'Contents'.
  - Click on the link called 'Explanatory notes' (in row 22) which should take you to a webpage on the ABS website.
- Use the information under 'Population and components of population change—Method of estimation' to help you complete this sentence.  
Estimates of the resident population are based on \_\_\_\_\_,  
to which are added the \_\_\_\_\_ and the number of  
Australian residents estimated to \_\_\_\_\_.
  - Which group are not included in this count?  
\_\_\_\_\_

5



Use your answers to questions **1, 2** and **3** to answer the following.

- a** Complete: The median age for a person in my state on 30 June 2011 was \_\_\_\_\_ years.  
The mean age for a person living in my state on 30 June 2011 was \_\_\_\_\_ years.
- b** Circle the correct words: Based on the shape of the distribution of ages for 2011, the medium age is the most / either the median age or the mean age is a / the mean age is the most reliable indication of the typical age of a person in my state.
- c** Explain your answer to question **b**.

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**Try  
this!**

Follow the steps in question 1 to create a histogram of the age distribution of persons in Australia as at 30 June 2011.

Compare the age distribution of your state with that of Australia. How are they similar? How are they different? Explain.

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SAMPLE PAGES

Student comment	Guardian comment/signature	Teacher feedback