

Activity 6 — Patterns and trends

ABOUT THIS ACTIVITY

In this activity students identify patterns and trends using scatter plots, broken line graphs and bar graphs. They read values from given graphs and use them to do calculations. They make simple predictions by identifying trends. Specific Outcomes and Assessment Criteria addressed by this activity are as follows: SO1 - AC1, 2, 3; SO2 - AC 6.

MANAGING THIS ACTIVITY

Introduce this activity by asking students what they understand by the word 'trend'. What are 'trendy' clothes? What is a market trend? What do we mean when we refer to trends in the crime rate? Explain that we are going to use the word trend for identifiable patterns that we can see on a graph or read from a table of numbers. We notice that in some instances variables seem related. They vary together in a pattern and as one increases (or decreases), so does the other. For example, as a child increases in height, we expect a corresponding increase in weight. Other data have no patterns and no links, for example a person's age is not linked to the city in which s/he lives.

Patterns or trends are easy to identify in a scatter graph, where each piece of data is represented by one point on the graph, forming a 'cloud' of points that often cluster around a 'line' pattern. Patterns can also be seen easily in broken line graphs where the line tends to move in one direction or another with a few dips and peaks. In bar graphs we look at the height of the bars. They may be getting steadily higher or lower, or perhaps there is no pattern at all in the different heights of the bars.

If there is a pattern, we can often see a trend in the way the values are changing. We can also draw a trend line or line of best fit, which is a line or curve drawn close to as many of the points as possible. If we extend a trend line we can make predictions about data that has not yet been measured. We need to be careful, though, about expecting a trend to simply continue, and we need to consider the context before drawing conclusions. For example, a child's height and weight do not just keep increasing indefinitely - when full (adult) height is reached s/he stops growing and weight usually stabilises.

Each student should get a copy of Handout 6 and Worksheet 6.

6.1 Count 6 points: each represents one person.

6.2

Age in years	18	25	40	58	64	78
Change	R2,50	R10	R25	R12	R50	R3

6.3 There is no rule relating the amount of change we carry in our pockets, to our age. Many people carry different amounts every day, children often carry no change.

6.4 There is no pattern to be seen on the graph, just an array of dots, which confirms what we know – there is no pattern.

6.5 We can make no prediction at all.

6.6 We expect that there is a clear connection between height and weight in growing children. Of course there are differences in growth and circumstances, but we are reasonably sure that as someone grows in height, his/her weight should increase. This pattern can be seen on the graph as points clustering in an upward direction in a linear fashion, except for one point.

6.7 The odd point represents a person with weight 20kg and a height of 160cm, which is very different from all the other points. This could be either a data error or a person in hospital with a very serious medical problem.

6.8 Mean height is $2\ 080 \div 12 = 173,3$ cm; mean weight is $770 \div 12 = 64$ kg.

6.9 Height range is $204 - 145 = 59$ cm; weight range is $98 - 20 = 78$ kg.

6.10 Most lines will be different, so accept very approximate answers here – 130cm and 70kg.

- 6.11 Read off the graph – R10 000.
- 6.12 Read off the graph – R30 000.
- 6.13 Yes. In general profits seem to be increasing with time.
- 6.14 The biggest drop was in June. In May the profit was R20 000 and in June R18 000, so the drop was $R20\ 000 - R18\ 000 = R2\ 000$.
- 6.15 Yes, the overall trend is increasing profits.
- 6.16 Because the profits are increasing, we conclude that the strategy is good and no major change is needed. There is a downward trend in this graph, with the car steadily depreciating in value every year. In year 1, the value was R67 000, in year 2 it was R62 000, in year 3 it was R60 000, in year 4 it was R45 000, in year 5 it was R42 000 and in year 6 it was R40 000. It depreciated by R27 000 over the six year period.

Activity 6 — Patterns and trends

This activity refers to the data sheet given on Handout 6.

Refer to the scatter plot showing 'my age' against 'change in my pocket'

Data was collected from a number of people by asking them how old they were and how much change they had in their pockets.

- 6.1 How many people were included in this sample?
- 6.2 Read from the graph the age of each person and how much change is in his/her pocket. Give approximate answers only and fill them in on the table below:

Age in years												
Change												

- 6.3 Is there any connection between your age and the change you carry in your pocket?
- 6.4 How does the scatter plot support your answer to 6.3?
- 6.5 Can we predict how much change a person of 32 years has in his/her pocket?

Refer to the 'scatter plot showing height against weight'

This data was collected by asking a number of people how tall they were and how much they weighed.

- 6.6 Do you think there is a connection between height and weight? How does the graph support your answer?
- 6.7 There is one point that seems odd. Identify which one this is. What conclusions could we draw about this odd point?
- 6.8 The data used to draw the scatter plot is shown in the table below. Calculate the mean height and the mean weight in the given sample.

Height	170	196	151	177	190	158	163	185	181	204	145	160
Weight	60	92	45	78	85	49	52	77	73	98	41	20

- 6.9 What is the range of height and weight?
- 6.10 Draw a curve on the given graph close to as many points as possible. This is called a 'line of best fit' and it does not have to touch any of the points but should be close. Using this line, give a prediction for the following:
 The approximate height of someone who weighs 20kg is ...
 The approximate weight of someone who is 175 cm tall is ...

Refer to the broken line graph showing 'Monthly profit'

This data was collected on a monthly basis for a period of a year by a small company which had just started business. They were collecting data to help them decide whether they need to change their strategy or whether things are going well.

- 6.11 What was the profit in January?
- 6.12 What was the profit in December?
- 6.13 Is there a pattern in this data? Describe it.
- 6.14 In which month was the biggest drop in profit? How much was this?
- 6.15 Do you agree that the trend is upwards?
- 6.16 What advice would you give this company – do they need to change their strategy or are things going well for them?

Refer to the bar graph showing 'Value of motor vehicle'

- 6.17 Describe the trend shown in this graph. Give a detailed answer including the approximate monthly figures and the total drop in value of the vehicle over the six year period. Use the words 'depreciate' or 'depreciation' in your answer to indicate 'drop in value'.

Data Sheet



