

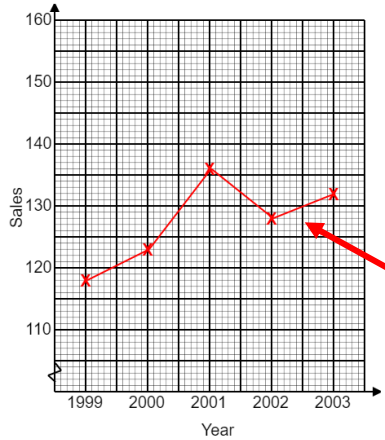
Knowledge Organiser: Representing and Interpreting Data and Scatter Graphs

What you need to know:

Time-series Graphs

Plot the following sales information on the graph below and describe the overall trend:

Year	1999	2000	2001	2002	2003
Sales	118	123	136	128	132



Step 1 – Label the x and y axes, and use an appropriate scale

Try to fill the graph paper

Step 2 – Plot each point onto the graph

Double check what one square represents

Step 3 – Join up each point with a straight line

Visualising a line of best fit through the plotted points can help you to see the overall trend

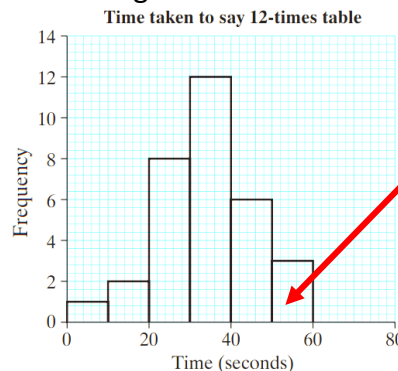
Step 4 – Identify the overall pattern shown = generally increasing

Histograms with Equal Class Intervals

A group of 32 students were asked to say the 12-times table as fast as possible.

a) Draw a histogram for the following data:

Time, t (s)	Frequency
$0 < t \leq 10$	1
$10 < t \leq 20$	2
$20 < t \leq 30$	8
$30 < t \leq 40$	12
$40 < t \leq 50$	6
$50 < t \leq 60$	3



See Cumulative Frequency, Box Plots, and Histograms for more on drawing histograms

No gaps between bars

$$\text{Frequency Density} = \frac{\text{Frequency}}{\text{Class Width}}$$

Key Terms:

Discrete data: countable data that can be categorised e.g. *Shoe size, eye colour*

Continuous data: data that is measured and can take any value e.g. *Height, time, temperature*

Qualitative data: text-based data that describes something e.g. *colours, race*

Quantitative data: numerical data e.g. *age, height, temperature*

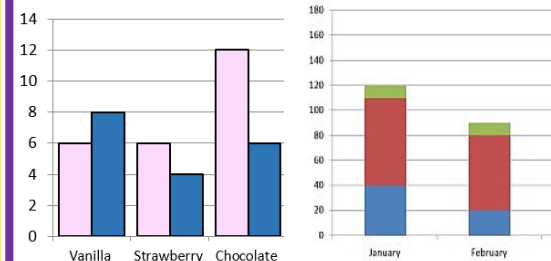
Frequency: the number of occurrences of an event

Extrapolate: to predict values from outside the range of data

You need to be able to:

- Know what chart to use for different types of data sets
- Draw and interpret all types of bar charts, pie charts, frequency polygons, line graphs, and time-series graphs
- Recognise simple patterns in graphs and charts (e.g. seasonal patterns)
- Estimate the median from a histogram with equal class intervals
- Compare averages of two distributions
- Predict future values from a time-series graph

Bar Charts



Comparative bar charts show data side by side

Compound bar charts show data stacked

Hegarty maths clip numbers

Bar Charts and Pictograms: 425 - 426

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Frequency Polygons: 441

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What you need to know:

Pie Charts

Use the data in the following table to draw a pie chart

House Type	Frequency	Angle
Detached	18	$18 \times 5^\circ = 90^\circ$
Semi-detached	30	$30 \times 5^\circ = 150^\circ$
Terraced	6	$6 \times 5^\circ = 30^\circ$
Flat	14	$14 \times 5^\circ = 70^\circ$
Other	4	$4 \times 5^\circ = 20^\circ$

Total = 72

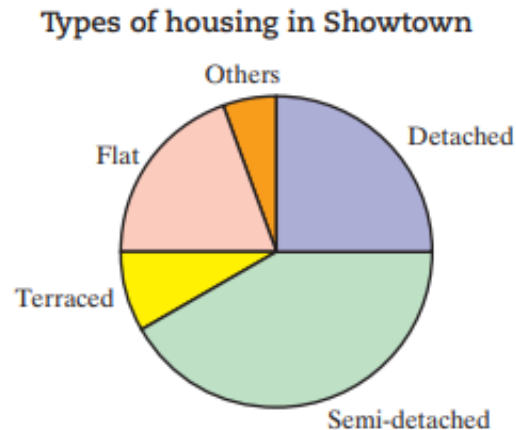
Finding angles:
Step 1 – Divide 360° by your total frequency to find how many $^\circ$ represents one house

$$= 360 \div 72 = 5^\circ$$

Step 2 – Multiply the frequency for each house type by the $^\circ$ per house

Drawing the pie chart:

- Step 1 – Draw a circle using a compass, and draw a vertical line from the centre to the top
- Step 2 – Using a protractor, measure and draw each angle
- Step 3 – Label each section of the pie chart
- Step 4 – Give your pie chart a suitable title

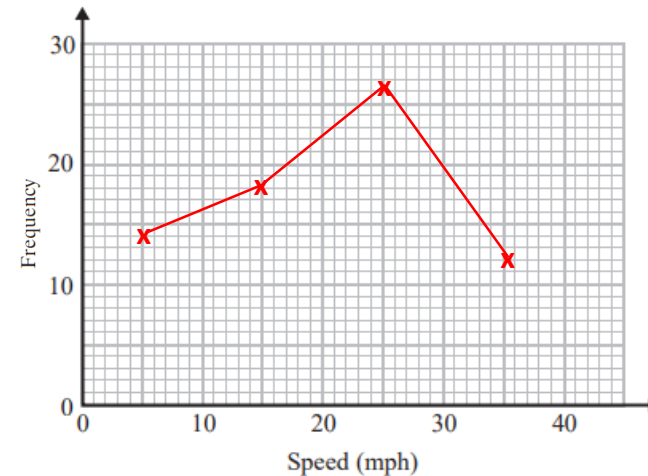


Drawing Frequency Polygons

This table gives information about the speeds of 70 cars.

Speed (s mph)	Frequency (f)	Midpoint
$0 < L \leq 10$	14	5
$10 < L \leq 20$	18	15
$20 < L \leq 30$	26	25
$30 < L \leq 40$	12	35

a) Draw a frequency polygon for this information.



- Step 1 – Find the midpoint of each class interval
- Step 2 – Label your axes and choose an appropriate scale
- Step 3 – Plot each point at the midpoint for that interval
- Step 4 – Connect each point with a straight line

Do not extend the line beyond the points you have

b) Identify the interval with the median speed

Step 1 – Identify the median car

$$\text{Median car} = 71 \div 2 = 35.5$$

$$\text{Median} = \frac{\text{Total Frequency} + 1}{2}$$

Step 2 – Which bracket does this car fall into?

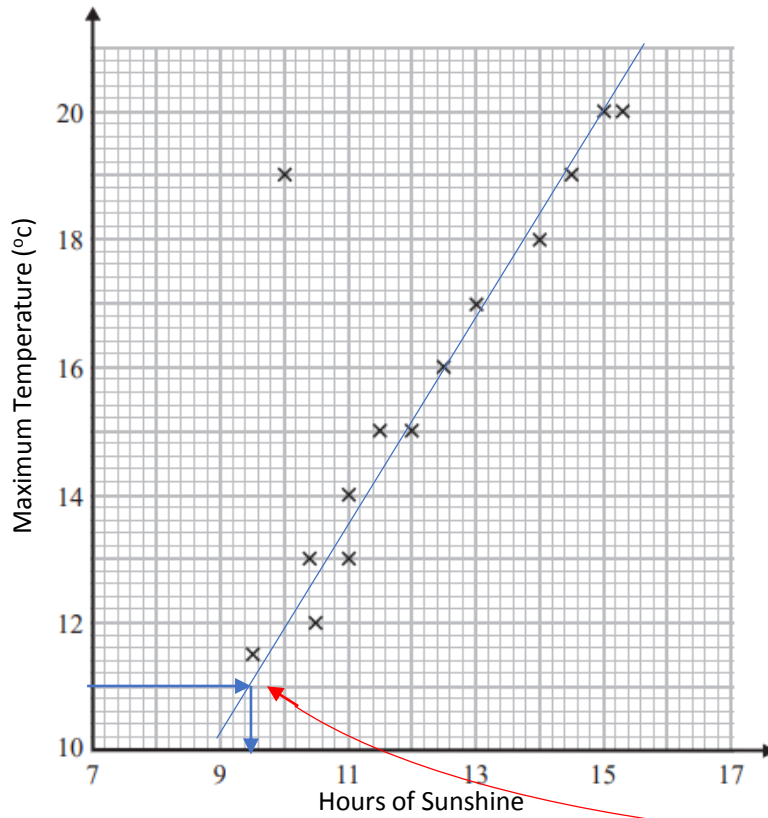
35.5 occurs in the $20 < L \leq 30$ bracket

Knowledge Organiser: Representing and Interpreting Data and Scatter Graphs

What you need to know:

Scatter Graphs

This scatter graph shows the maximum temperature and the number of hours of sunshine in 14 British towns in one day.



Scatter Graphs - Outliers and Correlation

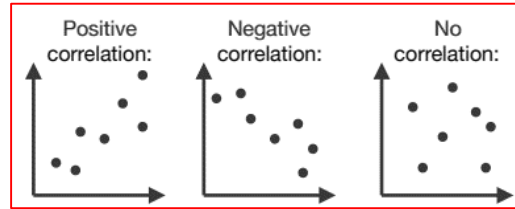
Identify the coordinates of the outlier.

= (10, 19)

An outlier is a value that doesn't fit the pattern of the data

What type of correlation does the remaining data show?

= Positive correlation



Scatter Graphs – Correlation and Causation

A student looks at the graph and says “This graph shows that sunshine causes higher temperatures”. Is this true? Give a reason.

Correlation does not imply causation. While it may look like variables are related, there may be something else responsible for the data points.

= No, although the graph shows a positive correlation, this does not mean there is a causal link between hours of sunshine and maximum temperature

Scatter Graphs – Explaining Patterns

A weatherman says “Temperatures are higher in towns that have more sunshine”. Is this supported by the scatter graph?

= Yes, the majority of points for high temperature appear when there are more hours of sunshine.

Interpolation and Extrapolation

Interpolation – making a prediction of a value that falls within the range of your data. This is more accurate.
 Extrapolation – making a prediction of a value that falls outside the range of your data. This is less accurate.

Another town had a maximum temperature of 11°C that day. Use a line of best fit to estimate the hours of sunshine at this town.

Step 1 – Draw a line of best fit = 9.5 hours
 Step 2 – Draw a line along from 11°C and down from the line of best fit

Comment on the reliability of your prediction.

= This is not a reliable estimate because it is extrapolation