

Maths Summer 1

Year 9

Blended Learning Booklet

Name:

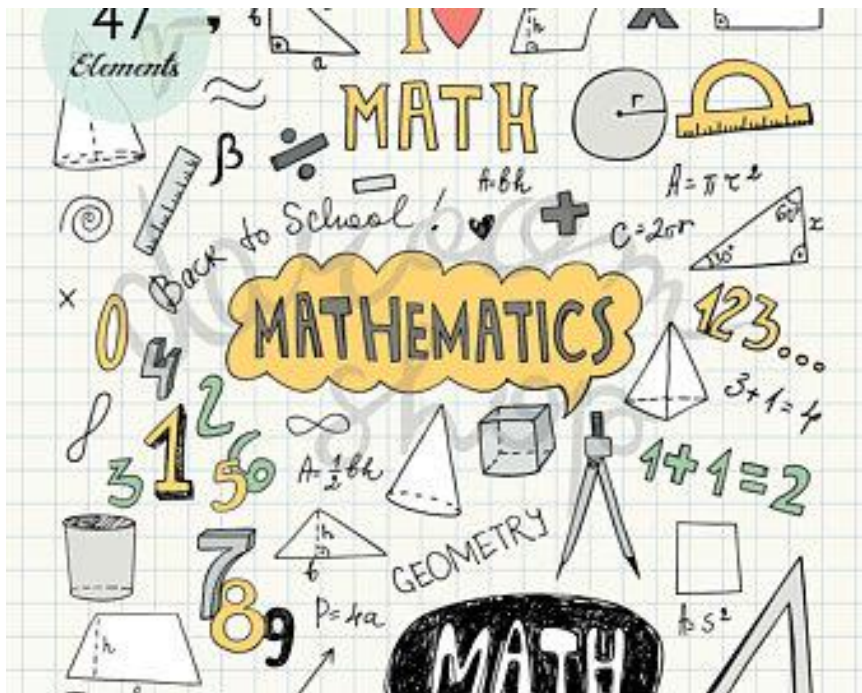
Form:

Each week covers topics you would complete in your 3 Maths lessons that week. Write out the title and LI and then complete the tasks.

All video links are online using the ClassCharts link.

The Knowledge Organiser on page 4 has further practice questions and page numbers linking to your pocket revision guides for all the key information and examples to help you with this unit.

Upload all work onto ClassCharts for feedback.



Contents

Page 3: Big Picture - Year 9 Overview

Page 4: Knowledge Organiser

Page 5-10: Week 1 –Probability scale

Page 11-16: Week 2 – Theoretical and experimental probability

Page 17-22: Week 3 – Sample space and Venn diagrams

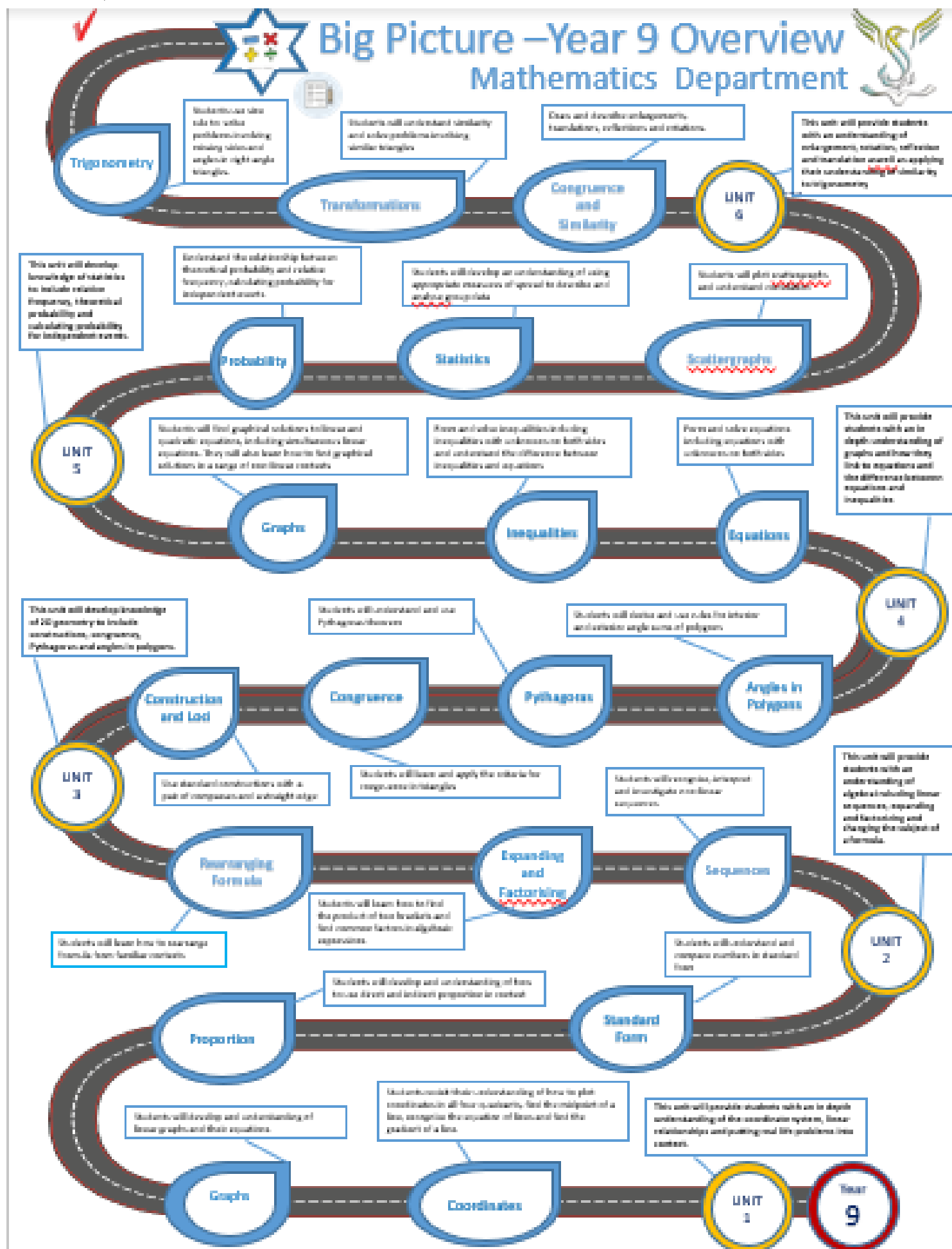
Page 23-28: Week 4 – Types of data

Page 29-34-: Week 5 – Finding averages from data tables

Page 35-40: Week 6 – Scatter graphs

Page 41-42: Week 7 -Analysing data

Page 43: Assessment Ladder



[illegible]

Week 1:

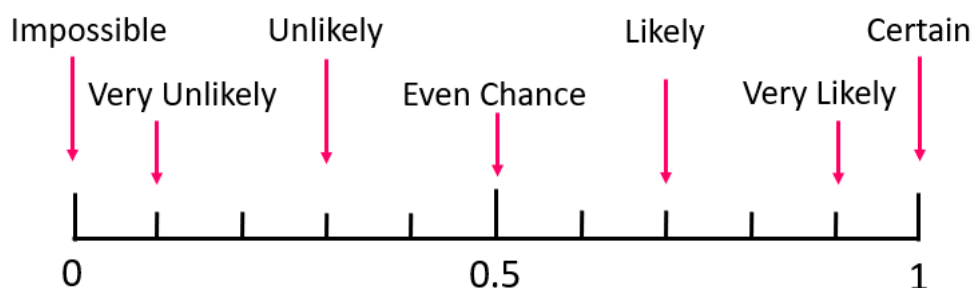
- **L1:** To understand and use the probability scale from 0 to 1

Demonstration Videos:

<https://corbettmaths.com/2013/05/12/probability-scale/>

Task 1

The Probability Scale



Write 3 sentences using these words,
and place them on the probability scale.

Task 2

Mark these events on the probability scale.

a) It will rain tomorrow
 $P = 0.5$

e) Mary will pass her driving exam.
 $P = 7/10$

b) There will be a test on Monday.
 $P = 0.1$

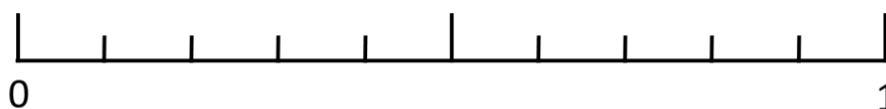
f) United will win their next match.
 $P = 25\%$

c) Jack will eat pasta for dinner.
 $P = 60\%$

g) It will snow at Christmas
 $P = 4/5$

d) Dan will fly home from school.
 $P = 0/10$

h) There will be homework today.
 $P = 0.92$

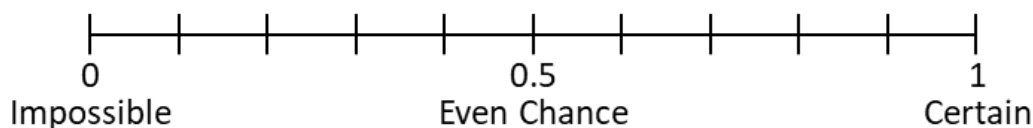


Task 3

The Probability Scale

1) How likely are these events? Mark the letter on the probability scale.

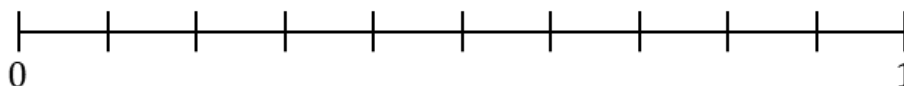
- | | |
|------------------------------------|--------------------------------------|
| A) It will rain tomorrow. | D) I will pass my next English test. |
| B) There will be school next week. | E) It will snow at Christmas. |
| C) I will do homework today. | F) A flipped coin lands on tails. |



2) The probability of each event is given.

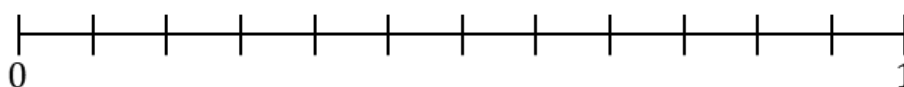
Mark each letter on the probability scale.

- | | |
|---|------------------------------------|
| A) Jack will cycle home = 99% | D) United will win = $\frac{1}{5}$ |
| B) Jenny will have potato for dinner = $\frac{7}{10}$ | E) See a pigeon today = 55% |
| C) It will be sunny tomorrow = 0.4 | F) Thunder tomorrow = 0.05 |



3) Mark the letter of each event on the probability scale.

- | | |
|-------------------------------------|---------------------------------------|
| A) Rain tomorrow = $\frac{7}{12}$ | D) Roll a 6 on a dice = $\frac{1}{6}$ |
| B) Test next lesson = $\frac{3}{4}$ | E) Roll an even number on a dice. |
| C) Pasta next lunch = $\frac{1}{3}$ | F) <u>Not</u> roll a 6 on a dice. |



- **L:** LO: I can understand and use the language associated with probability

Task 1

Question 1: Which phrase from the box best describes the likelihood of each of these events?
You may use each phrase more than one.

Impossible Unlikely Even Chance Likely Certain

- (a) Rolling a 9 on an ordinary six sided dice.
- (b) A newborn baby being a boy.
- (c) A day picked at random ending with the letter y
- (d) Getting a tail when a coin is flipped.
- (e) It snowing in London in May.
- (f) Rolling a number greater than 1 on an ordinary six sided dice.

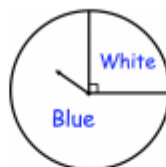
Question 2: Which word from the box best describes the likelihood of each of these events?

Impossible Unlikely Even Likely Certain

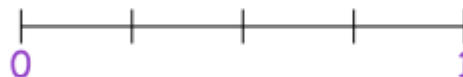
- (a) You throw a coin and get a Heads.
- (b) You take a green counter from a bag that only contains black counters.
- (c) May 18th 2018 is the day after May 17th 2017.

Task 2

Question 7: The diagram shows a fair spinner.



- (a) Which colour is the arrow least likely to land on?



- (b) Mark the probability scale with an arrow to show the probability of landing on white.
Label the arrow, W.
- (c) Mark the probability scale with an arrow to show the probability of landing on blue.
Label the arrow, B.



Task 3

- Question 1: Curtis has a fair 6-sided spinner.
The spinner has numbers less than 7 on it.
The number 5 is the least likely number that the spinner will land on.
There is an even chance that the spinner will land on a 3.
It is impossible that the spinner will land on an even number.
Write the numbers on the spinner.



Task 4

- Question 3: A school offers students 3 lunchtime clubs each week: hockey, golf and cricket.

- (a) Which clubs does Helen attend?
(b) Which of the children attend the cricket club?
(c) Which of the club do the least of the 5 children attend?
(d) Which child attends the most clubs?

	Hockey	Golf	Cricket
Helen	✓		✓
Leah			✓
Emily	✓	✓	✓
Mia	✓	✓	
Sally	✓		

Mr White picks one of the 5 children at random

- (e) On the probability scale, mark with a cross the probability that he will pick a child that attends the hockey club.



Task 5

James has a spinner labelled with the numbers 1 to 4. The table shows the probabilities of landing on 1, 3 and 4.

Outcome	1	2	3	4
Probability	0.3	x	0.5	0.1

- a) Work out the value of x .

b) James spins the spinner 200 times. How many times would you expect the spinner to land on a 4?

- **L1:** To understand relative frequency

Demonstration Videos:

<https://corbettmaths.com/2013/06/20/relative-frequency/>

Task 1

Clara has a box that contains only red cubes and yellow cubes.

She takes out a cube, writes down whether it is red (R) or yellow (Y), and then puts it back into the box.

Clara does this eight times.

a) Complete the table.

Outcomes:	Relative frequency of red cubes	Relative frequency of yellow cubes
R R Y Y R Y R R	$\frac{5}{8}$	

b) Clara repeats the experiment, by again taking eight cubes out, one at a time, and replacing them each time.

Complete the table.

Outcomes:	Relative frequency of red cubes	Relative frequency of yellow cubes
R R Y Y R Y R R Y R Y Y Y R R Y		

c) Clara repeats the experiment a third time.

The results of all three experiments are shown below.

Complete the table.

Outcomes:	Relative frequency of red cubes	Relative frequency of yellow cubes
R R Y Y R Y R R Y R Y Y Y R R Y Y Y Y R Y Y R R		

d) What do you notice about the sum of the relative frequencies in each experiment?



Task 2

Relative Frequency

- 1) Sarah conducts an experiment & spins the spinner 20 times.

4 2 3 4 2 2 1 3 2 3
3 4 2 4 1 4 2 2 4 2



Score	1	2	3	4
Frequency				
Relative Frequency				

- Complete the table with frequencies & relative frequencies.
- What is the **theoretical** probability of the spinner landing on four?
- Do you think the spinner is **biased**? Explain why.

- 2) A dice is rolled 30 times. It lands on four 12 times.

- What is the relative frequency of the dice landing on four?
- Do you think the dice is biased? Explain why.



- 3) Toby spins the spinner 50 times and records his results.

Complete his table.

Score	1	2	3	4	5
Frequency	12	14		8	
Relative Frequency			0.2	0.16	

- 4) Sam rolls a biased dice 200 times.

He calculates that the relative frequency of scoring a six is 0.2
How many times did Sam roll a six during his experiment?

- 5) Mack records the meals bought at lunch. 60 students buy a sandwich.

He calculated the relative frequency of a student buying a sandwich was 0.8 How many meals did Mack record?

Week 2:

- **L1:** To Understand theoretical probability

Demonstration Videos:

<https://corbettmaths.com/2018/11/30/probability-videos/>

Concept corner

Calculating probabilities of a single event

Probability is a measurement of the **chance** or **likelihood** of an **event** happening.

$$\text{Probability of an event} = \frac{\text{number of successful outcomes}}{\text{number of possible outcomes}}$$

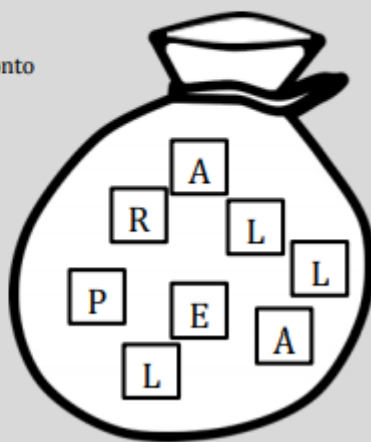
For example, the letters of the word 'parallel' are written onto separate cards, placed into a bag, and jumbled up.

What is the probability of pulling the letter A from the bag without looking?

$$P(\text{taking the letter P}) = \frac{1}{8} \text{ or } 0.125 \text{ or } 12.5\%$$

$$P(\text{taking the letter L}) = \frac{3}{8} \text{ or } \dots\dots\dots \text{ or } \dots\dots\dots$$

$$P(\text{taking the letter A}) = \dots\dots\dots$$



Task 1

The following table shows the probabilities of five events.

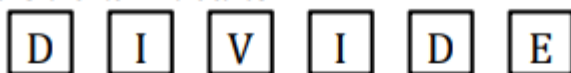
For each one work out the probability of the event **not occurring**.

Event	Probability of the event occurring	Probability of the event not occurring
Probability of it raining tomorrow	$\frac{11}{15}$	
Probability of the next person walking in the room is male	0.6	
Probability of chicken for dinner	20 %	
Probability picking red ball out of a bag	$\frac{2}{5}$	
Probability of winning the lottery	$\frac{1}{175\,000\,000}$	

Task 2

The letters of the word DIVIDE are written onto separate pieces of card, and placed into a box.

The box is then shaken to mix the cards.



A card is taken from the box without looking at the cards.

What is the probability that:

- the card displays the letter V?
- the card displays the letter I?
- the card displays the letter I or V?
- the card displays a vowel?
- the card shows the letter I or V or E?
- the card does **not** show the letter D?
- Why do you get the same answer for question (e) and (f)?
.....

Task 3

Jo chooses one card from the following playing cards:

(Note: Hearts and diamonds are red, clubs and spades are black)



Work out the following probabilities:

- $P(\text{a red playing card}) = \dots\dots\dots$
- $P(\text{a black playing card}) = \dots\dots\dots$
- $P(\text{choosing a seven}) = \dots\dots\dots$
- $P(\text{choosing an even number}) = \dots\dots\dots$

- **LI:** To understand that different trials of an experiment may produce different outcomes

Demonstration Videos:

<https://corbettmaths.com/2018/11/30/probability-videos/>

Task 1

Spun 200 times

1	2	3	4
40	47	33	80

Experimental Probability (4) =

Not 6	6
90	30

Experimental Probability (6) =

80 cars recorded

Blue	Green	Other
	9	55

Experimental Probability (Blue) =

Less than 12	12
36	14

Experimental Probability (12) =

Spun 250 times

1	2	3	4	5
70		25	82	58

Experimental Probability (2) =

Tails	Heads
90	110

Experimental Probability (Tails) =

Late	On time
14	6

Experimental Probability (Late) =

Rolled 150 times

1	2	3	4
33	51		42

Experimental Probability (3 or 4) =

Spun 400 times

1	2	3	4
120	60	140	80

Experimental Probability (1) =

Task 2

Amanda used a standard deck of 52 cards and selected a card at random. She recorded the suit of the card she picked, and then replaced the card. The results are in the table below.

Diamonds	
Hearts	
Spades	
Clubs	

1. Based on her results, what is the experimental probability of selecting a heart?
2. What is the theoretical probability of selecting a heart?
3. Based on her results, what is the experimental probability of selecting a diamond or a spade?
4. What is the theoretical probability of selecting a diamond or a spade?
5. Compare these results, and describe your findings.

Task 3

Experimental Probability

Conduct an **experiment** to find an **estimate** for the **theoretical probability** of an event (scoring a 6).

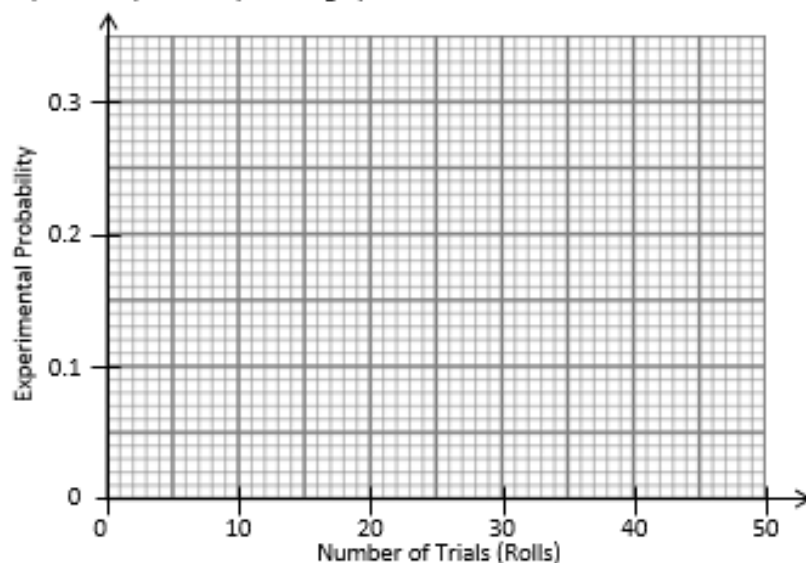


In total you need to complete 50 trials (rolls). Use a tally chart to record the rolls & the 6s scored.

After 6 trials, complete the 1st row of the table. Complete every row up to 50 rolls.

Calculate the experimental probability & plot each probability on the graph.

Number of trials	6s scored	Experimental Probability of rolling a 6
6		
10		
20		
30		
40		
50		



What **conclusions** can you make?

- What do you notice about your results? Is there a trend?
- Use your results to estimate the theoretical probability of rolling a 6.
- What is the actual theoretical probability?
- Is the dice fair?

- **L:** To systematically list outcomes using a variety of representations

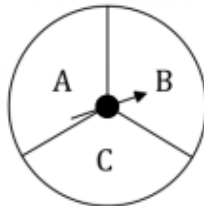
Demonstration Videos:

<https://corbettmaths.com/2013/05/04/listing-outcomes/>

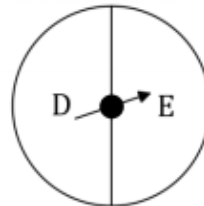
Tasks 1

1. Alice has two spinners:

First spinner



Second spinner



Alice spins both spinners.

Complete each of the methods below to find all the possible outcomes in the sample space.

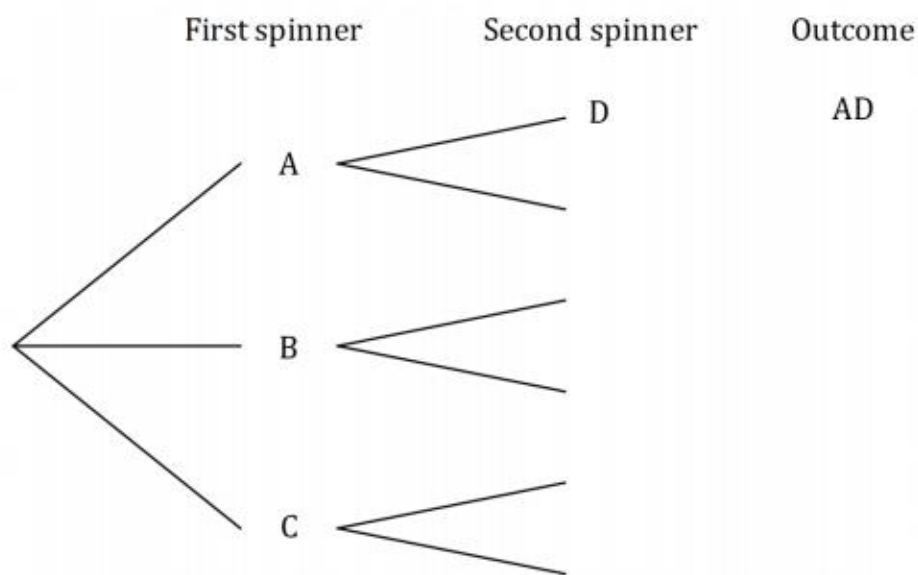
a)

First spinner	Second spinner	Outcome
A	D	A, D
A	E	
B		
B		

b)

		First spinner		
		A	B	C
Second spinner	D	A, D		
	E			

c)



Task 2



At the ice cream kiosk you can choose...
one flavour & one topping.

Flavours	Toppings
Vanilla	Flake
Chocolate	Sprinkles
Banana	Marshmallows



How many different ice cream possibilities are there?

Task 3

Product Rule for Counting

1 8 How many 2-digit numbers can you make with these 2 cards?

1 8 7 How does this change if we add a third card?

1 8 7 3

A) How many 4-digit numbers can you make using these cards?

- How many choices do you have for the 1st card?
- After you choose a 1st card, how many choices do you have for the 2nd card, 3rd card & 4th card?

4 8 3 6 2

B) How many odd 5-digit numbers can you make with these cards?

- One number must be last, how does this affect our choices?

7 9 1 5 3

C) How many numbers greater than 40,000 can you make?

- How many choices are there for the 1st card?

5 6 8 3 4 2

D) How many odd 6-digit numbers can you make?

- How many choices are there for the last card?

7 1 6 5 2 9

E) How many numbers greater than 300,000 can you make?

1 6 5 2 7

F) How many 5-digit numbers that are a multiple of 2 can you make?

7 2 4 3 8

G) How many odd numbers greater than 50,000 can you make?

- Sum the choices for each starting card.

6 1 9 7 3 2

H) How many odd numbers greater than 500,000 can you make?

8 2 5 1 7 4

H) How many even numbers smaller than 600,000 can you make?

9 6 7 1

I) How many 2-digit numbers can we make using these cards?

J) How many 3-digit numbers can we make using these cards?

2 8 1 5 6

K) How many ways can we make 3 numbers from these cards?

L) The number 156 is made. How many different numbers use these same digits?

M) If we don't care about their order (the number they make):
how many ways can we pick 3 digits from the 5 cards?

Week 3:

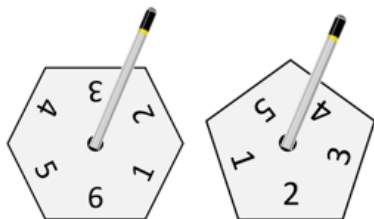
- **L1:** To use a sample space diagram to list possible outcomes.

Demonstration Videos:

<https://corbettmaths.com/2013/06/18/sample-space-diagrams/>

Task 1

A student makes a hexagonal spinner (1-6) and a pentagonal spinner (1-5).



a) Complete the Sample Space Diagram for spinning both and adding their scores.

		1 st Spinner					
		1	2	3	4	5	6
2 nd Spinner	1	2	3	4			
	2	3					
	3						
	4						
	5						
		Total Score					

Calculate:

- $P(11) =$
- $P(7) =$
- $P(8 \text{ or more}) =$
- $P(4 \text{ or } 9) =$
- $P(\text{the same number on both spinner}) =$

Task 2



A dice and a coin are thrown at the same time.

a) Complete the Sample Space Diagram.

		Dice					
		1	2	3	4	5	6
Coin	Head	H, 1					
	Tail					T, 5	

- Calculate the probability of scoring a 4 on the dice and a heads on the coin.
- Calculate the probability of scoring tails and an odd number on the dice.
- $P(\text{Heads and a number greater than } 2) =$
- $P(\text{NOT a 5 and NOT Heads}) =$

Task 3



A 6-sided and a 4-sided die are thrown and the product of their results recorded.

a) Complete a Sample Space Diagram.

b) $P(\text{Even number}) =$

c) $P(\text{less than } 10) =$

d) $P(\text{NOT more than } 2) =$

e) $P(\text{NOT a prime number}) =$

f) $P(\text{NOT a square number}) =$

g) $P(11) =$

Task 4

TRUE or FALSE?

Complete the Sample Space Diagrams and decide whether the given probability is: TRUE or FALSE

A

Two coins are flipped.

	H	T
H	HH	HT
T		

P (Tails & Tails) = 0.25

B

Two coins are flipped.

	H	T
H		
T		

P (At least 1 Tails) = 0.5

C

A coin is flipped & a dice is thrown.

	1	2	3	4	5	6
H	H, 1					
T	T, 1					

P (Tails & Odd) = 1/4

D

Two 4-sided spinners are spun & their scores added.

	1	2	3	4
1	2			
2	3			
3				
4				

P (6) = 4/16

E

Two 4-sided spinners are spun & their scores multiplied.

	1	2	3	4
1	1	2	3	4
2				
3				
4				

P (More than 4) = 11/16

F

A 6-sided dice and a 4-sided spinner: scores added.

	1	2	3	4	5	6
1	2	3				
2	3	4				
3						
4						

P (7 or less) = 0.75

G

A 3-sided & a 8-sided spinner are spun & their scores added.

	1	2	3	4	5	6	7	8
1	2	3						
2								
3								

P (4 or 9) = 1/4

H

2 cube dice are rolled & their scores added.

P (Less than 6) = 5/12

I

A 6-sided dice & a tetrahedron dice are rolled & their scores are multiplied.

P (More than 8) = 0.5

J

Two 5-sided spinners: scores added.

	1	2	3	4	5
1	2	3			
2	3	4			
3					
4					
5					

P (3 or 6) = 0.15

K

Two 5-sided spinners: scores multiplied.

	1	2	3	4	5
1					5
2					10
3					15
4					20
5	5	10	15	20	25

P (Less than 3 or exactly 20) = 0.2

L

An octahedron & a cube dice are rolled & their scores are added.

P (9 or more) = 7/16

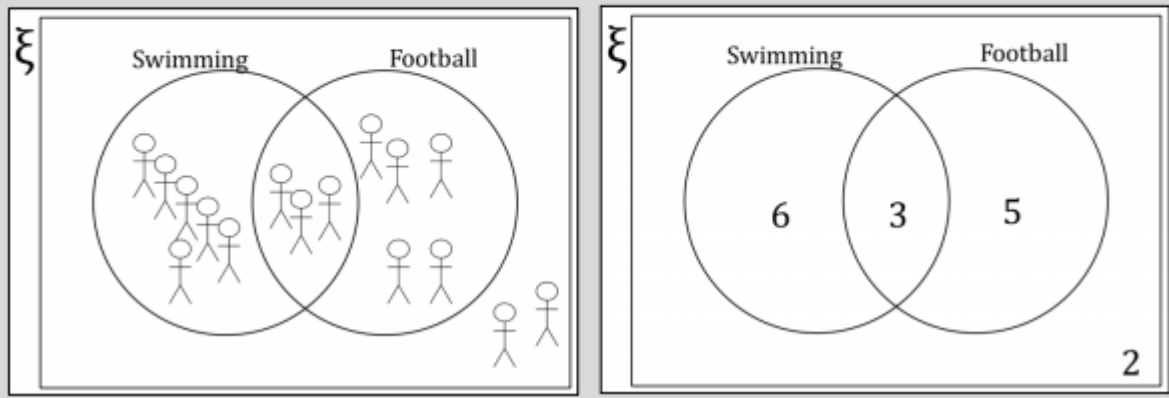
- **L1:** To use Venn diagrams

Demonstration Videos:

<https://corbettmaths.com/2016/08/07/venn-diagrams/>

Concept corner

Jay asks students in his class if they like swimming, football, both or neither. He displays his results in a Venn diagrams below.



Task 1

Venn Diagrams for Multiples

A) ξ = Numbers from 1 to 20 inclusive
Multiple of 3 Multiple of 5

B) ξ = Numbers from 1 to 30 inclusive
Multiple of 6 Multiple of 8

C) ξ = Numbers from 1 to 40 inclusive
Multiple of 7 Multiple of 5

In the next questions complete the **full Venn diagram** including the numbers in ξ but not in the sets.

D) ξ = Multiples of 2 up to 20 inclusive
Multiple of 4 Multiple of 3

E) ξ = Multiples of 5 up to 50 inclusive
Multiple of 3 Multiple of 10

F) ξ = Multiples of 8 up to 40 inclusive
Multiple of 3 Multiple of 4

G) ξ = Multiples of 6 up to 60 inclusive
Multiple of 9 Multiple of 12

H) ξ = Numbers from 1 to 80 inclusive
Multiple of 10 Multiple of 15
Multiple of 9

Task 2

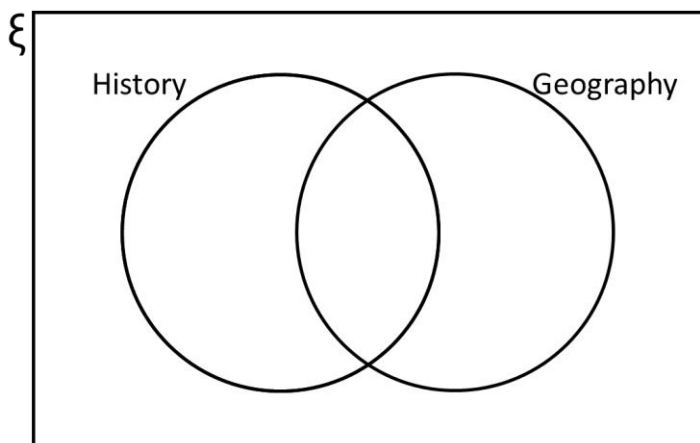
At Werlock School **40** students study **History**.
50 students study **Geography**.
40 students don't study **History OR Geography**.
 In total there are **100** students.



②

A) Complete the Venn Diagram.

What is a probability of picking:



B) A student who studies ONLY Geography

C) What is the probability they study History, Geography or both?

Task 3

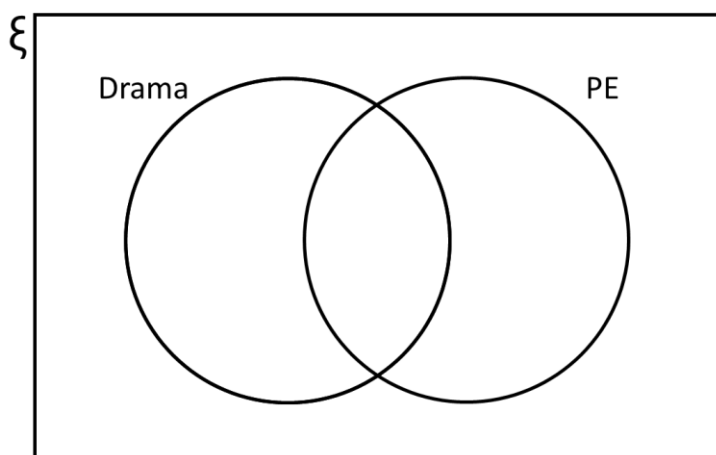
60 students were surveyed.
 37 students study Physical Education.
 15 students study both Drama and Physical Education.
 17 students don't study Drama or Physical Education.



③

A) Complete the Venn Diagram.

B) What is $P(\text{Only Drama})$?



C) $P(\text{Drama or PE but not both}) =$

D) Mr Gregson picks a student who studies Drama.

What is the probability the student also studies PE?

- **LI:** To use Venn diagrams and understand the meaning of union and intersection

Demonstration Videos:

<https://corbettmaths.com/2016/08/07/venn-diagrams/>

Set Notation

Sets of Data

Universal Set $\rightarrow \xi = \{\text{Numbers 1 to 20 inclusive}\}$

Elements \leftarrow

A = {Square Numbers} = {1, 4, 9, 16}

B = {Multiples of 4} = {4, 8, 12, 16, 20}

What is...

A \cup B

Union: the combination of **A** and **B**.
 $A \cup B = \{1, 4, 8, 9, 12, 16, 20\}$

A \cap B

Intersection: The overlap of **A** and **B**.
 $A \cap B = \{4, 16\}$

A'

Complement: Not in **A**.
 $A' = \{2, 3, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20\}$

Task 1

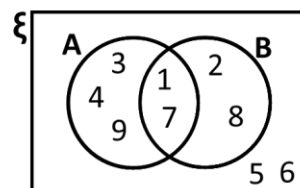
Venn Diagrams & Set Notation

$\xi = \{\text{Numbers 1 to 9 inclusive}\}$

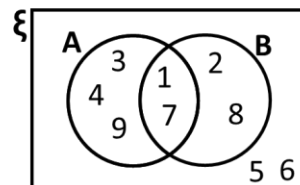
A = {1, 3, 4, 7, 9}

B = {1, 2, 7, 8}

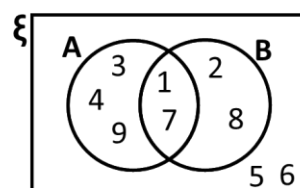
Union
A \cup B =
 The combination
 of **A** and **B**.



Intersection
A \cap B =
 The overlap
 of **A** and **B**.



Complement
A' =
 Not in **A**.



Task 2

50 students were surveyed about whether they studied Art or Drama.
A student is picked at random.

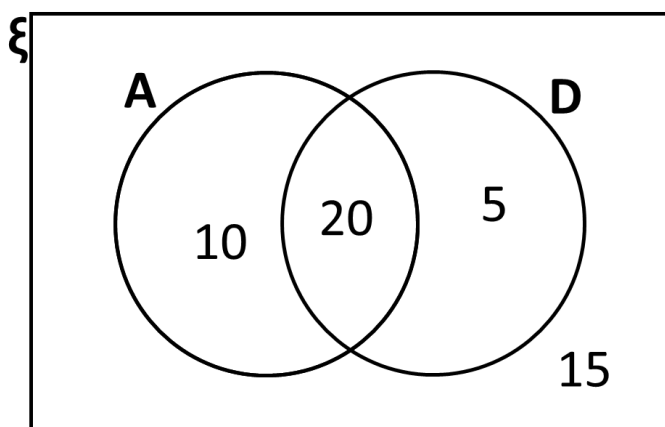
②

What is $P(D)$?

What is $P(A \cup D)$?

What is $P(A')$?

What is $P(A \cap D)$?



Task 3

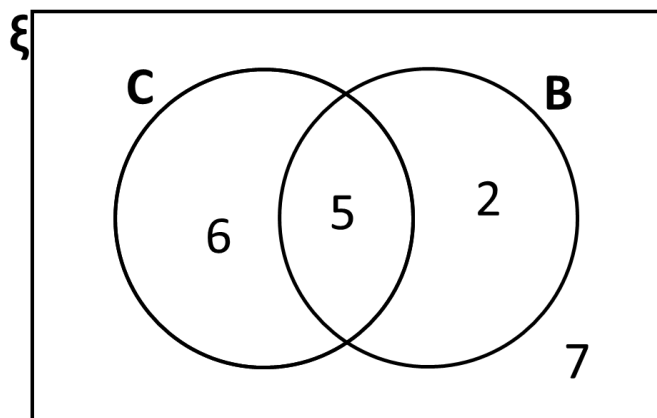
20 students were surveyed about their hair. **Curly** or **Brown** ③
A student is picked at random.

What is $P(C')$?

What is $P(C \cap B)$?

What is $P(C' \cup B)$?

What is $P(C \cap B')$?

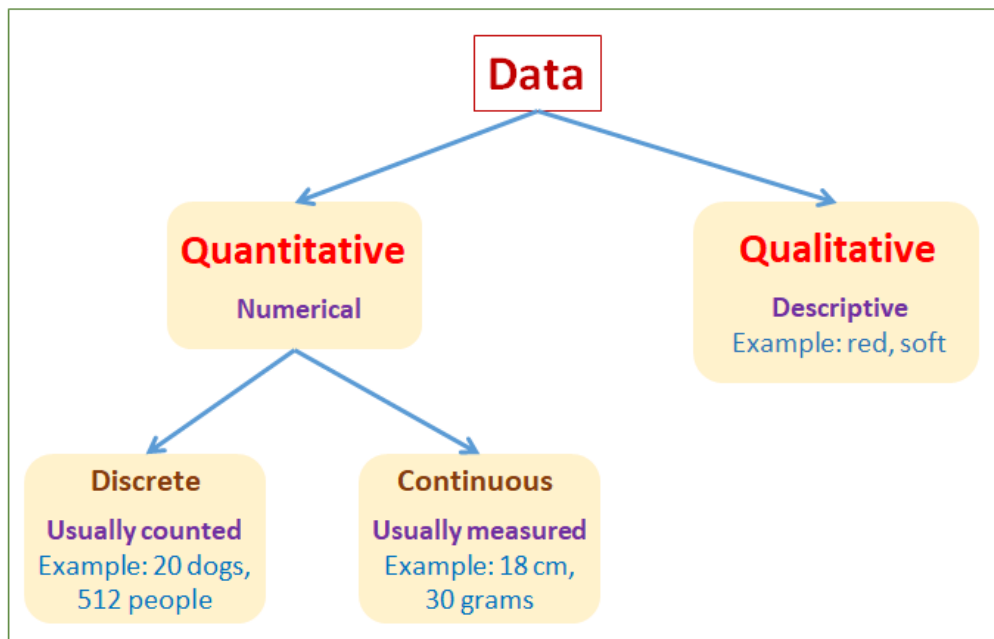


Week 4:

- **L1:** To analyse the difference between discrete and continuous data

Demonstration Videos:

<https://corbettmaths.com/2013/05/12/discrete-and-continuous-data-corbettmaths/>



Task 1

Concept corner

Use the words in the box to fill in the blanks.

primary qualitative continuous
quantitative discrete secondary

..... data is raw data collected by an individual or organisation to use for a particular purpose.

..... data is already available or has been collected by someone else for a different purpose.

Data that can only be described in words is

Data which is given numerical values is

Quantitative data is either or

..... data can only take certain values, usually whole numbers, but may include fractions.

..... data can take any value within a range and is measurable.

Task 2

Question 1: What does the term **discrete data** mean?

Question 2: Write down 3 examples of discrete data

Question 3: What does the term **continuous data** mean?

Question 4: Write down 3 examples of continuous data

Question 5: For each of the following, state if the data would be discrete or continuous:

- | | |
|--|-------------------------------------|
| (a) The number of people in a room | (b) The mass of a book |
| (c) The number of pages in a book | (d) The length of a line |
| (e) The time taken to complete a puzzle | (f) The size of a shoe |
| (g) The number of glasses in a dishwasher | (h) The volume of water in a bottle |
| (i) The number of songs in an album | (j) The weight of an apple |
| (k) The number of people at a football match | |

Question 6: A teacher collects the ages of students in her school.
Is that variable discrete or continuous?

Question 7: Steven keeps a record of the prices of all the cars he sold in one year.
Is that variable discrete or continuous?

Task 3

A car salesman records information about the cars he is selling.



Here is a list of words.

Qualitative Continuous Discrete

Use a word from the list to complete each sentence.

- (a) The number of doors is data.
- (b) The age of each car is data.
- (c) The colour of the car is data.

- **LI:** To find the mean, median and mode of a data list

Demonstration Videos:

<https://corbettmaths.com/tag/averages/>

<https://www.youtube.com/watch?v=NZpPa1yOPdk>

Task 1

Use the numbers 1, 2, 3, 4, 5, 6, 7, 8 & 9 to complete these tables.

A	Mean 4	Mean 3	Mean 8
Median 5			8
Mean 6	3	6	
Mean 4	4		

B	Median 7	Mean 4	Mean 4
Range 8	9		4
Median 6		8	6
Mean 4			

C	Range 5	Median 6	Mean 5
Mean 2		2	1
Range 3			9
Median 5	4		

Use the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 & 11 to complete these tables.

D	Median 1	Range 5	Mean 5	Range 6
Range 10		8		
Mean 5	0		10	
Median 6	7			5

E	Range 5	Mean 5	Mean 3	Median 9
Median 7	4	10		
Range 8			6	
Mean 3	9		1	0

Use the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 & 15 to complete this table.

F	Median 11	Mean 7	Range 10	Median 8
Median 9			7	
Mean 5	3	12		4
Range 15			0	
Mean 7.5		6		5

Just Some Average Puzzles

Challenging

Task 2

Averages: One value to represent the group.		
	7, 1, 4, 1, 2	4, 5, 0, 2, 9, 1
Mean Sum of values divided by quantity		
Median The middle value. 2 middle values = take the mean of those.		
Mode The most common value.		

Task 3

- a) Calculate the mean and median
4, 5, 7, 11, 13
- b) Calculate the mean and median
4, 5, 7, 11, 13, 14
- c) The median is 8, find the value of x
1, 2, x, 9, 10, 11
- d) The mean is 7, find the value of x
1, 3, x, 9, 10, 11
- e) The median is 9 and the mean is 10
Find the value of x and y
1, 3, x, 11, 14, y

Task 4

Here is a list of numbers.

0 3 5 7 12 29

- (a) Write down **three** numbers from the list with a median of 7.

Answer _____, _____ and _____

(1)

- (b) Write down **three** numbers from the list with a range of 7.

Answer _____, _____ and _____

(1)

- (c) Find **three** numbers from the list with a mean that is a whole number.

Answer _____, _____ and _____

(2)

- **LI:** To find an estimate of the mean from grouped data and continuous data

Demonstration Videos:

<https://corbettmaths.com/2012/08/19/means-from-frequency-tables/>

Task 1

20 students took a science test.

Place the data in grouped frequency table. to a grouped frequency table.



25	32	31	52	45
27	55	28	42	44
46	23	51	48	26
20	51	49	33	41

Marks, m	Tally	Total
20-29	I	
30-39		
40-49	II	
50-59		

Task 2

A clothes shop recorded the ages of its customers in one day.

Put the data in to a grouped frequency table.

What is the modal group?



20	33	21	18	30	18
28	24	20	12	22	32
25	13	24	16	30	23
17	21	19	26	21	15

Age, a	Tally	Total
	II	
	III	

Task 3

A florist measured the heights of his flowers after 2 weeks.

Put the data into a grouped frequency table.



22	39	18	30	4
24	11	26	13	27
20	24	9	40	20
7	30	21	17	28

Height, h (cm)	Tally	Total
$0 < h \leq 10$		
$10 < h \leq 20$	I	
$20 < h \leq 30$	III	
$30 < h \leq 40$		



Task 4

Averages from Grouped Frequency Tables

Anne's tallest friend is 140 cm tall. Her shortest friend is 120 cm tall. Anne and her four other friends are between these heights. What is a good estimate of the mean height of Anne's group of friends?

When we use data that is in groups, we must use the midpoint of each group to estimate averages.

The frequency table below shows the height of everyone in Anne's class.

1) Which groups are these students in?
 Alice is 132 cm tall. Arjun is 130 cm tall. Andy is 140 cm tall.

Height, h (cm)	Frequency	Group Midpoint	Estimated Group Value (Frequency × Midpoint)
110 < h ≤ 120	4	115	
120 < h ≤ 130	2		
130 < h ≤ 140	4		
140 < h ≤ 150	5		
150 < h ≤ 160	2		
Totals			Class Total =

We can use this data to find an estimated mean.

2) Find the midpoint of each group and complete that column.
 3) Find the total value of each group (multiply the frequency by the midpoint).
 4) Find the class total by adding all the estimated group values.

$$\text{Estimated Mean} = \frac{\text{Total data}}{\text{Total Frequency}}$$

5) Use this formula to find the estimated mean.
 Estimated Mean = _____

6) How many people are in Anne's class?
 7) How could we describe where the median is?

This table shows data for a different class.

8) Complete the table and find the estimated mean and the group with the median.

Height, h (cm)	Frequency	Group Midpoint	Estimated Group Value (Frequency × Midpoint)
120 < h ≤ 130	2		
130 < h ≤ 140	6		
140 < h ≤ 150	4		
150 < h ≤ 160	3		
Totals			

Estimated Mean = _____ Group including Median = _____

Mr Higgins collected the data from his Geography test.

9) Complete the table and find the estimated mean and the median group.

Score, s (cm)	Frequency
0 < s ≤ 20	7
20 < s ≤ 40	11
40 < s ≤ 60	13
Totals	

Estimated Mean = _____ Group including Median = _____

10) The pass mark was 30. How many people do you think passed the test?

11) Complete this grouped frequency table and find an estimate for the mean and median.

Score, s (cm)	Frequency
0 < s ≤ 30	5
30 < s ≤ 60	
60 < s ≤ 90	675
90 < s ≤ 120	420
Totals	25

Estimated Mean = _____ Group including Median = _____

- ### Demonstration Videos:

Task 1

①



When you have complete the tallies, write the total in the frequency column.

What is the most popular pet?

②



Subject	Tally	Frequency
Maths		
English		
Science		
Drama		
Geography		
History		
P.E.		
	Total	

What fraction of students said P.E. their favourite?

Task 2

1	0	3	3	3
1	1	4	2	2
0	0	3	2	4
4	0	2	3	3
3	2	1	0	4

Mean = Mode = Median =

0	4	3	2	0
3	3	4	0	1
1	2	0	0	3
1	1	2	3	4
5	2	1	3	1
4	3	2	0	0

Mean = Mode = Median =



Task 3



As a **Director of Football** for your club you want to sign a new player – either for your women's or men's teams. The goals for **8 strikers in their most recent matches** are below. Calculate the **mean, median & mode** goals scored for each player. Which player do you want to sign? Which player is best value for money? What might you consider other than averages?

Andi Woodley	£10 million	Burt Smith	£17 million	Cat Henson	£12 million	Dana Fleet	£10 million
Goals	Frequency	Total Goals	Goals	Frequency	Total Goals	Goals	Frequency
0	6	0	0	0	0	0	12
1	8	8	1	0	0	1	4
2	3	6	2	2		2	4
3	0		5	4		3	7
4	1			1		4	3
5	2			2			
Mean =			Mean =			Mean =	
Median =			Median =			Median =	
Mode =			Mode =			Mode =	
Emma Eastwood	£15 million	Fred Richardson	£7 million	Gerald Row	£6 million	Herb Hughes	£2 million
Goals	Frequency	Goals	Frequency	Goals	Frequency	Goals	Frequency
0	7	0	4	0	2	0	25
1	0	1	4	1	3	1	12
2	0	2	4	2	3	2	1
3	8			3	0	6	2
Mean =		Mean =		Mean =		Mean =	
Median =		Median =		Median =		Median =	
Mode =		Mode =		Mode =		Mode =	

- **LI:** To determine the modal class of grouped data
- **LI** I can determine the class interval containing the median of grouped data

Demonstration Videos:

<https://www.youtube.com/watch?v=Uy7xyldWkU>

Task 1

Skill 1 Find the mean, median and mode from each frequency table

No. of Calls	Frequency
0	9
1	12
2	7
3	5
4	8
5	9

No. Faulty	Frequency
7	29
8	33
9	29
10	28
11	37
12	34

No. Letters	Frequency
4	17
5	27
6	34
7	19
8	13

No. pets	Frequency
0	8
1	18
2	12
3	13
4	9

No. Goals	0	1	2	3	4
Frequency	7	13	10	6	4

Task 2

Skill 2 Find the mean, median and modal class from each grouped frequency table

Height (cm)	Frequency
$130 < h \leq 140$	3
$140 < h \leq 150$	8
$150 < h \leq 160$	9
$160 < h \leq 170$	12
$170 < h \leq 180$	10
$180 < h \leq 190$	6
$190 < h \leq 200$	2

French Test Score	Frequency
$0 \leq x < 10$	1
$10 \leq x < 15$	3
$15 \leq x < 20$	5
$20 \leq x < 25$	8
$25 \leq x < 35$	9
$35 \leq x < 50$	4

Consultation (mins)	Frequency
$0 \leq x < 5$	15
$5 \leq x < 10$	22
$10 \leq x < 15$	11
$15 \leq x < 20$	7

Clothes Shop (pounds)	Frequency
$5 \leq x < 25$	12
$25 \leq x < 40$	39
$40 \leq x < 70$	51
$70 \leq x < 100$	27
$100 \leq x < 150$	12
$150 \leq x < 200$	9

Task 3



1. John recorded the goals scored by his favourite football team.

Complete the table and calculate the Mean, Mode and Median.

Score	Tally	Games	Total Goals
0			
1			
2			
3			
Total			

Mean = _____ Mode = _____ Median = _____

- 2.



Anna rolled a dice 20 times and recorded the results.

Complete the table and calculate the Mean, Mode and Median.

Score	Frequency	Score x Frequency
1	3	
2	5	
3		
4	1	
5	0	
6	4	
Total		

Mean = _____ Mode = _____ Median = _____

3. The mean of this data is 1.4.
Complete the table and find the median.

Score	Frequency	Score x Frequency
0		0
1		9
2		12
3	7	
Total		30

Median = _____

4. Josh and Jane played mini-golf and recorded their scores.



JOSH

JANE

Score	Frequency	S x F
2	5	
3	2	
4	4	
5	0	
6	1	
Total		

Score	Frequency	S x F
2	4	
3	3	
4	2	
5	1	
6	0	
7	2	
Total		

Calculate the mean, median and range for each player.

Who is the better player?

5. Hannah recorded the merit points of students in his class over a week.

Points	0	1	2	3	4	5
Frequency	3	0	4	6	3	2

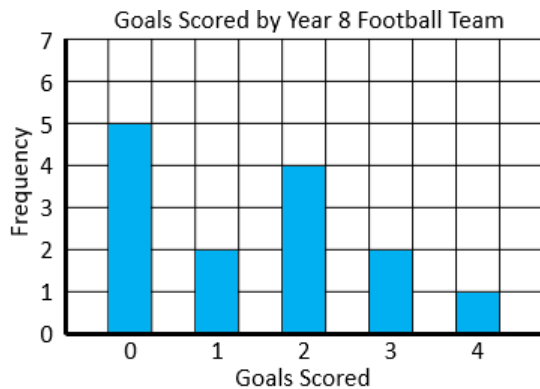
Another class had a mean of 2.3 and a range of 4. Which class did better?

- **LI:** To calculate averages from bar charts

Demonstration Videos:

<https://www.youtube.com/watch?v=3e1SIAPan8E>

Task 1



Use the bar charts to complete the frequency tables and then find the Mean and Mode for each team.

Goals	Frequency	Total Goals
0		
1		
2		
3		
4		
Totals:		

Mean =

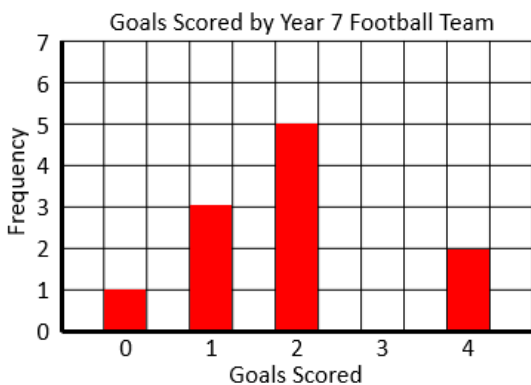
Mode =

Goals	Frequency	Total Goals
0		
1		
2		
3		
4		
Totals:		

Mean =

Mode =

Task 2



Use the bar charts to complete the frequency tables and then find the Mean, Mode, Range & Median for each team.

Goals	Frequency	Total Goals
0		
1		
2		
3		
4		
Totals:		

Mean =

Mode =

Range =

Median =

Goals	Frequency	Total Goals
0		
1		
2		
3		
4		
Totals:		

Mean =

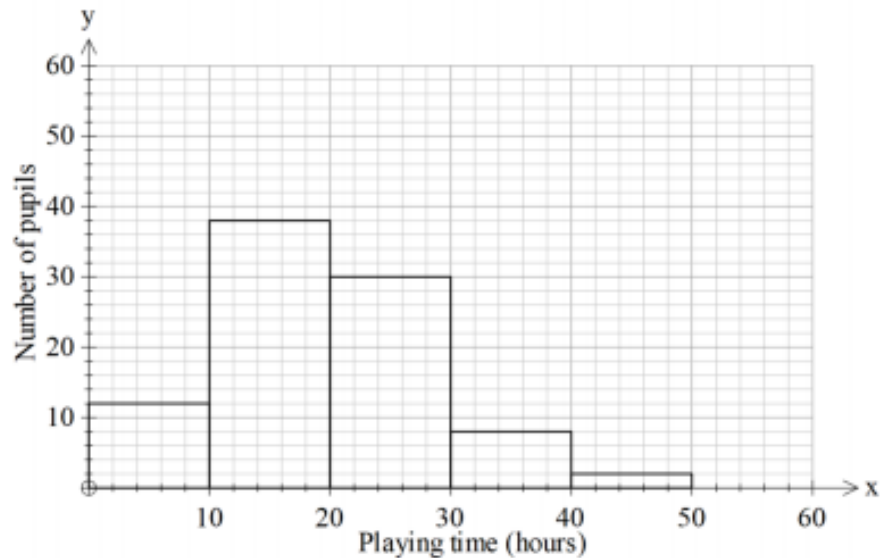
Mode =

Range =

Median =

Task 3

The graph below shows the number of hours a sample of pupils spent playing on a computer during one week in the summer term.



a) Complete the frequency table for this sample.

Playing time (hours, h)	Number of pupils, f		
$0 \leq h < 10$	12		
$10 \leq h < 20$			
$20 \leq h < 30$			
$30 \leq h < 40$			
$40 \leq h < 50$			
Totals			

b) Use the table to help you find an estimate for the mean playing time.

c) Another survey is carried out in the winter term.
What difference would you expect to see in the data?

.....

Week 6:

- **L1:** To describe, interpret and compare distributions, involving appropriate measures of central tendency and spread

Demonstration Videos:

<https://corbettmaths.com/2012/08/10/scatter-graphs/>

Concept corner

Scatter graphs are a way of illustrating paired data.

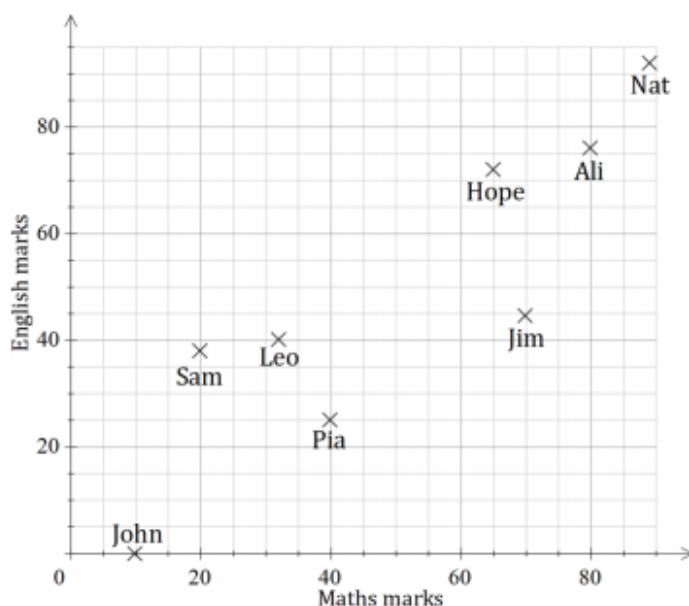
Two data sets are 'paired' if each item in one set of data is related to exactly one item of data in the second set.

For example, the heights of a group of people and the shoe-sizes of a group of people.

The two variables are treated as a set of (x, y) coordinates and are plotted to form a scatter graph.

Task 1

The scatter graph below shows the marks scored in an English test plotted against the marks scored in a Maths test.



- Who got zero marks on the English test?
- Who got exactly 40 marks in the maths test?
- Who got exactly 40 marks in the English test?
- Who got a better mark in the English test; Jim, Hope or Ali?
- Who got the top marks in maths and English?



Task 2

Decide whether you expect each pair of variables to have a **positive** correlation, **negative** correlation or **no** correlation.

Rainfall & umbrellas sold

Positive



Temperature & jumpers sold

Negative



Sunny days in a year & girls born

No correlation

Revision time & test results

Positive



Height & arm span

Positive



Sweets eaten per week & age

Negative



Height & hours playing computer games

No correlation

Task 3

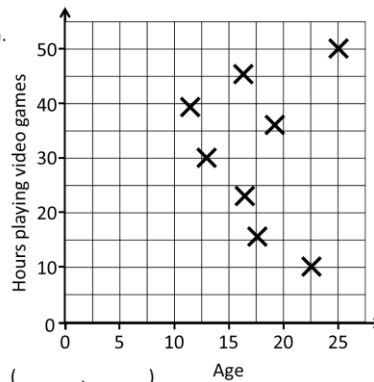


Thunder Games survey a population about their **age** and the **hours they play video games** every month.

①

A) Plot the last three data points on the graph.

Age (x)	Hours playing video games (y)
20	30
25	20
10	50



B) Draw a line of best fit.

C) What correlation do the variables have?

D) Write down the coordinates of an outlier. (,)

E) Give a possible reason for the outlier.

Task 4

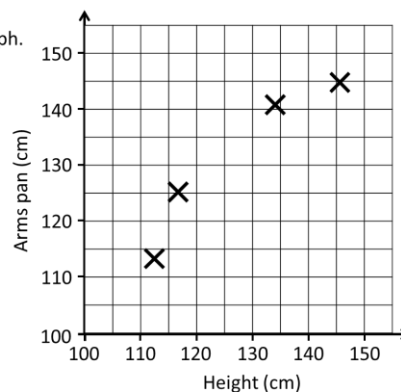


20 students are surveyed about their **height** and their **arm span**.

②

A) Use the data to complete the scatter graph.

Height (cm)	Arm span (cm)
130	125
140	140
125	130
125	125
145	150
132	135



B) What correlation do the variables have?

C) Draw a line of best fit.

D) Jim has a height of 120 cm.

How wide do you expect his arm span to be?
(Use the line of best fit)

- **L1:** To plot scatter graphs

Demonstration Videos:

<https://corbettmaths.com/2012/08/10/scatter-graphs/>

Task 1

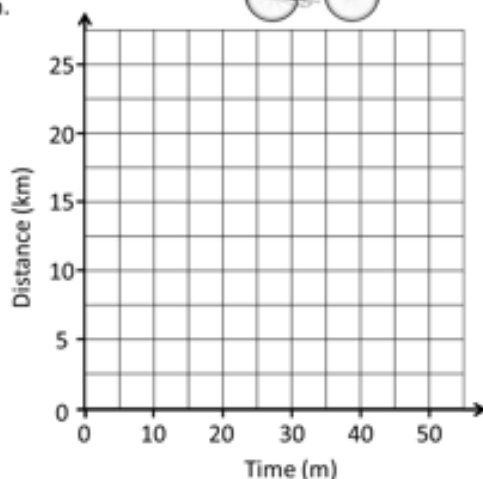
Khan recorded his average time and distance for 20 bicycle rides.



③

A) Use the data to complete the scatter graph.

Time (minutes)	Distance (km)
30	10
45	20
20	10
10	5
25	15
40	14
50	5
35	20



B) Describe the correlation.

C) Draw a line of best fit.

D) Write down the coordinates of an outlier.

(,)

E) Khan plans a ride for 35 minutes. How far would he expect to go?

Task 3

Lite Mobile recorded the **price** and **sales** of its phones and plotted a scatter graph.

④



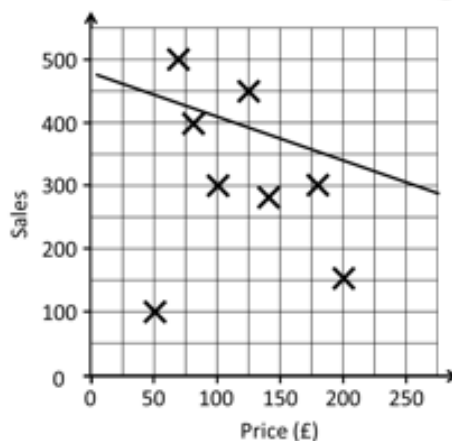
Price (£)	Sales
200	150
100	300
125	400
70	500
180	300
50	100
140	280
80	400

B) Write down two mistakes they have made.

C) Draw an accurate line of best fit.

D) Write down the coordinates of an outlier.

(,)



E) Lite mobile's next phone will cost £175. How many should they expect to sell?

F) They want to sell 450 units of a budget phone. How much should the phone cost?

Task 3

Scatter Graphs

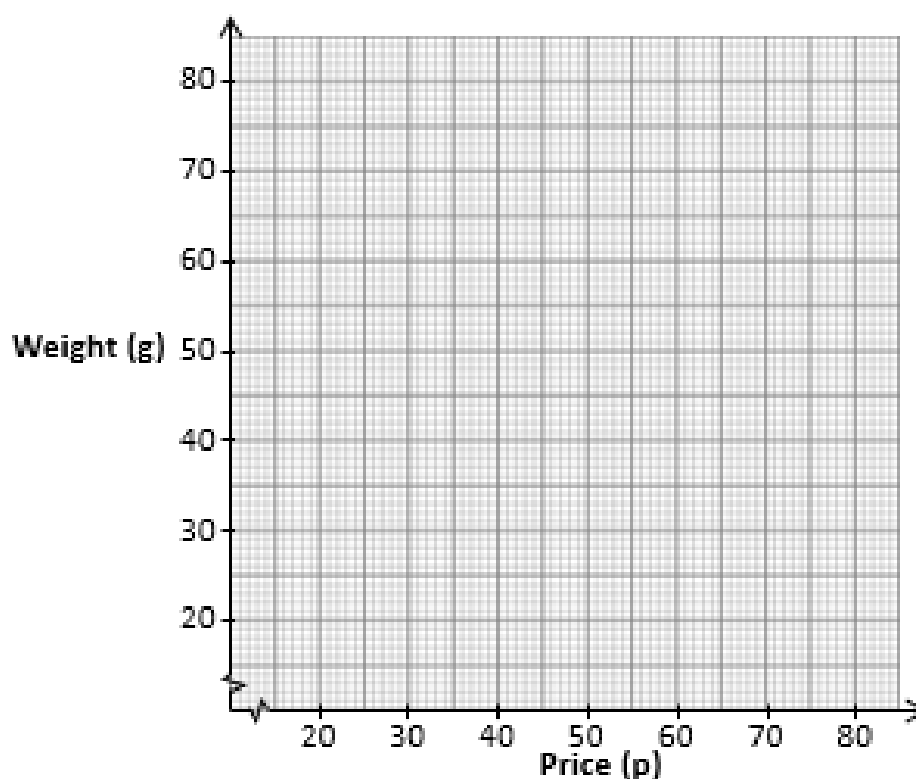
As the CEO of a chocolate bar company you have done some research about the competitors!

- 1) Plot the price and weight of the 13 bars as coordinates on the grid.
- 2) What do you notice?
- 3) Which bar is best/worst value for money?

You want your new bar to be 40 g.
How expensive should it be?

Chocolate Bar	Price (p)	Weight (g)
Choco Deluxe	60	70
Mini-Snack	30	40
Duo Bar	45	50
Snack-Time	35	75
Crispy Biscuit	75	34
Real Cocoa	75	80
Caramel Twist	25	30
Crazy-Choc	32	50
Mega Max Bar	48	62
Nougat Now!	68	67
Recharge!	20	44
Raisin 'N' Nut	57	62
Toffee-Choc	55	45
		40

Chocolate Bar Prices & Weights



- **Li:** To plot scatter graphs

Demonstration Videos:

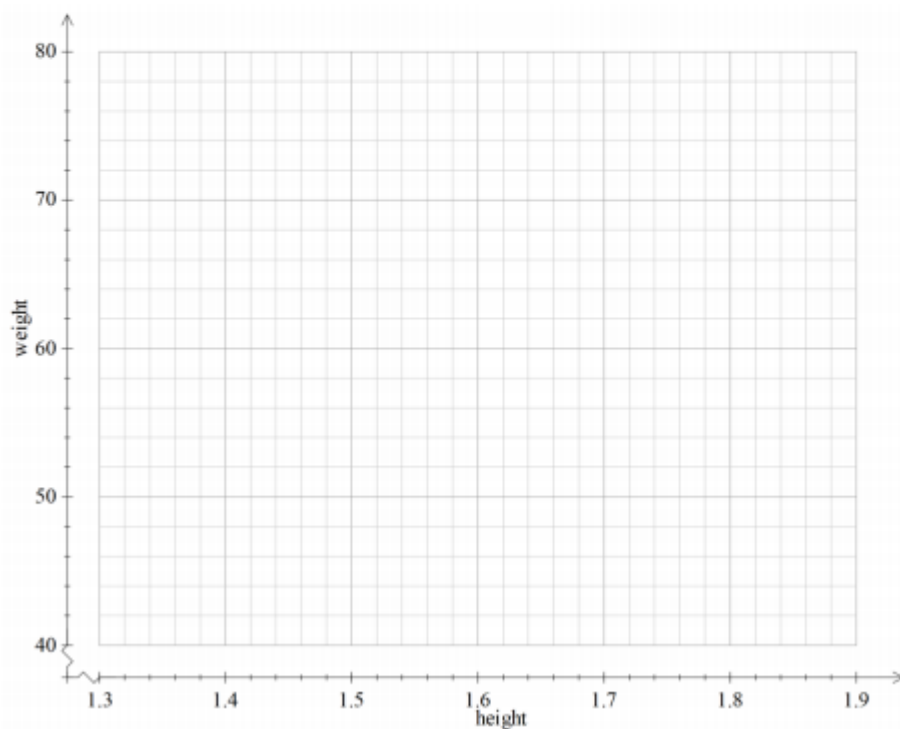
<https://corbettmaths.com/2012/08/10/scatter-graphs/>

Task 1

2. The table below shows the weight and heights of 12 students.

Height metres	1.40	1.48	1.53	1.55	1.59	1.65	1.65	1.68	1.68	1.70	1.75	1.88
Weight kilograms	49	51	54	58	59	59	63	64	65	66	70	77

- a) Plot this information on a scatter diagram.

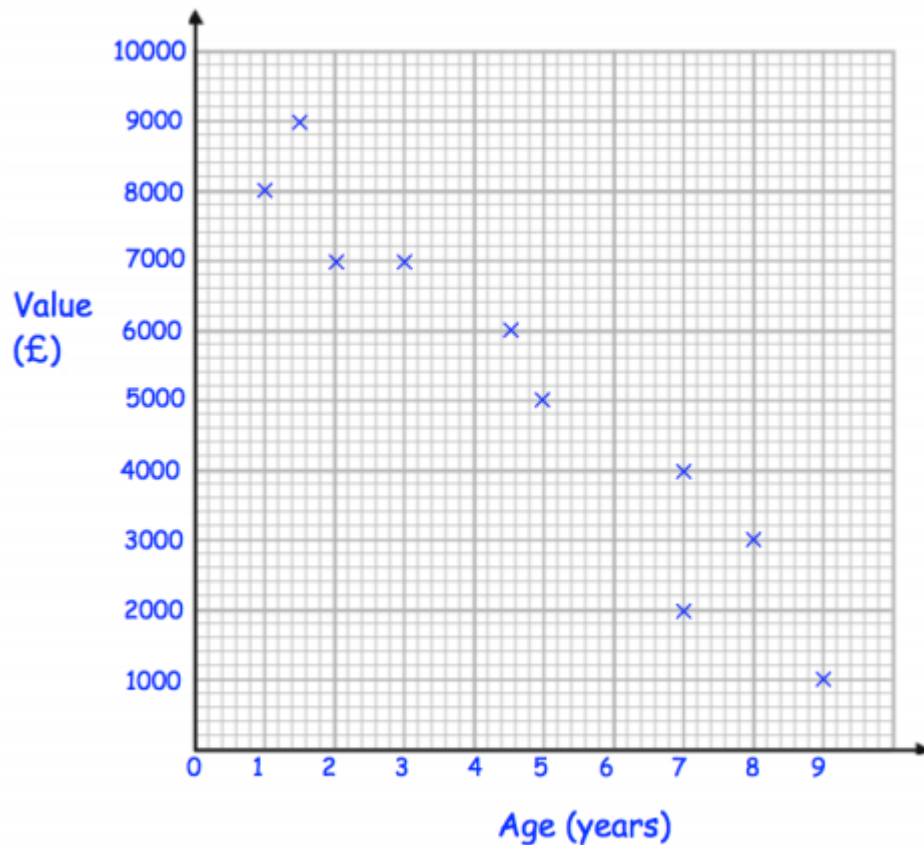


- b) Complete the following the sentence:

"The students who are taller"

Task 2

- The value of cars in a used car garage are recorded below.
The scatter graph shows this information.



Another car arrives at the garage.
It is 4 years old and worth £5000.

- Show this information on the scatter graph.

(1)

- Describe the correlation between the value of the car and the age of the car.

.....
(1)

The next car that arrives is 6 years old.

- Estimate the value of the car.

£.....
(2)

Week 7:

- **LI:** To interpret data

Averages from Grouped Frequency Tables Exam Questions

- Zach has 10 CDs.
The table gives some information about the number of tracks on each CD.

Number of tracks	Frequency	
11	1	
12	3	
13	0	
14	2	
15	4	

- Write down the mode.

..... (1)

- Work out the mean.

..... (3)
(Total 4 marks)

- 30 adults took part in a survey.
They were each asked how much money they spent on lottery tickets last week.
The table shows the results of the survey.

Money (£)	Frequency	
0	5	
2	16	
4	6	
20	2	
30	1	

Work out the mean amount of money the 30 adults spent on lottery tickets.

£ (Total 3 marks)

3. Josh asked 30 adults how many cups of coffee they each drank yesterday.

The table shows his results.

Number of cups	Frequency	
0	5	
1	9	
2	7	
3	4	
4	3	
5	2	

Work out the mean.

.....
(Total 3 marks)

4. Majid carried out a survey of the number of school dinners 32 students had in one week.

The table shows this information.

Number of school dinners	Frequency	
0	0	
1	8	
2	12	
3	6	
4	4	
5	2	

Calculate the mean.

.....
(Total 3 marks)

Attainment Band :	Handling Data and Probability	
	Knowledge and Understanding	Skills
Yellow Plus	Understands how to use inverse operations to solve problems 10*	Can perform reverse calculations using the mean to find missing values 10a/b Calculates a mode from scatter graph 11a Calculates the range from scatter graphs 11b Performs probability calculations with fractions
Yellow	Understands how to read a <u>scattergraph</u> 11* Understands how to find the mean and range from a data set 7c/11b	Completes a Venn diagram 6a Estimates the mean from a grouped frequency table 7b Compares range and mean data 7c
Blue	Finds the midpoints from grouped data 7a Understands mean and range 7c Understands bivariate relationships 8b/9	Calculates probabilities from a sample space diagram 4b/c Calculates probabilities from a two-way table 5a/b Calculates probabilities from <u>venn</u> diagrams 6b/c Describes the correlation of a scatter graph 8a
Green	Knows the more trials the more reliable an experiment 3b Understands mode means most frequent 11a/7	Uses relative frequency to calculate expected outcomes 2b Calculates probability from a table 3a Completes a sample space diagram 4a Finds the modal class from grouped table 7a
White	Knows probabilities sum to 1 2a/12 Can identify odd numbers 4	Marks probability on a number line 1