

Useful links:

 [Sidcot intranet - Firefly](#)

 [Instant classroom](#)

 [MyMaths](#)

[Objectives](#)

Objectives

To revise scatter graphs

To use them to make estimations

Scatter Graphs

Revision powerpoint



Now make some revision notes

Classwork: Page 321 M11.3 Q 1 to 5

Objectives

To revise finding averages from tables of information.

To learn to compare data sets.

Mean, Median and Mode from frequency tables

The number of goals scored by the 21 teams in the local football league last week was recorded in a table.

Find the mode, median, mean and range of the no. of goals scored.

Σ
Sigma

No of goals (n)	No of teams (f)	nf
0	1	0
1	3	3
2	6	12
3	2	6
4	4	16
5	3	15
6	2	12
TOTAL	$\Sigma f = 21$	$\Sigma nf = 64$

$$\text{mean} = \frac{\Sigma nf}{\Sigma f} = \frac{64}{21} = 3.05 \text{ (to 2dp)}$$

$$\text{mode} = 2 \text{ goals}$$

$$\text{range} = 6 - 0 = 6 \text{ goals}$$

$$\text{median is in position } \frac{21+1}{2} = 11\text{th} \Rightarrow 3 \text{ goals}$$

The following week the teams played again:

Mode: 3 goals Median: 3.5 goals Mean: 3.8 goals Range 4 goals

Compare the results from the two weeks.

Objectives

To revise finding averages from tables of information.

To learn to compare data sets.

Mean, Median and Mode from grouped frequency tables

Javelin competition results in year 2000

$$\begin{aligned} \text{max Range} \\ &= 60 - 20 \\ &= \underline{\underline{40\text{m}}} \end{aligned}$$

Distance (meters) d	No. of competitors (f)	midpt (m)	$m \times f$
$10 \leq m < 20$	0	15	0
$20 \leq m < 30$	3	25	75
$30 \leq m < 40$	14	35	
$40 \leq m < 50$	21	45	
$50 \leq m < 60$	7	55	
$60 \leq m < 70$	0	65	
TOTAL	45	//////	1895

$$\begin{aligned} \underline{\underline{\text{Est of mean}}} \\ &= \frac{1895}{45} = 42.1\text{m} \\ &\quad (1\text{dp}) \end{aligned}$$

$$\begin{aligned} \text{modal group} \\ &= 40 - 50\text{m} \end{aligned}$$

For each year....

Calculate (i) an estimate of the mean throw

(ii) the modal group

(ii) the group in which the median lies

(iv) the maximum range

$$\begin{aligned} \text{Median is in position} \\ \frac{45+1}{2} = 23^{\text{rd}} \Rightarrow \underline{40-50\text{m}} \end{aligned}$$

and use your results to compare the competitors performances in the two years

Javelin competition results in year 2010

Distance (meters) d	No. of competitors (f)		
$10 \leq m < 20$	1		
$20 \leq m < 30$	4		
$30 \leq m < 40$	19		
$40 \leq m < 50$	13		
$50 \leq m < 60$	11		
$60 \leq m < 70$	2		

Frequency Polygons - to compare data sets

- a line graph plotted at the midpoint of each group
- comparisons made as before (average, range)

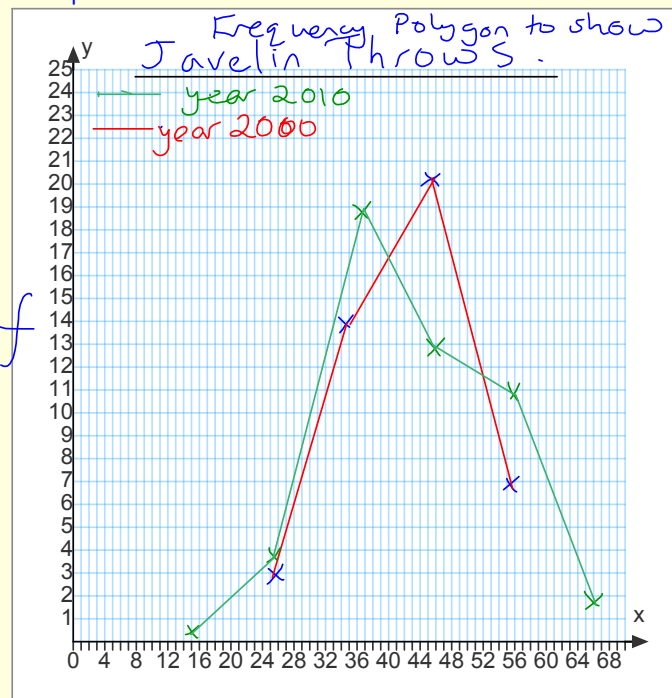
Objectives

- To revise finding averages from tables of information.
- To learn to compare data sets.

Javelin competition results in year 2000

Distance (meters) d	No. of competitors (f)	M	
$10 \leq m < 20$	0	15	
$20 \leq m < 30$	3	25	
$30 \leq m < 40$	14	35	
$40 \leq m < 50$	21	45	
$50 \leq m < 60$	7	55	
$60 \leq m < 70$	0	65	

On the same set of axes draw frequency polygons for this data. Compare and comment.



Javelin competition results in year 2010

Distance (meters) d	No. of competitors (f)	M	
$10 \leq m < 20$	1	15	
$20 \leq m < 30$	4	25	
$30 \leq m < 40$	19	35	
$40 \leq m < 50$	13	45	
$50 \leq m < 60$	11	55	
$60 \leq m < 70$	2	65	

Distance in (m)

From the graph, I can see

- more variation in distances thrown in 2010
- mode is higher in 2000 $\Rightarrow$ more longer throws,

Objectives

To revise finding averages from stem and leaf diagrams and use them to compare data sets.

Stem and Leaf Diagrams

c/w Page 430

Q2, Q5 & — no need to draw.

Key?

Method for median?
 $(\frac{n+1}{2})^{\text{th}}$ position

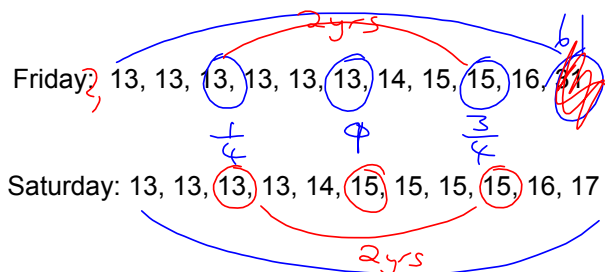
$$\frac{33+1}{2} = 17^{\text{th}} \text{ position}$$

If you finish.....

Read p433 T14 M14.6 Q1

Discussion..... (whiteboards and calculators)

The ages of the first 11 people to arrive at the youth club (put in order):



Median age is..... Modal age is..... Mean age isRange is.....

Friday: 13 13 15.36 18

Saturday: 15 13, 15 14.5 4



Objectives

To understand an improved measure of range.
To find IQR from raw data and cumulative frequency curves.
To draw and interpret Box and Whisker Diagrams.

The interquartile range IQR

10 6 14

- measures the spread of the 'central half' of the data
- is not affected by anomalies (outliers)
- is most useful when comparing two data sets

If there are n numbers.....

The median is found at position $\frac{n+1}{2}$ th

The Lower Quartile (LQ) is at position $\frac{n+1}{4}$ th

The Upper Quartile (UQ) is at position $3 \frac{(n+1)}{4}$ th

The IQR = UQ - LQ

Example:

Temperature in 11 cities (degrees C)

3 8 8 11 15 16 16 21 22 23 36

median
↓
LQ

median: at position $\frac{11+1}{2} \Rightarrow 6$ th median = 16°C

LQ : at position $\frac{11+1}{4} \Rightarrow 3$ rd LQ = 8°C

UQ : at posⁿ $3 \frac{(11+1)}{4} \Rightarrow 9$ th UQ = 22°C

$$\begin{aligned} \text{IQR} &= 22 - 8 \\ &= 14^{\circ}\text{C} \end{aligned}$$

c/w Page 433 Q1 to 5

Objectives

- To understand an improved measure of range.
- To find IQR from raw data and cumulative frequency curves.
- To draw and interpret Box and Whisker Diagrams.

Compare the no of goals scored by year 9 and the year 10 netball teams in their last 11 matches (without the results being affected by extreme values):

Year 9

0, 3, 5, 5, 7, 8, 8, 12, 14, 14, 28

$$\text{Median} = 8$$

$$\text{LQ} = 5$$

$$\text{UQ} = 14$$

$$\text{IQR} = 14 - 5 = 9$$

$$\text{Lowest} = 0$$

$$\text{Highest} = 28$$

Year 10

1, 1, 3, 4, 6, 11, 11, 15, 16, 20, 22

$$\text{Median} = 11$$

$$\text{LQ} = 3$$

$$\text{UQ} = 16$$

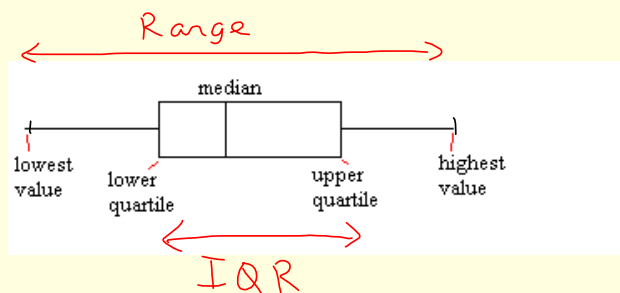
$$\text{IQR} = 16 - 3 = 13$$

$$\text{Lowest} = 1$$

$$\text{highest} = 22$$

Now draw a pair of box plots to show the data (next page)

Use the box plots to compare the teams using a measure of 'average' and a measure of 'spread'.....



Box and Whisker Diagram (Box Plots)

Year 9

0, 3, 5, 5, 7, 8, 8, 12, 14, 14, 28

Median = 8 goals

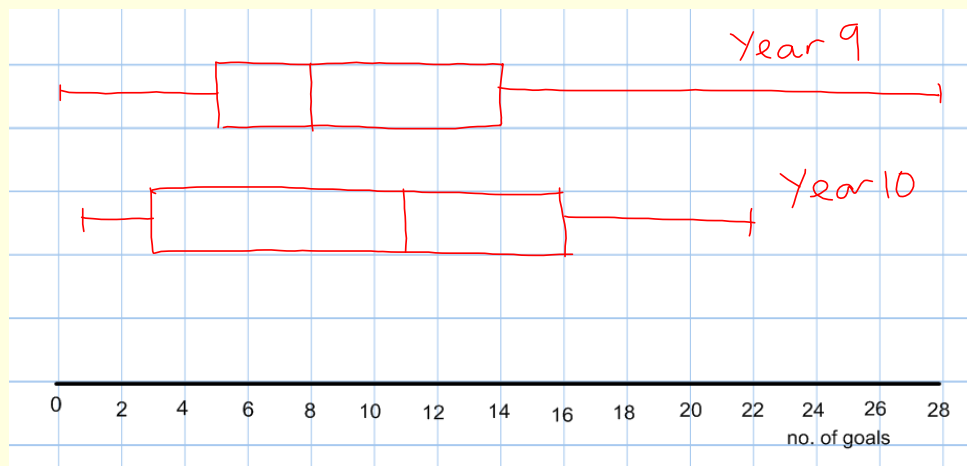
LQ = 5 goals UQ = 14 goals

Year 10

1, 1, 3, 4, 6, 11, 11, 15, 16, 20, 22

Median = 11 goals

LQ = 3 goals UQ = 16 goals



Compare : -

- Median higher for year 10. This tells me that on average yr10 scored more goals
- IQR higher for year 10. This tells me that yr10's goal Scoring was more varied (this measure not affected by outliers)

c/w page 434 Q6 - draw box plots for this data and compare them.

page 439 - reading box plots Q1, 4

Starter Murder Mystery 31
- use whiteboards for calculations

Instant classroom

Objectives

- To understand an improved measure of range.
- To find IQR from raw data and cumulative frequency curves.
- To draw and interpret Box and Whisker Diagrams.

Revision powerpoint

Cumulative Frequency Curves

Javelin Throws 2010

Distance (meters) d	No. of competitors (f)	Cumulative freq (F)	Plot at:
$10 \leq m < 20$	1	1	(20, 1)
$20 \leq m < 30$	4	5	(30, 5)
$30 \leq m < 40$	19	24	(40, 24)
$40 \leq m < 50$	13	37	(50, 37)
$50 \leq m < 60$	11	48	(60, 48)
$60 \leq m < 70$	2	50	(70, 50)

Draw a cumulative frequency curve, find median and IQR, draw a box plot, use for estimations.....

1) Estimate no. of throws less than 50m. 36 throws

2) % of throws over 25m.

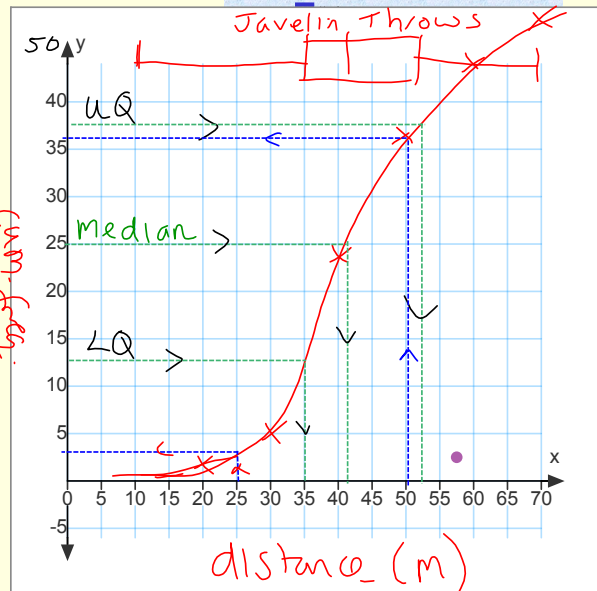
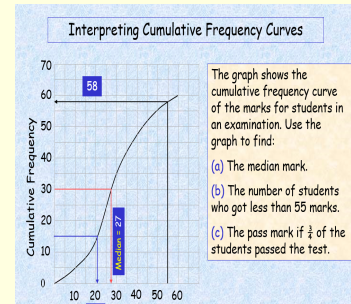
There were 3 throws 25m or less

$\therefore 50 - 3 = 47$ throws more than 25m

c/w Page 436 M14.7

Q1, Q3, Q4

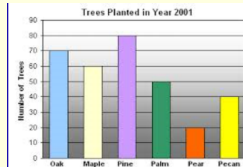
$\therefore \frac{47}{50} = \frac{94}{100} = \underline{\underline{94\%}}$ over 25m.



Objectives

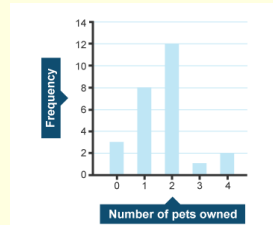
To understand an improved measure of range.
To find IQR from raw data and cumulative frequency curves.
To draw and interpret Box and Whisker Diagrams.
To draw histograms for unequal grouped data

Histograms (grade A*)



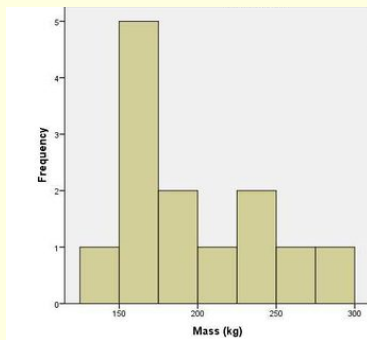
QUALITATIVE DATA

- draw a bar chart with gaps



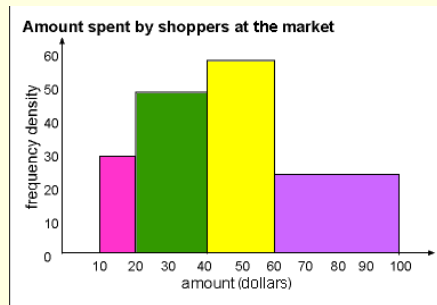
DISCRETE QUANTITATIVE DATA

- draw a bar chart with gaps



CONTINUOUS DATA, equal groups

- draw a bar chart without gaps
(frequency diagram)



CONTINUOUS DATA, unequal groups

- draw a histogram

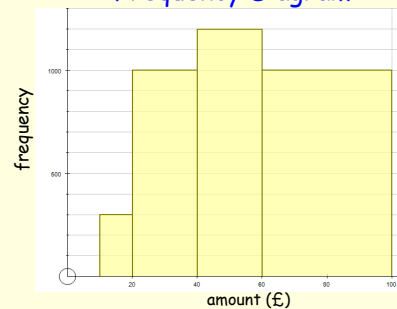
We draw histograms to prevent our graphs giving a biased impression of the data.....

(These diagrams show the same data)

Histogram



Frequency Diagram

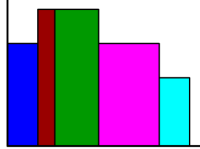


Histograms (grade A*)

Objectives

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Histogram

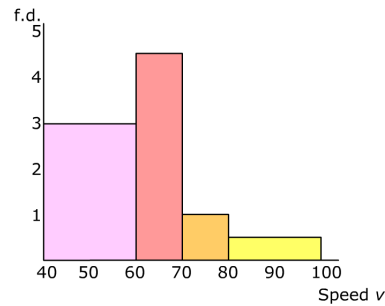


The **area** of the bar tells us the frequency

The histogram shows the speeds of 125 cars along the main road.

Work out the area of each bar in this histogram.

Your answer will be the frequency for that group.



Speed (v mph)	Frequency
$40 \leq v < 60$	60
$60 \leq v < 70$	45
$70 \leq v < 80$	10
$80 \leq v < 100$	10

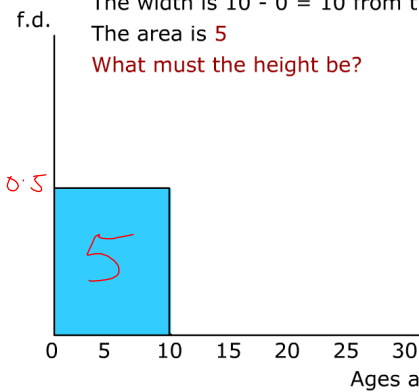
Finding the frequency density

The **area** of this bar is the **frequency** that it represents.

The width is $10 - 0 = 10$ from the table

The area is 5

What must the height be?



Ages (a years)	Frequency	fd
$0 \leq a < 10$	5	0.5
$10 \leq a < 15$	4	
$15 \leq a < 20$	3	
$20 \leq a < 30$	8	

Finding the frequency density

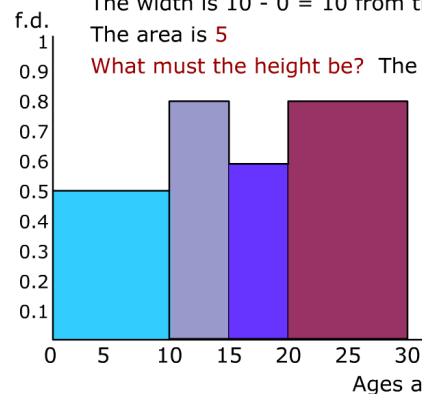
The **area** of this bar is the **frequency** that it represents.

The width is $10 - 0 = 10$ from the table

The area is 5

What must the height be? The height is the area divided by the width.

$$\text{Frequency Density} = \frac{\text{Frequency}}{\text{Classwidth}}$$



Ages (a years)	Frequency	fd
$0 \leq a < 10$	5	$5 \div 10 = 0.5$
$10 \leq a < 15$	4	$4 \div 5 = 0.8$
$15 \leq a < 20$	3	$3 \div 5 = 0.6$
$20 \leq a < 30$	8	$8 \div 10 = 0.8$

Objectives

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Histograms (grade A*)

- Histograms are drawn when the groups are not of equal width
- The **AREA** of each bar represents the frequency
- The height of the bar is called the **FREQUENCY DENSITY**

$$\text{Frequency density} = \frac{\text{frequency}}{\text{class width}}$$



 Example - work through this together (Whitboard maths ex 1)

Page 442 Q1, 2, 3

Reading histograms: Page 445 E14.2 Q1 to 5 (help needed with Q4, 5 - do together)

Attachments

Scatter_Graphs_and_Lines_of_Best_Fit SSK Grade C+.ppt

Cumulative Frequency Curves.ppt

Histograms 3b (Unequal Class Intervals) Constructing.ppt