

Activity 4 — Changing the picture

ABOUT THIS ACTIVITY

In this activity, students read information from existing graphs and identify ways in which these graphs can be used to manipulate and distort the information. They get further practice in drawing their own graphs and change the scale on the vertical axis to observe the effects. The Specific Outcomes and Assessment Criteria addressed are: SO1 – AC1, 2, 3; SO2 – AC2, 5, 6, 7.

MANAGING THIS ACTIVITY

This activity is well suited to assessment purposes, as it draws on the ideas introduced in the previous activities and reinforces the reading of tables and the drawing of bar graphs. Little preparation is necessary although it may be a good idea to remind students that any suitable scale can be chosen for a graph, provided it remains consistent everywhere on the axis. After they have completed the activity, it may be interesting to generate a class discussion around the fact that information is always open to manipulation, which raises questions of ethics. Pose questions to the class to increase awareness of how statistics should be carefully examined for distortions. Do publishers often give information that the reader wants to hear in order to sell their newspapers? Does an employee draw an impressive graph to keep his job? Does a politician distort the facts to gain votes? Is it possible to distort information without actually telling a lie? How ethical would that be?

Students should each receive a copy of Handout 4 and Worksheet 4.

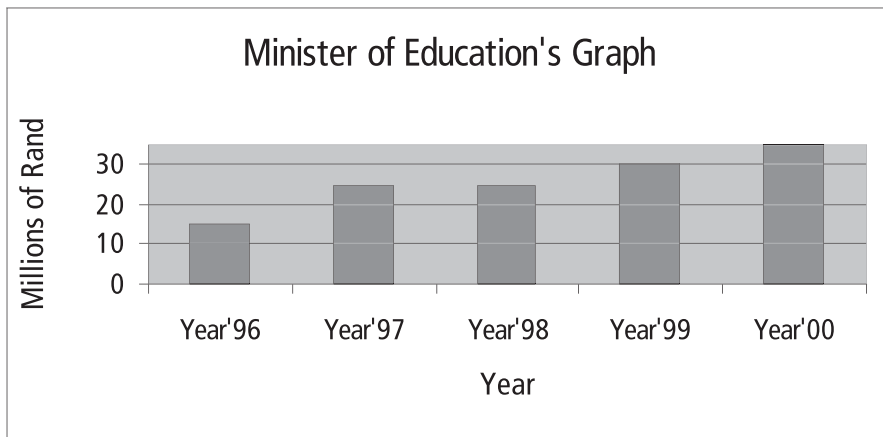
- 4.1 All three completed tables are identical, read from the graphs as follows:

Car Sales				
	June	July	August	September
No. of cars	200	180	150	100

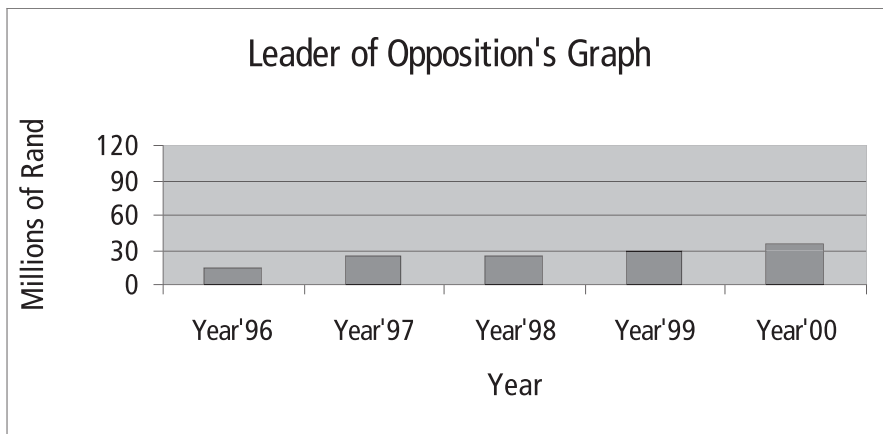
- 4.2 All three tables show identical figures although the graphs look significantly different.
- 4.3 In graph 1, the vertical scale starts at 0, goes up to 250 and goes up in 50s. In graph 2, the vertical scale starts at 100, goes up to 200 and also goes up in 50s. In graph 3, the vertical scale starts at 0, goes up to 500 and goes up in 100s.
- 4.4 Add each of the totals to get 630 cars.
- 4.5 The modal month is June, because most cars were sold in that month.
- 4.6 The mean is the total cars sold divided by the number of months: $630 \div 4 = 158$.
- 4.7 To find the percentage, take the fraction of cars sold in June and multiply by 100, i.e.:
 $200 \div 630 \times 100 = 31,7\%$.
- 4.8 The journalist would probably choose graph 2, because it gives the impression of a big drop in sales. The fact that the graph starts at 100 gives the impression of zero sales in September to a careless reader. The salesman might choose graph 3 because all the bars are small and look similar, creating the impression that there was not much change.
- 4.9 Yes, graphs 4, 5 and 6 do show identical figures, although the differing scales make them look very different.
- 4.10 Graph 4 starts at 0 and goes up to 200 in 50s. Graph 5 starts at 100 and goes up to 160 also in 50s. Graph 6 starts at 0 and goes up to 500 in 100s.
- 4.11 Total: $120 + 140 + 100 + 150 + 160 = 670$. The average per month is $670 \div 5 = 134$.

4.12 Graph 5 gives the impression of the greatest fluctuation, with a big drop in the third month. This impression is created by 'hiding' part of the axis and could be used by someone trying to convince others that things are very unstable, eg. a resident lobbying for more police presence in the area. Graph 6 is the 'flattest' of the three, giving the impression that nothing much is changing. By drawing the vertical axis up to 500, the impression is also created that the problem is not so bad. The line is near the bottom, so theft does not seem high. This could be used by local police or politicians trying to convince people that theft in the area is not too bad.

4.13 A possible answer:



The bars are high and getting higher, creating an impression of strong growth. The last bar is clearly double the size of the first, which is impressive.



Notice that by allowing the vertical axis to go much higher than necessary, the impression is created that the figures are very low and that although the bars are increasing in height, it is by an insignificant amount. One hardly notices that the last bar is double the size of the first.

Activity 4 — Changing the picture

Study the graphs drawn on Handout 4 and then answer the following questions:

- 4.1 Fill in the following tables for graphs 1, 2 and 3 (reading the figures from the graphs).

Graph 1 – Car Sales				
	June	July	August	September
No. of cars				

Graph 2 – Car Sales				
	June	July	August	September
No. of cars				

Graph 3 – Car Sales				
	June	July	August	September
No. of cars				

- 4.2 What observation can you make about the three tables above?
- 4.3 Describe in words, the vertical scale in each case. You should mention where the graph starts and ends and in what interval it goes up.
- 4.4 How many cars were sold over the four month period, June to September?
- 4.5 What is the modal month for car sales?
- 4.6 What is the mean number of cars sold per month?
- 4.7 What percentage of cars were sold in June over the four month sales period?
- 4.8 Which graph would a journalist choose if s/he wanted to write an article describing a crisis and rapid decline in car sales? Which graph would a salesman choose if s/he was trying to convince the boss that sales are fairly stable with only a small decline? Explain.
- 4.9 Now consider graphs 4, 5 and 6. Do they all show the same information too?
- 4.10 Describe the scale on the vertical axis in each case.
- 4.11 How many cars were stolen over the 5 month period shown? What was the average number of cars stolen per month?
- 4.12 What different impressions are created by these three graphs and who might use each one to their advantage?
- 4.13 The table below shows the provincial education budgets for one of our provinces over a five year period. Draw two bar graphs showing these figures. One should be suitable for the Minister of Education to use to explain the trend in education spending. He is proud of the increases in education expenditure that his government has provided. Your second graph should be suitable for use by the leader of the Opposition, who would like to play down the budget increases the government has provided. Remember to give your graphs headings and labels, and remember that you can change the 'look' of a graph by changing the scale on the vertical axis.

Year	1996	1997	1998	1999	2000
R (Millions)	15	25	25	30	35

Data Sheet

