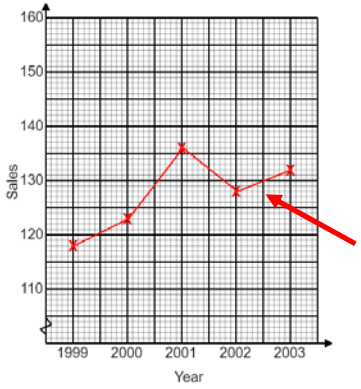
Knowledge Organiser: Representing and Interpreting Data and Scatter Graphs

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

Step 4 – Identify the overall pattern shown = generally increasing

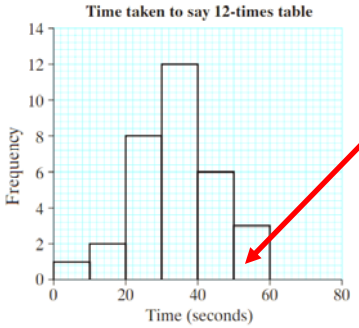
Visualising a line of best fit through the plotted points can help you to see the overall trend

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*

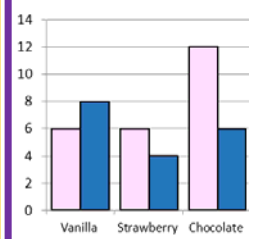
Qualitative data: text-based data that describes something *e.g. colours, race*

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

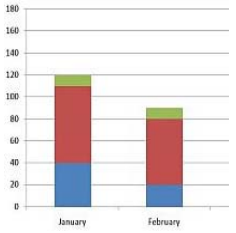
Frequency: the number of occurrences of an event

Extrapolate: to predict values from outside the range of data

Bar Charts



Comparative bar charts show data side by side



Compound bar charts show data stacked

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

Hegarty maths clip numbers

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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

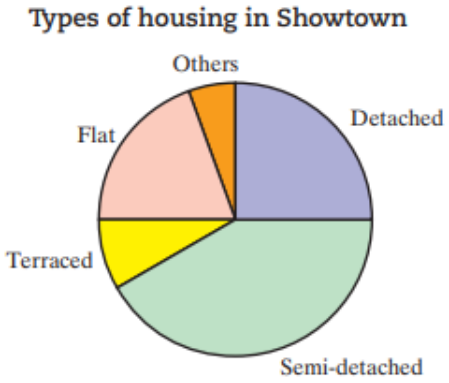
House Type	Frequency	Angle
Detached	18	18 x 5° = 90°
Semi-detached	30	30 x 5° = 150°
Terraced	6	6 x 5° = 30°
Flat	14	14 x 5° = 70°
Other	4	4 x 5° = 20°

Total = 72

Finding angles:
Step 1 – Divide 360° by your total frequency to find how many ° represents one house
= 360 ÷ 72 = 5°

Step 2 – Multiply the frequency for each house type by the ° 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

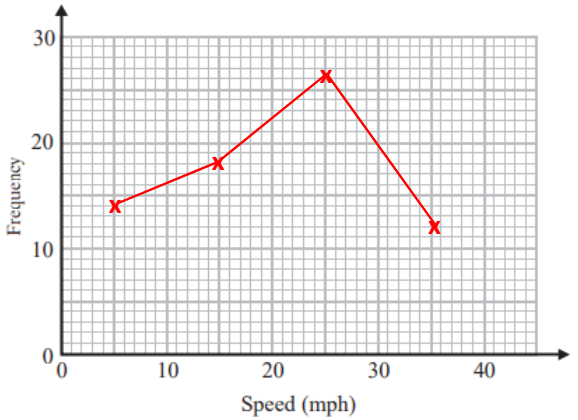


Drawing Frequency Polygons

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

Median car = 71 ÷ 2
= 35.5

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

Step 2 – Which bracket does this car fall into?

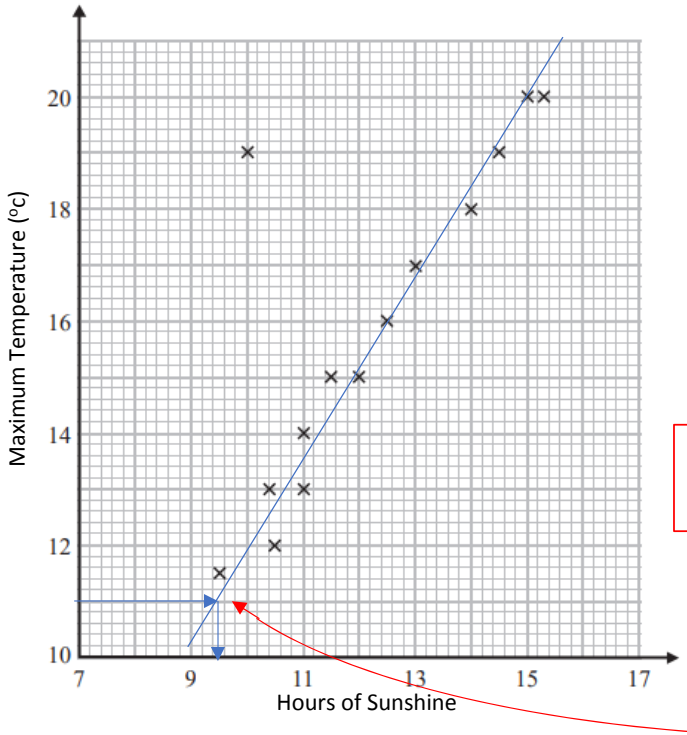
35.5 occurs in the $20<L\leq30$ bracket

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

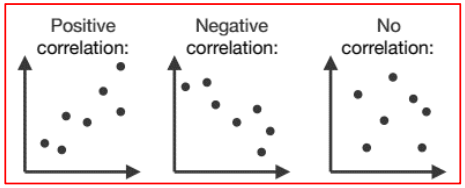
Identify the coordinates of the outlier.

= (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
Step 2 – Draw a line along from 11°c and down from the line of best fit

= 9.5 hours

Comment on the reliability of your prediction.

= This is not a reliable estimate because it is extrapolation