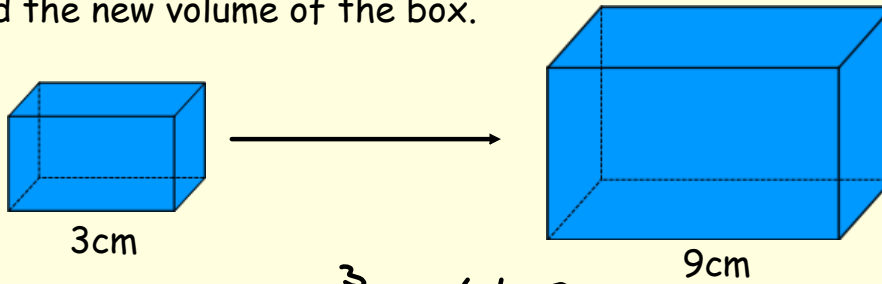


Starter

- 1) The small box has a volume of 24cm^3 . The boxes are similar.
Find the new volume of the box.



$$24\text{cm}^3 \times 3^3 = 648\text{cm}^3$$

- 2) What is the turning point of the graph $y = (x - 9)^2 + 4$

$$(9, 4)$$

Mean, Mode, Median and Range

Today we are revising...

How to calculate averages.



I will know if I have been successful if...

I know how to calculate the mean, mode, median and range.

Given circumstances I can choose the most suitable mean to find.

I can interpret my answer in terms of the question.

National 5 WB 26th Feb Statistics

3, 5, 5, 8, 19, 20, 23, 27, 27

Mean	Mode	Median	Range
$\frac{137}{9}$ =15.2	5 and 27	19	$27 - 3$ = 24

Green, Blue, Brown, Green, Green, Blue, Blue, Brown, Green

Mean	Mode	Median	Range
	Green		

Mode - Use when we have data that is not numerical.

Median - Use when we have outliers.



4, 5, 8, 3, 9, 10, 4, 5, 6, 95.

~~3, 4, 4, 5, 5, 6, 8, 9, 10, 95~~



Median = 5.5

Mean = 14.9

kahoot.it

Starter

1) Solve to one decimal place $y = x^2 + 7x - 9$

2) What is the gradient of the line passing through the points (9, 10) and (13, 18)

Standard Deviation

Today we are learning...

How to calculate standard deviation and what it is.

I will know if I have been successful if...

I can complete the table.

I understand what is meant by sigma notation.

I can calculate standard deviation and interpret the results.



Standard Deviation

Definition: For a set of values the standard deviation is a measure of how far away on average, each values is, from the mean.

Definition

Standard Deviation

Standard deviation:

$$s = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}}$$

This is given to you in the exam!

Standard Deviation

Standard deviation:

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n-1}}$$

$$\text{or } s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}}, \text{ where } n \text{ is the sample size.}$$

This is given to you in the exam!

Example

Two machines in a factory produce chocolate bars. A sample of 6 chocolate bars were taken and measured by quality control. The weights in grams were;

Machine 1 : 57g, 61g, 58g, 63g, 61g, 60g.

Machine 2 : 69g, 54g, 59g, 66g, 61g, 51g.

Which machine should we select to increase the chances of getting a heavier chocolate bar?

Machine 1 : 57g, 61g, 58g, 63g, 61g, 60g.

Standard deviation: $s = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n-1}}$

Machine 2 : 69g, 54g, 59g, 66g, 61g, 51g.

Standard deviation: $s = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n-1}}$

The Results

Standard Deviation for Machine 1 =

Standard Deviation for Machine 2 =

Practice

Calculate the standard deviation of the following.

4, 6, 7, 9, 10, 11 and 13

Standard deviation:

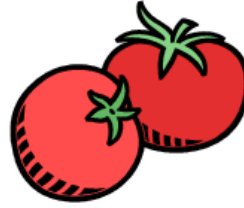
$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n-1}}$$

Summary

After trying a new fertilizer on one of his tomato plants, a grower counted the number of tomatoes on each of its six bunches.

The number of tomatoes was:

8, 14, 9, 16, 13, 18



- a) Calculate the mean number of tomatoes. 1 KU
- b) Construct a table and use it to calculate the standard deviation. 4 KU

Starter

1) Calculate the volume of a cylinder with diameter 8cm and height 11cm.

$$V = \pi r^2 h$$

$$= \pi \times 4^2 \times 11 = 552.92 \text{ cm}^3$$

2) Simplify $\frac{(x+8)(x-3)}{x^2+11x+24} = \frac{\cancel{(x+8)}(x-3)}{\cancel{(x+8)}(x+3)}$

$$= \frac{x-3}{x+3}$$

Quartiles

Today we are learning...

What quartiles are and how to calculate it.

I will know if I have been successful if...

I understand what the quartiles represent.

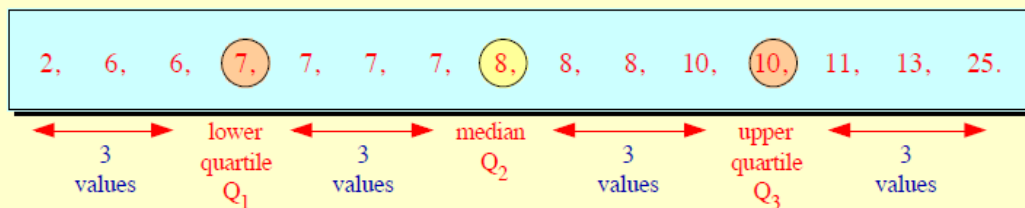
I can find the median.

I can find the upper and lower quartiles.



The Quartiles

The **QUARTILES** are the 3 values that split a distribution of **ordered** numbers into **four** equal bits.



Quartiles help us to investigate the spread of the data.

The Quartiles

Lower Quartile - Q_1

25% of the data is below this point.

Median - Q_2

50% of the data is below this point.

Upper Quartile - Q_3

75% of the data is below this point.

The Quartiles

Given a data set containing n values the....

$$\text{Lower Quartile } Q_1 = \frac{(n + 1)}{4}$$

$$\text{Upper Quartile } Q_3 = \frac{3(n + 1)}{4}$$

The Interquartile Range

$$Q_3 - Q_1$$

The Semi - Interquartile Range

$$\frac{1}{2}(Q_3 - Q_1)$$

Quartiles

Given a data set containing n values the...

$$\text{Lower Quartile } Q_1 = \frac{(n+1)}{4} \text{ th value}$$

$$\text{Upper Quartile } Q_3 = \frac{3(n+1)}{4} \text{ th value}$$

Calculate the IQR & SIQR of the following data set...

5, 8, 9, 10, 11, 12, 15, ~~16~~ $n=7$

$$Q_1 = 2^{\text{nd}} \text{ value} = 8$$

$$Q_3 = 6^{\text{th}} \text{ value} = 12$$

$$\begin{aligned} \text{IQR} &= Q_3 - Q_1 \\ &= 12 - 8 = 4 \end{aligned}$$

$$\begin{aligned} \text{SIQR} &= \frac{1}{2} (Q_3 - Q_1) \\ &= \frac{1}{2} \times 4 \\ &= 2 \end{aligned}$$

Exercise 11.3

1. Calculate the **median** and **lower** and **upper quartiles** for each of the following sets of values. Hence, calculate the **semi-interquartile range** of each.

(a) 13, 13, 15, 19, 23, 23, 24, 26, 27.

(b) 2.4, 2.6, 2.9, 2.9, 3.1, 3.1, 3.3, 3.6, 3.6, 3.8, 4.1, 4.1, 4.5, 4.7, 4.9, 5.0.

(c) 101, 108, 109, 112, 112, 115, 120, 121, 125, 131, 131, 134, 135, 138, 140.

2. A group of 25 third year pupils was asked to say how many cousins they had.

3, 1, 4, 2, 3, 4, 5, 2, 2, 4, 5, 1, 0, 6, 8, 2, 4, 4, 6, 2, 3, 1, 0, 9, 6.

- (a) Rearrange them in order starting with the lowest.
 (b) Calculate the **mean**, **median** and **modal value**.
 (c) Determine the **lower** and **upper quartiles**.
 (d) Calculate the **range** and the **S.I.Q.R.**



2015 N5 Past Paper P1, Q10

2. Ten couples took part in a dance competition.

The couples were given a score in each round.

The scores in the first round were

16 27 12 18 26 21 27 22 18 17

(a) Calculate the median and semi-interquartile range of these scores.
(3 marks)

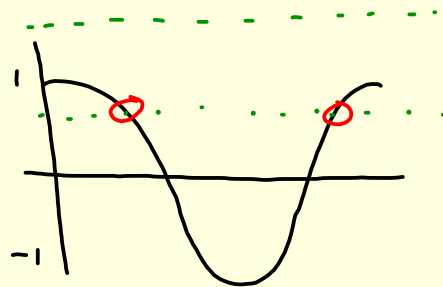
(b) In the second round, the median was 26 and the semi-interquartile range was 2.5.

Make two valid comparisons between the scores in the first and second rounds.
(2 marks)

Starter

1) Solve $3 - 2\cos(x) = 0$ for $0 < x < 360$

$$\begin{aligned} -2\cos(x) &= -3 \\ \cos(x) &= \frac{3}{2} \end{aligned}$$



2) Calculate $\frac{3}{7} + 2\frac{1}{4}$

$$\frac{3}{7} + \frac{9}{4}$$

$$= \frac{12}{28} + \frac{63}{28}$$

$$= \frac{75}{28}$$

==

Box Plots

Today we are learning...

How to plot a box plot.

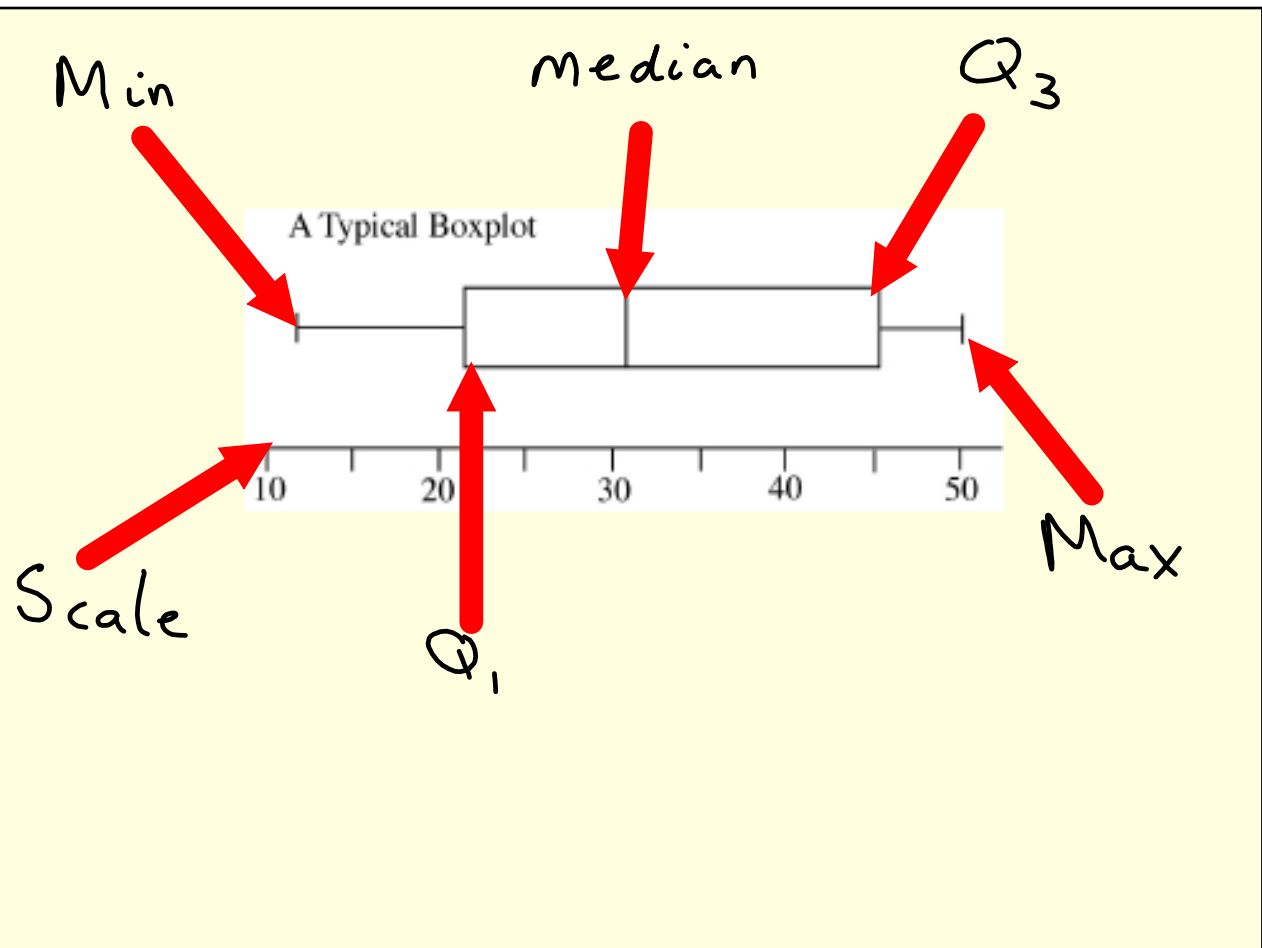


I will know if I have been successful if...

I can find the median, upper and lower quartile of a set of data.

I can find the maximum and minimum value of a set of data.

I can plot a suitable box plot to represent a set of data.



Display the Data in a Box Plot

Test Scores (%) from the Prelim for those who completed 4 past papers out of 8:
 SS/6 Nat 5

11, 22, 31, 33, 48, 48, 49, 56, 58, 60, 66

$$\text{Min} = 11$$

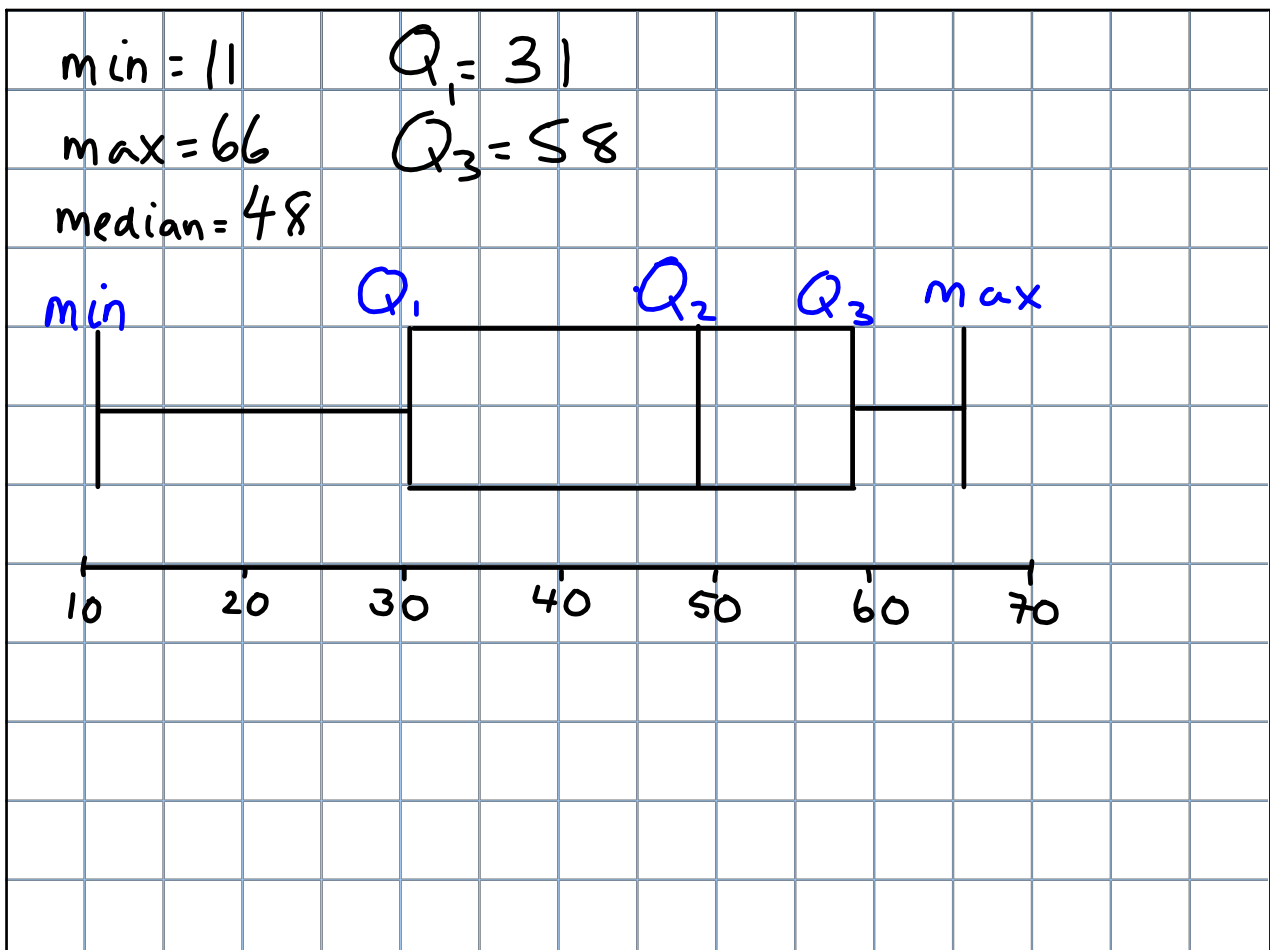
$$\text{Max} = 66$$

$$\text{Median} = 48$$

$$Q_1 = \frac{(n+1)}{4} \text{th value} \quad Q_3 = \frac{3(n+1)}{4} \text{th value}$$

$$= 3 \text{rd value} \quad = 9 \text{th value}$$

$$= 31 \quad = 58$$



Starter

1) Solve $9\cos(x) - 8 = 0$ for $0 < x < 360$

2) Calculate the volume of a sphere with diameter 8.6cm.

3) Solve $y = 4x^2 - 49$

Scattergraphs

Today we are learning...

How to sketch and interpret scattergraphs.

I will know if I have been successful if...

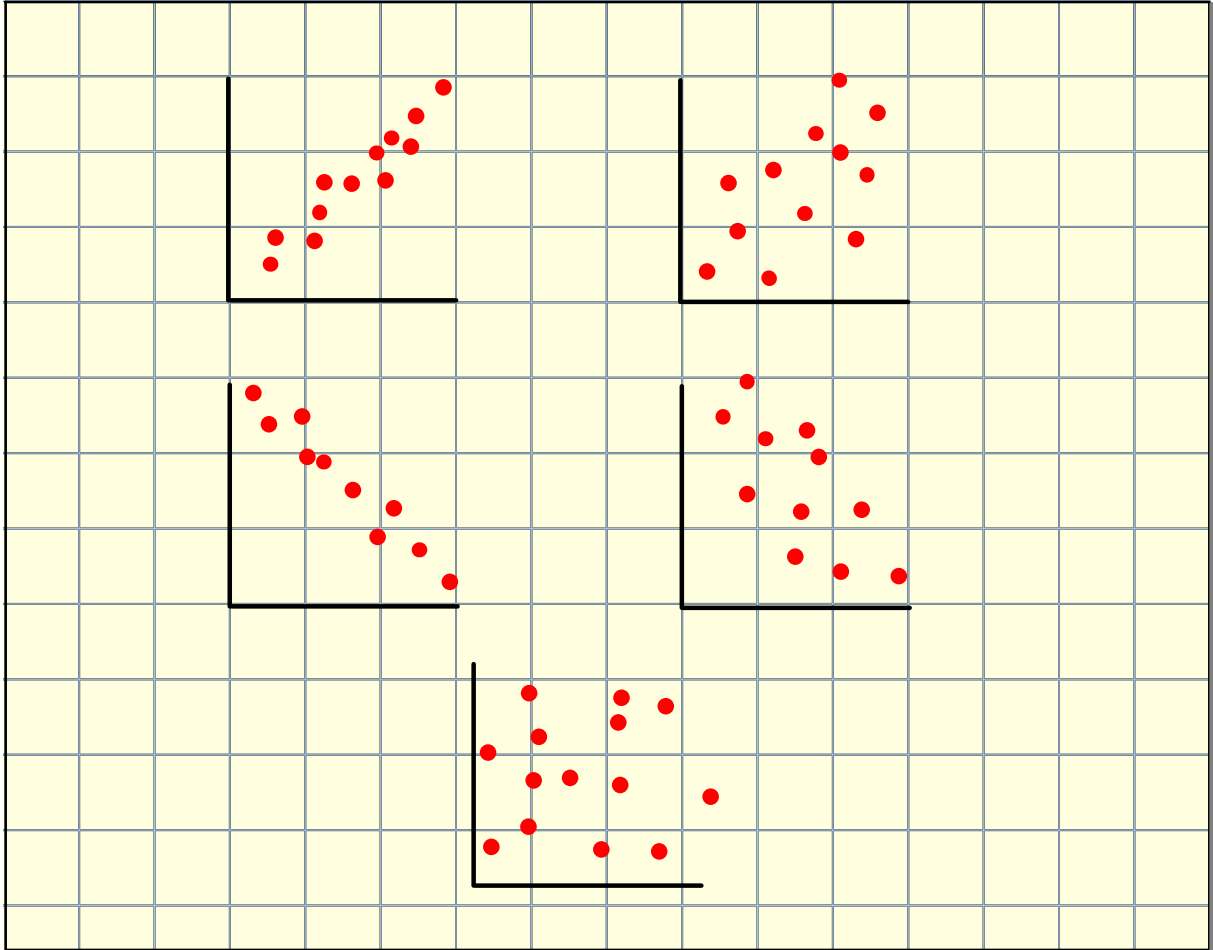
Using suitable axes I can plot points to form a scattergraph.

I can draw a line of best fit.

I can use the line of best fit to predict values.



National 5 WB 26th Feb Statistics



Plotting

Higher Prelim - Dec 2017

Past Papers Completed	4	6	4	3	1	0
Prelim Score	79	62	48	28	30	17

Plotting

Higher Prelim - Dec 2017

Use your scattergraph to predict what a student would have scored if they had completed 5 past papers?

Consumption of sour cream, per person in half pints in the US

vs

Motorcycle accidents, in the US in non collision transport accidents.

<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
6.1	6.5	6.7	7.5	7.9	8.3	7.9	8.2	7.9	7.8
35	34	33	47	54	63	44	56	55	51

Consumption of sour cream, per person in half pints in the US

vs

Motorcycle accidents, in the US in non collision transport accidents.

<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
6.1	6.5	6.7	7.5	7.9	8.3	7.9	8.2	7.9	7.8
35	34	33	47	54	63	44	56	55	51

Correlation does not imply Causation

Correlation does not imply causation.

Real World Examples of Correlation does not imply causation.



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