

# Maths Summer 2

## Year 10 Foundation

### Blended Learning Booklet

Name:

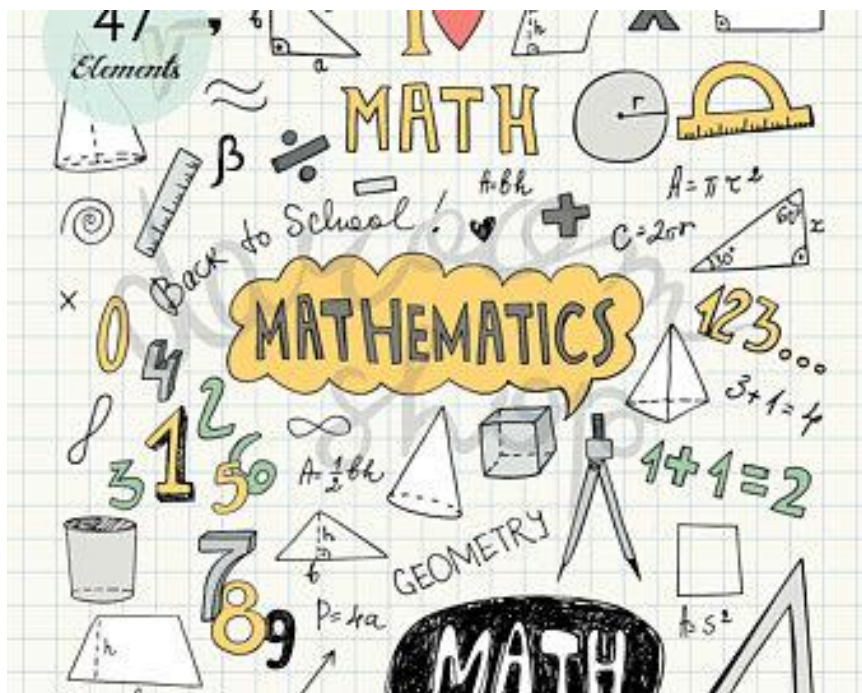
Form:

*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.*



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Page 17 - 23: Week 3 – Tally charts, two-way tables and sample space diagrams

Page 24 - 29: Week 4 – Set notation and Venn Diagrams

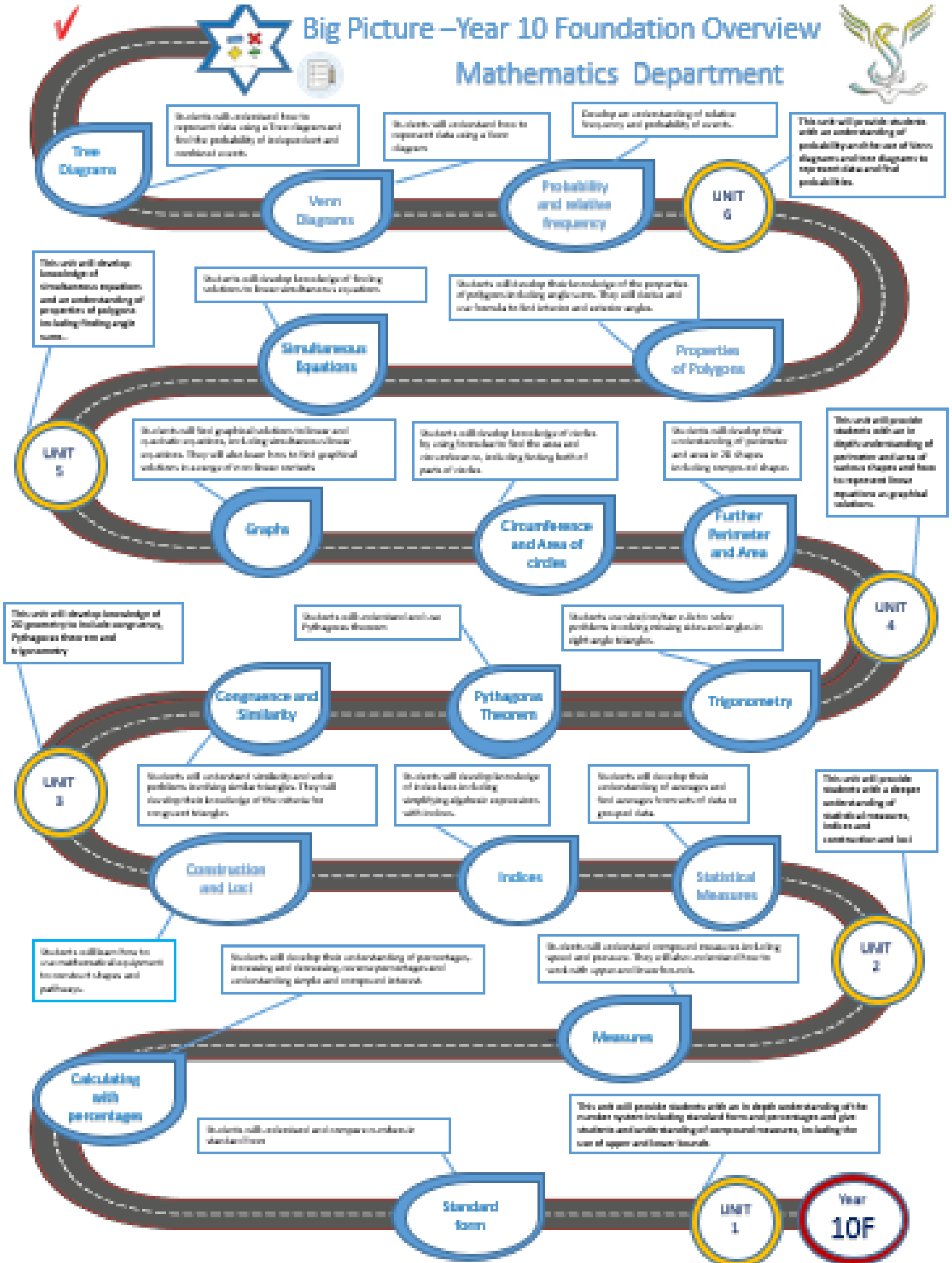
Page 30 - 34-: Week 5 – Frequency and probability trees

Page 35 - 40: Week 6 – More than one outcome and conditional probability

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## Big Picture – Year 10 Foundation Overview Mathematics Department





**Year 10 - Foundation**

**Summer Two**

Relative Frequency, Venn Diagrams, Tree Diagrams

**Revision Guide pages:**

Relative Frequency – 89

Venn Diagrams – 91

Tree Diagrams – 90

**Task 1**

A box contains 7 red and 3 blue pens. A pen is selected at random and removed from the box. A second pen is then selected at random. Use a tree diagram to calculate the probability that exactly one of the pens removed was red.

**Task 2**

A spinner has 3 sectors, X, Y and Z. The table shows the relative frequency for sectors X and Y.

	X	Y	Z
Frequency	0.38	0.15	

Work out the relative frequency for sector Z.

In 40 matches of chess played between player A and player B it is noted that player A won 23 matches. What is the relative frequency of player B winning a match?

A spinner has 3 sectors, A, B and C. The table shows the results of 50 spins.

	A	B	C
Frequency	15		20

Work out the relative frequency for sector B.

A die is rolled in a series of trials. Here are the results.

Score	1	2	3	4	5	6
Frequency	9	5	7	11	2	6

Work out the relative frequency of scoring 5.

**Task 3 – Shade the correct region on each Venn diagram**

$A \cup B$

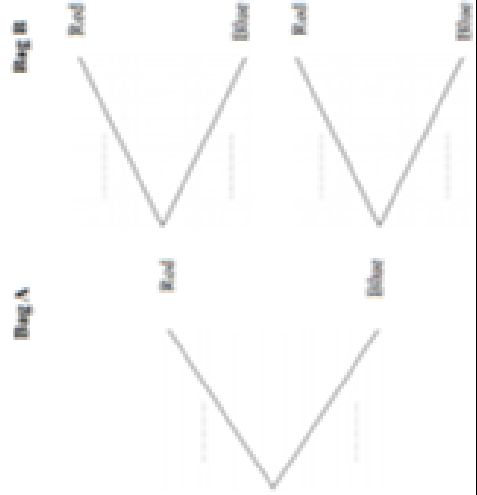
$A' \cup B$

$A' \cap B'$

**Task 4**

Tina has two bags of counters, Bag A and Bag B. There are 5 red counters and 3 blue counters in bag A. There are 4 red counters and 5 blue counters in bag B. Tina takes at random a counter from each bag.

(4) Complete the probability tree diagram.

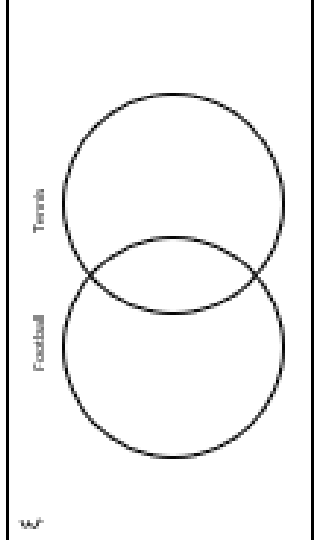


**Task 5**

In a class there are:

- 7 students who play tennis and football
- 8 students who do not play tennis or football
- 12 students who play tennis
- 21 students who play football

Using the Venn diagram, calculate how many students are in the class.



## Week 1:

- LI: I understand that probability can be written as fractions, decimals, or percentages

### Demonstration Videos:

<https://corbettmaths.com/2013/02/15/fractions-to-decimals/>

<https://corbettmaths.com/2013/03/29/fractions-to-percentages/>

<https://corbettmaths.com/2012/08/19/decimals-to-percentages/>

### Tasks: Fractions, Decimals & Percentages

## SPOT the MISTAKE!

Can you find the mistakes?

Correct them when you do!



$\frac{17}{20}$	60%	$\frac{1}{2}$	$\frac{43}{100}$	0.64
$\frac{3}{50}$	$\frac{11}{20}$	0.05	15%	0.06
0.85	55%	30%	$\frac{1}{20}$	0.15
$\frac{7}{25}$	64%	0.5	50%	40%
$\frac{2}{5}$	$\frac{3}{5}$	0.28	0.3	43%

Shade in the values equivalent to :

0.43	$\frac{16}{25}$
0.6	85%
5%	6%
0.55	0.4
28%	$\frac{3}{20}$






What is the missing fraction?

**Challenge:**

Question 2: Convert the following fractions to decimals.

(a)  $\frac{1}{8}$    (b)  $\frac{7}{20}$    (c)  $\frac{5}{8}$    (d)  $\frac{3}{20}$    (e)  $\frac{3}{25}$    (f)  $\frac{7}{8}$

(g)  $\frac{19}{20}$    (h)  $\frac{43}{50}$    (i)  $\frac{1}{3}$    (j)  $\frac{9}{200}$    (k)  $\frac{9}{40}$    (l)  $\frac{13}{20}$

**Exam Practice:****1** Write 0.29 as a percentage.**(1 mark)****2** Write  $\frac{5}{100}$  as a decimal.**(1 mark)****3** Write 0.3 as a percentage.**(1 mark)****4** Write 18% as a decimal.**(1 mark)****5** Write 4% as a decimal.**(1 mark)****6** Write 0.3 as a fraction.**(1 mark)****7** Write  $\frac{2}{5}$  as a decimal.**(1 mark)****8** Write 0.03 as a fraction.**(1 mark)**

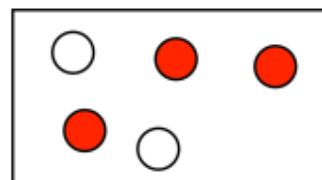
- LI: I can calculate the probability of an outcome
- LI: I understand the most likely event by comparing probabilities

## Demonstration Videos:

<https://corbettmaths.com/2013/06/15/probability>

## Tasks:

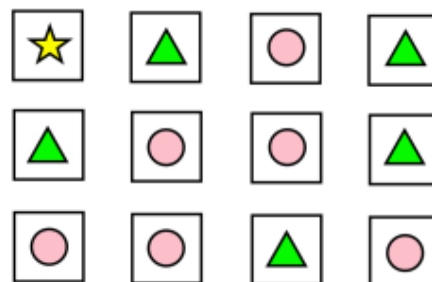
Question 1: Theo has 3 red sweets and 2 white sweets.  
He picks a sweet at random.



- Write down the probability that Theo picks a red sweet.
- Write down the probability that Theo picks a white sweet.

Question 2: Leah has 12 cards, each with a shape on it.  
She takes a card at random.

- What is the probability that Leah takes a card with a star on it?
- What is the probability that Leah takes a card with a triangle on it?
- What is the probability that Leah takes a card with a circle on it?



Question 3: Ralph has 9 cards, each with a number on it.



He picks a card at random.

Write down the probability that the chosen card is

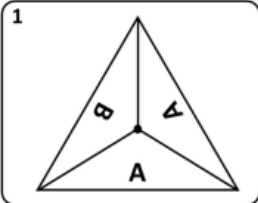
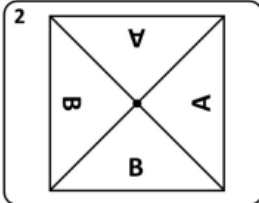
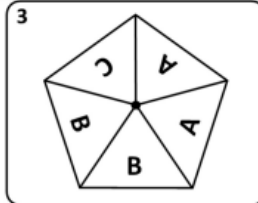
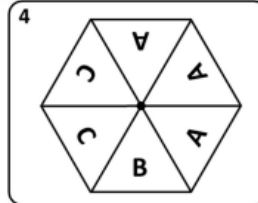
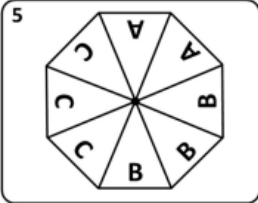
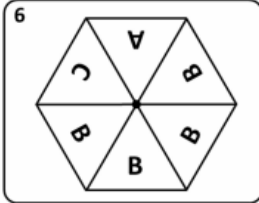
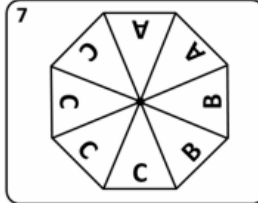
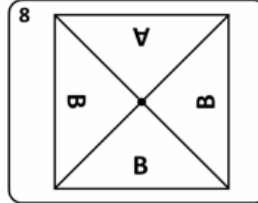
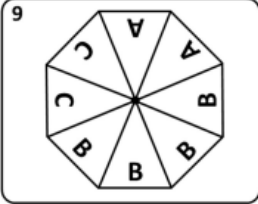
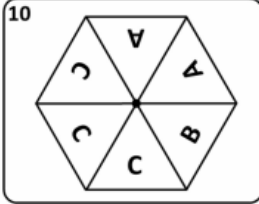
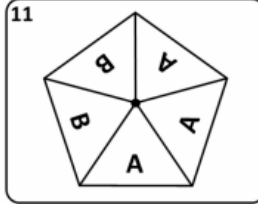
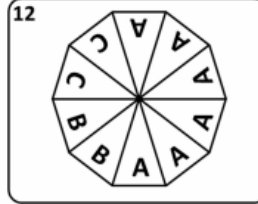
- the number 8
- an even number
- a number less than 7
- a multiple of 4
- a square number
- a prime number

Question 4: Evelyn has 80 pens in a drawer.  
15 pens are black and the other pens are blue.

Evelyn picks a pen at random from the drawer.

- What is the probability that Evelyn picks a black pen?
- What is the probability that Evelyn picks a blue pen?

Question 5 – Match the picture to the probability.

1 	2 	3 	4 
5 	6 	7 	8 
9 	10 	11 	12 
$P(A) = 1/3$	$P(B) = 1/4$	$P(A) = 1/2$	$P(B) = 3/4$
$P(B) = P(C)$	$P(B) = 2/5$	$P(A) = P(C)$	$P(A) = P(B)$
$P(C) = 3/8$	$P(B) = 1/2$	$P(A) = 2/3$	$P(B) = 2/3$

### Challenge:

Question 1: Megan has a fair 6 sided spinner.  
The spinner has the letters A, B and C on it.

The probability that the spinner will land on an A is  $\frac{1}{2}$

The probability that the spinner will land on a C is  $\frac{1}{3}$

Write the letters on the spinner.



Question 2: Elliott has eight numbered cards.



One of the cards is chosen at random.

Elliott says:

The probability of a 8 is  $\frac{1}{4}$

The range of the numbers is 5.

The probability of a number greater than 10 is 0.

The probability of a 7 is  $\frac{1}{2}$

Fill in the six missing numbers.



**Exam Practice:**

- 1** A fair ordinary dice is thrown once. **[1 mark]**

Circle the probability of getting a 2 or a 3

$\frac{1}{6}$        $\frac{2}{6}$        $\frac{3}{6}$        $\frac{5}{6}$

- 2** A fair ordinary dice is thrown once. **[1 mark]**

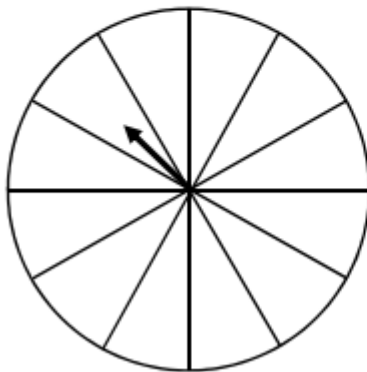
Circle the probability of getting an odd number or a 4

$\frac{1}{6}$        $\frac{2}{6}$        $\frac{3}{6}$        $\frac{4}{6}$

- 3** A fair spinner has 12 equal sections. **[3 marks]**  
 Label each section A, B, C or D so that when the arrow is spun,

the probability it lands on A is  $\frac{1}{6}$

the probability it lands on B is equal to the probability it lands on C  
 the probability it lands on D is double the probability it lands on A.



- 4** Put these probabilities in order, starting with the least likely. **[2 marks]**

50%       $\frac{1}{5}$       0.505       $\frac{3}{4}$

Answer \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

- 5** Put these probabilities in order, starting with the least likely. **[2 marks]**

0.03       $\frac{1}{3}$        $\frac{3}{5}$       30%

Answer \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_

## Week 2:




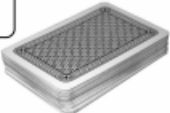

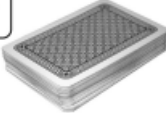
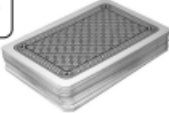
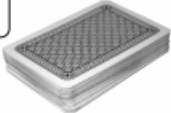
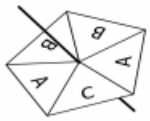

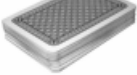

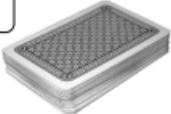

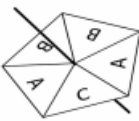
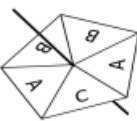
- LI: I can find the probability of an event not happening based on the event happening

### Demonstration Videos:

<https://corbettmaths.com/2013/05/15/probability-of-not-happening/>

### Tasks: -

1. Start in Box 1, decide if the answer is left or down then move to that square. Keep moving to the box with the correct answer.

<p><b>START!</b></p>  <p><math>P(\text{not a } 6) =</math></p>	<p><math>\frac{5}{6}</math></p>  <p><math>P(\text{not more than } 4) =</math></p>	<p><math>\frac{1}{3}</math> In a bag there are 6 green, 12 pink and 9 blue cubes.</p> <p><math>P(\text{not green}) =</math></p>	<p><math>\frac{11}{13}</math> In a bag there are 4 red, 12 black and 2 blue cubes.</p> <p><math>P(\text{not black}) =</math></p>	<p><math>\frac{2}{3}</math> In a bag there are 9 red, 4 black and 2 blue cubes.</p> <p><math>P(\text{not red}) =</math></p>
<p><math>\frac{3}{6}</math></p>  <p><math>P(\text{not more than } 3) =</math></p>	<p><math>\frac{2}{3}</math></p>  <p><math>P(\text{not a king}) =</math></p>	<p><math>\frac{7}{9}</math></p>  <p><math>P(\text{not grey or black}) =</math></p>	<p><math>\frac{9}{13}</math></p>  <p><math>P(\text{not ace or queen}) =</math></p>	<p><math>\frac{5}{12}</math></p>  <p><math>P(\text{not } 9 \text{ or } 7) =</math></p>
<p><math>\frac{4}{5}</math></p>  <p><math>P(\text{not a queen}) =</math></p>	<p><math>\frac{12}{13}</math></p>  <p><math>P(\text{not B}) =</math></p>	<p><math>\frac{4}{9}</math></p>  <p><math>P(\text{not grey}) =</math></p>	<p><math>\frac{3}{8}</math></p>  <p><math>P(\text{not black and not less than } 4) =</math></p>	<p><math>\frac{10}{26}</math></p>  <p><math>P(\text{not black}) =</math></p>
<p><math>\frac{3}{5}</math></p>  <p><math>P(\text{not a face card}) =</math></p>	<p><math>\frac{10}{13}</math></p>  <p><math>P(\text{not white}) =</math></p>	<p><math>\frac{3}{9}</math></p>  <p><math>P(\text{not vowel}) =</math></p>	<p><math>\frac{7}{8}</math></p>  <p><math>P(\text{not A}) =</math></p>	<p><b>FINISH!</b></p>

Question 5: Leon throws a biased coin.  
The probability of getting tails is 0.4  
Work out the probability of getting heads.



Question 6: Edith plants a daffodil bulb.  
The probability that the bulb will grow is 0.8  
What is the probability that the bulb will **not** grow?

Question 7: Wycombe Wanderers play a match of football.  
The probability that they win the match is 0.28  
The probability that they draw the match is 0.55  
Work out the probability that they lose the match.

## Challenge:

- Question 12: Frederick organises a raffle for his school fayre.  
 The top prize is a ride in a hot air balloon, which will be won by 1 ticket.  
 Altogether Frederick sells 700 raffle tickets.  
 Miss Robinson buys 5 tickets for the raffle.



Work out the probability that Miss Robinson does **not** win.

- Question 14: A bag contains 600 coloured counters.  
 The counters are yellow, brown or orange.  
 There are 117 yellow counters in the bag.  
 The probability that a brown counter is chosen from the bag is 0.35

Calculate the number of orange counters in the bag.

## Exam Practice:

- 1 The probability a new laptop has a fault is 0.014  
 What is the probability that a new fridge does **not** have a fault?

.....  
**(Total for Question 1 is 1 mark)**

- 2 The probability a new kettle has a fault is 0.012  
 What is the probability that a new kettle does **not** have a fault?

.....  
**(Total for Question 2 is 1 mark)**

- 3 The probability a new TV does **not** have a fault is 0.965  
 What is the probability that a new TV does have a fault?

.....  
**(Total for Question 3 is 1 mark)**

- 4 The probability that A is the outcome of an experiment is 0.3  
 Circle the probability that A is **not** the outcome.  
**[1 mark]**

0.07      0.3      0.7      0

- 5 The probability that A is the outcome of an experiment is 0.85  
 Circle the probability that A is **not** the outcome.  
**[1 mark]**

0.05      15      0.85      0.15

- LI: I understand that all probabilities sum to one

Demonstration Videos:

<https://corbettmaths.com/2013/06/15/probability/>

Tasks: -

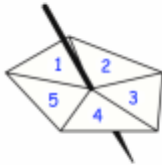
Question 7: Wycombe Wanderers play a match of football.  
The probability that they win the match is 0.28  
The probability that they draw the match is 0.55  
Work out the probability that they lose the match.

Question 8: Evelyn has 80 pens in a drawer.  
15 pens are black and the other pens are blue.

Evelyn picks a pen at random from the drawer.

- (a) What is the probability that Evelyn picks a black pen?  
(b) What is the probability that Evelyn picks a blue pen?

Question 11: Darcy has a biased spinner.  
A spinner has sections labelled 1, 2, 3, 4 and 5.  
The table below shows information about some of the probabilities



Number	1	2	3	4	5
Probability	x	0.15	0.05	0.2	0.35

Work out the value of x.

Challenge

Question 10: There are only pink, yellow, green and blue counters in a bag.  
The table shows the probability that a counter taken at random from the bag will be pink, green or blue.

Colour	Pink	Yellow	Green	Blue
Probability	0.5		0.1	0.2

- (a) Work out the probability that the counter taken is yellow

There are 40 counters in the bag.

- (b) Work out the number of blue counters in the bag.

**Exam Practice:**

- 1** A train can be early, on time or late.

The probability that the train is early is 0.2  
 The probability that the train is on time is 0.7

Work out the probability that the train is late.

**[2 marks]**

- 2** There are some buttons in a bag.  
 The counters are yellow, or red, or blue, or green.  
 Bridgette is going to take at random a button from the bag.  
 The table shows each of the probabilities that the button will be blue or green.

<b>Colour</b>	yellow	red	blue	green
<b>Probability</b>			0.35	0.45

There are 21 blue buttons in the bag.

The probability that the button Bridgette takes will be yellow is three times the probability that the counter will be red.

- (a) Work out the number of yellow counters in the bag.

.....  
 (4)

A cube is going to be taken at random from a bag of cubes.  
 The probability that the cube will be black is 0.5

There must be an even number of cubes in the box.

- (b) Explain why.

.....  
 .....  
 .....

(1)

**(Total for Question 1 is 5 marks)**



# Stewards Academy

- LI: I can calculate relative frequency using probability from an experiment
- LI: I can understand biased results

## Demonstration Videos:

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

## Tasks:

Question 1: Leo plants and grows 50 flowers.  
The table shows information about the colours.

Colour	Red	Yellow	White
Frequency	16		28
Relative Frequency	0.32		

(a) Copy and complete the table.

Altogether, Leo grows 125 flowers.

(b) How many flowers would you expect to be yellow?

Question 2: A coin is thrown 30 times.  
The coin lands on tails 20 times.  
What is the relative frequency of the coin landing on tails?

Question 3: A dice is rolled 50 times.  
It lands on six 37 times.  
(a) Write down the relative frequency of the dice landing on a six.

Robyn says "the dice is biased towards landing on a six."  
(b) Do you think the dice is biased? Explain your answer.

Question 4: Jessica wants to test if a coin is biased.  
She throws the coin 24 times.

T T H H T H H H T H T T  
T H H T T H H T H H H T

(a) Complete the relative frequency table.

	Heads	Tails
Relative frequency		

(b) Do you think the coin is biased? Explain your answer.

Question 5: A biased dice is rolled is rolled 30 times.



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

(a) Complete the relative frequency table

Number	1	2	3	4	5	6
Relative Frequency						

(b) Do you think the dice is biased? Explain your answer.



# Stewards Academy

Question 6: Esme takes the bus to university 40 times during a term.  
The relative frequency of the bus being late is 0.3.  
How many times was the bus late?

Question 7: Katie rolls a dice 100 times.  
The table shows the results

Number	1	2	3	4	5	6
Frequency	22	9	14	31	19	5

Work out the relative frequency of throwing:

- (a) An even number      (b) A square number      (c) A prime number  
(d) A cube number      (e) A multiple of 3      (f) A factor of 18

Question 8: Martin and Laura want to estimate how many green jelly beans are in a tub of 600 jelly beans.  
A trial consists of taking a jelly bean at random, noting the colour and replacing the jelly bean into the tub.

	Number of trials	Number of green jelly beans chosen
Martin	30	4
Laura	150	12

- (a) Write down the relative frequency of Martin taking a green jelly bean.  
(b) Write down the relative frequency of Laura taking a green jelly bean.  
(c) Whose experiment gives the more reliable estimate of the number of green jelly beans in the tub? Give a reason for your answer.  
(d) How many green jelly beans do you expect to be in tub altogether?

## Challenges:

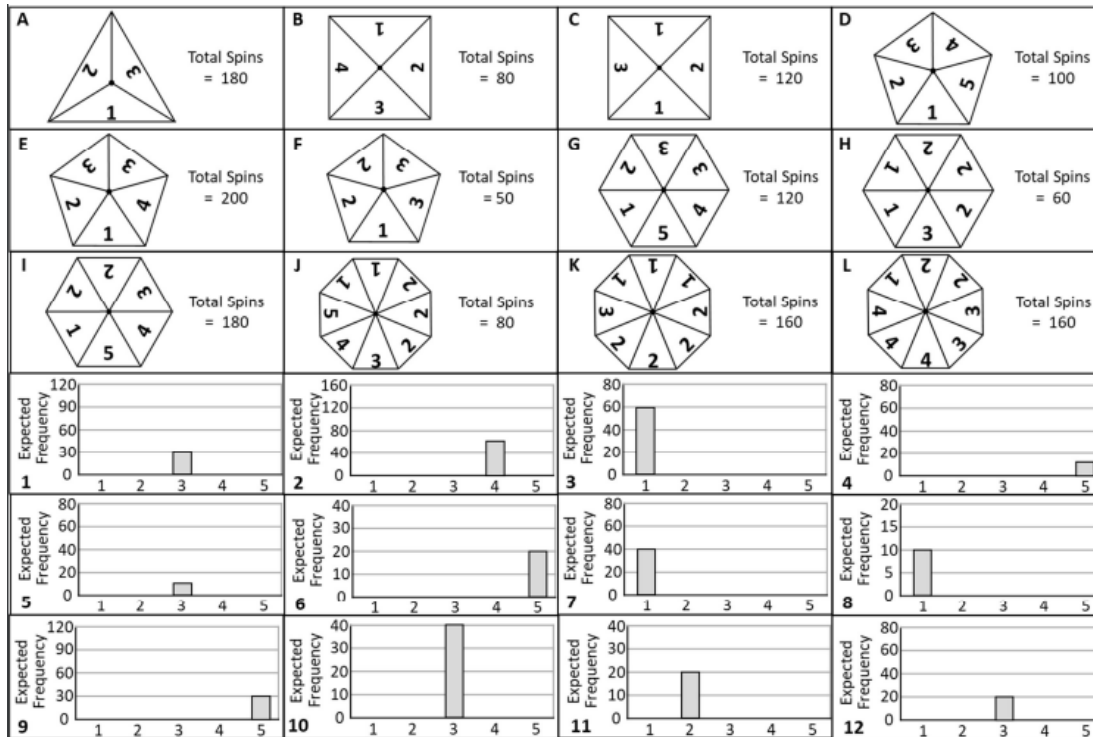
Question 1: An ordinary coin is thrown 50 times.  
Barry says "I am going to get heads 25 times and tails 25 times."  
Explain why he could be wrong.

Question 2: Four students have each written a 2000 word essay.  
The spellings are checked for all four students.  
The relative frequencies of a spelling mistake for the 4 students are:

Student	Alan	Beryl	Connie	Diego
Relative Frequency	0.032	0.01	0.009	0.017

Work out the mean number of spelling mistakes made by the four students.

Question 4: A coin lands on heads 300 times.  
The relative frequency of heads is 0.6  
Work out the number of times the coin was flipped.



### Exam Practice:

- 13** A biased spinner can land on 1, 2, 3 or 4.  
The table shows the probabilities that the spinner will land on 2 and 4.

<b>Number</b>	1	2	3	4
<b>Probability</b>		0.32		0.17

The probability that the spinner will land on 1 is **twice** the probability that the spinner will land on 3.

- (a) Complete the table. (2)

Johnny is going to spin the spinner 200 times.

- (b) Work out an estimate for the number of times the spinner will land on 2. (2)

**(4 marks)**

- 14** The table shows the probabilities that a biased dice will land on 1, on 2, on 3, on 5 and on 6.

<b>Number</b>	1	2	3	4	5	6
<b>Probability</b>	0.14	0.2	0.08		0.13	0.21

The dice is rolled 200 times.

Work out an estimate for the number of times the dice will land on 2 or on 4.

**(3 marks)**



## Week 3:

- LI: I can use methods to record probability; tally, two-way table, sample space diagram

### Demonstration Videos:

<https://corbettmaths.com/2012/08/10/two-way-tables/>  
<https://corbettmaths.com/2013/05/07/tally-charts-corbettmaths/>  
<https://corbettmaths.com/2013/05/04/listing-outcomes/>  
<https://corbettmaths.com/2013/06/18/sample-space-diagrams/>

### Tasks: Using Tally charts

Question 2: Dara has recorded how many tries he scored in 25 rugby matches  
Copy and complete the tally chart

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

Number of tries	Tally	Frequency
0		
1		
2		
3		

Question 3: Isabelle is creating a tally chart.  
Complete the tally chart for her.

Day	Tally	Frequency
Monday		12
Tuesday		
Wednesday		7
Thursday		
Friday		10

Question 4: Jessica rolls a dice 30 times and records the scores.

- Draw a tally chart to show her results
- Which score was the most common?
- Do you think the dice was fair?

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

Question 7: Thomas records the ages of people at a party.

Age	Tally	Frequency
21 - 30		
31 - 40		
41 - 50		
51 - 60		
61 - 70		

- Complete the tally chart
- How many people when to the party?
- How many people were 40 years or younger?
- Thomas says the oldest person was 70. Explain why he might not be correct.

## Tasks: Creating Two Way Tables

1) Complete the two-way table.



		Shape		
		Square	Circle	Total
Colour	Black	4		
	White	3		
	Total			

- How many shapes are there in total?
- How many squares are there?
- How many black squares are there?

## Question 2

Complete the two way tables below and decide if the statement is true or false

<p><b>A</b> 30 adults &amp; 30 children were asked if they preferred movies or documentaries.</p> <table border="1"> <thead> <tr> <th></th> <th>Movie</th> <th>Doc.</th> <th></th> </tr> </thead> <tbody> <tr> <th>Adults</th> <td>12</td> <td>18</td> <td></td> </tr> <tr> <th>Children</th> <td>20</td> <td>11</td> <td></td> </tr> <tr> <th>Total</th> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Movie	Doc.		Adults	12	18		Children	20	11		Total				<p><b>B</b> Adults &amp; children were asked if they played sport or went to the gym.</p> <table border="1"> <thead> <tr> <th></th> <th>Sport</th> <th>Gym</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Adults</th> <td>9</td> <td></td> <td></td> </tr> <tr> <th>Children</th> <td></td> <td>8</td> <td></td> </tr> <tr> <th>Total</th> <td>24</td> <td></td> <td>49</td> </tr> </tbody> </table> <p>17 adults went to the gym.</p>		Sport	Gym	Total	Adults	9			Children		8		Total	24		49	<p><b>C</b> 20 Year 8 &amp; 20 Year 9 students were asked about the number of siblings they had.</p> <table border="1"> <thead> <tr> <th></th> <th>0</th> <th>1</th> <th>2</th> <th>3</th> </tr> </thead> <tbody> <tr> <th>Year 8</th> <td>7</td> <td></td> <td></td> <td></td> </tr> <tr> <th>Year 9</th> <td></td> <td>3</td> <td>4</td> <td>1</td> </tr> <tr> <th>Total</th> <td>19</td> <td>10</td> <td></td> <td>4</td> </tr> </tbody> </table> <p>6 Year 8 students had 2 or more siblings.</p>		0	1	2	3	Year 8	7				Year 9		3	4	1	Total	19	10		4																												
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Total	19	10		4																																																																														
<p><b>D</b> 60 people were asked if they preferred watching football or athletics.</p> <table border="1"> <thead> <tr> <th></th> <th>Football</th> <th>Athletics</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Children</th> <td>17</td> <td></td> <td>19</td> </tr> <tr> <th>Adults</th> <td></td> <td>18</td> <td></td> </tr> <tr> <th>Total</th> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><math>\frac{1}{3}</math> of the people preferred watching football.</p>		Football	Athletics	Total	Children	17		19	Adults		18		Total				<p><b>E</b> Year 9 &amp; Year 10 students were asked about how they got to school.</p> <table border="1"> <thead> <tr> <th></th> <th>Walk</th> <th>Bus</th> <th>Cycle</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Year 9</th> <td>6</td> <td>12</td> <td></td> <td>26</td> </tr> <tr> <th>Year 10</th> <td>3</td> <td></td> <td>7</td> <td></td> </tr> <tr> <th>Total</th> <td></td> <td></td> <td></td> <td>51</td> </tr> </tbody> </table> <p><math>\frac{3}{5}</math> of the Year 10s took the bus to school.</p>		Walk	Bus	Cycle	Total	Year 9	6	12		26	Year 10	3		7		Total				51	<p><b>F</b> Adults &amp; Children gamers were asked what platform they play on.</p> <table border="1"> <thead> <tr> <th></th> <th>PC</th> <th>Console</th> <th>Phone</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Adults</th> <td>10</td> <td>10</td> <td></td> <td>25</td> </tr> <tr> <th>Children</th> <td>5</td> <td></td> <td>15</td> <td>45</td> </tr> <tr> <th>Total</th> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><math>\frac{4}{7}</math> of the console players were children.</p>		PC	Console	Phone	Total	Adults	10	10		25	Children	5		15	45	Total																												
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<p><b>G</b> Year 7 &amp; Year 8 students were asked which dish they had for lunch.</p> <table border="1"> <thead> <tr> <th></th> <th>Pasta</th> <th>Pie</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Year 7</th> <td>11</td> <td>14</td> <td></td> </tr> <tr> <th>Year 8</th> <td>7</td> <td>16</td> <td></td> </tr> <tr> <th>Total</th> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><math>\frac{5}{8}</math> of the students had Pie.</p>		Pasta	Pie	Total	Year 7	11	14		Year 8	7	16		Total				<p><b>H</b> Year 9 &amp; Year 10 students were asked about what they drank with their lunch.</p> <table border="1"> <thead> <tr> <th></th> <th>Juice</th> <th>Soda</th> <th>Other</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Year 9</th> <td>7</td> <td>7</td> <td></td> <td>22</td> </tr> <tr> <th>Year 10</th> <td></td> <td>6</td> <td></td> <td>28</td> </tr> <tr> <th>Total</th> <td>20</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>34% of the students didn't have Juice or Soda.</p>		Juice	Soda	Other	Total	Year 9	7	7		22	Year 10		6		28	Total	20				<p><b>I</b> People were asked how they stayed healthy.</p> <table border="1"> <thead> <tr> <th></th> <th>Gym</th> <th>Run</th> <th>Cycle</th> <th>N/A</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Adults</th> <td>13</td> <td></td> <td>5</td> <td></td> <td></td> </tr> <tr> <th>Children</th> <td></td> <td>7</td> <td></td> <td>2</td> <td></td> </tr> <tr> <th>Total</th> <td>15</td> <td>21</td> <td>14</td> <td>10</td> <td></td> </tr> </tbody> </table> <p>Proportionally, more adults went to the gym than children went running.</p>		Gym	Run	Cycle	N/A	Total	Adults	13		5			Children		7		2		Total	15	21	14	10																					
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## Tasks: Probability from two-way tables

1) After school on Tuesday,

14 Year 9s played football. 12 Year 9s played basketball.  
17 Year 10s played football. 11 Year 10s played basketball.



Complete the two-way table with this information

	Football	Basketball	Total
Year 9			
Year 10			
Total			

- How many students played Basketball?
- How many students were there in total?
- If a student was picked at random, what is the probability they play Basketball? (express your answer as a fraction)

2) 60 students were asked if they prefer Maths, Science or English.

Complete the two-way table.

	Maths	Science	English	Total
Year 7	12	8		
Year 8	11		10	35

- If a student was picked at random, what is:  
 $P(\text{They prefer Maths})$ ?
- If we picked **only from** Year 7s, what is:  
 $P(\text{They prefer English})$ ?

3) 40 adults & 50 children people were asked how they prefer to keep fit.

Complete the two-way table.

	Running	Gym	Sport	N/A	
Adults	17	10		4	
Children		6	21		
Total	37				

- From everyone, what is  $P(\text{They prefer to play sport})$ ?
- From only those that prefer going to the gym, what is  $P(\text{Adult})$ ?

5) Children under 13, Teenagers, Adults & Pensioners were asked how much money they spend a day on snacks

	0-99p	£1-1.99	£2+	Total
Child (<13)		4		14
Teenager	4	8	2	
Adult	5			
Pensioner		5	4	11
Total	14	22		50

- Find  $P(\text{A person who spends } \pounds 2 \text{ or more a day})$
- Find  $P(\text{A teenager who spends more than } \pounds 1 \text{ per day})$
- From those older than 12,  $P(\text{A person who spends less than } \pounds 2 \text{ per day})$



## Challenges:

Question 1: Each student at a school studies one language.  
The tally chart shows the languages that a group of 20 students study.

(a) What percentage of the students study Spanish?

(b) What fraction of the students study French?

A student is selected at random.

(c) What is the probability that the student studies German?

Language	Tally
French	
German	
Latin	
Spanish	

Question 2: 60 people visited a swimming pool one evening.  
13 out of the 19 people who wore goggles were adults.  
There were 15 children.

(a) Complete a two-way table for this information.

(b) How many adults did not wear goggles?

(c) What fraction of the children wore goggles?

Question 3: 100 families booked a holiday in July or in August, at a travel agents.  
Some of the families booked to go to France.  
Some booked to go to Spain.  
The rest of the families booked a holiday to Portugal.

59 families booked to go on holiday in August.

19 of the 35 families going to France booked to go in July.

30 families booked to go to Portugal.

20 families booked to go to Spain in August.

(a) Create a two-way table for this information.

(b) How many families booked to go to Portugal in July?

Question 6: Isla has a box of counters.  
The table shows information about the shape and colours of the counters.

		Shape		
		Circle	Triangle	Square
Colour	Blue	6	2	5
	Red	8	9	11

Isla picks a counter at random, looked at it and then returned it to the box.

(a) Given it is a circular counter, what is the probability that it was red?

David picks a counter at random, looked at it and then returned it to the box.

(b) Given it is a blue counter, what is the probability that it was triangular?

Emily adds a number of red square counters to the box.

The probability of Emily picking a red square at random is now  $\frac{2}{3}$

(c) How many red square counters did Emily add to the box?

**Exam Practice:**

- 1 The two way table gives information about how 100 students travelled to school.

	Walk	Car	Other	Total
Boys	15			52
Girls		22	8	
Total			19	100

- (a) Copy and complete the two way table. (3)

One of the students is picked at random.

- (b) Write down the probability they walk to school. (1)

**(4 marks)**

- 4 There are 170 students in year 7 at a school.  
All of these students either walk to school, get the bus to school or cycle to school.

82 of the students are boys.

33 of the students get the bus to school.

19 of the 41 students that walk to school are boys.

56 girls cycle to school.

Copy and complete the two way table.

	Walk	Bus	Cycle	Total
Boys				
Girls				
Total				

**(3 marks)**

- 6 100 students attended a revision lesson at the weekend.

Each student went to Maths or English or Science.

55 of these students attended on Saturday.

Over the weekend a total of 40 students went to Maths.

12 of the 27 students that went to Science went on Sunday.

10 students went to English on Saturday.

How many students went to the Maths revision lesson on Saturday?

**(4 marks)**

- 9 Two different schools, school A and school B, attended a conference.

12% of the attendees were teachers, the rest were students.

47% of the attendees were from school A.

48% of the attendees were **students** from school B.

One of the attendees is selected at random.

Find the probability that they are a teacher from school A.

**(4 marks)**

- LI: I can draw a sample space diagram and list possible probabilities

## Demonstration Videos:

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

## Tasks:

Question 2: Two fair six sided dice are rolled.  
The numbers on the two dice are **multiplied** together to give a score.

(a) Complete the table to show all possible scores.

(b) Write down the probability

(i) 10      (ii) 9      (iii) 12      (iv) 8

(c) Write down the probability of scoring

(i) an even number      (ii) an odd number

(iii) a number less than 20

		Dice 1					
		1	2	3	4	5	6
Dice 2	x						
	1						
	2						
	3						
	4						
	5						
6							

Question 4: Rose is playing a game with a fair six sided dice and a fair coin.  
She rolls the dice and flips the coin.

If the coin lands on heads, her score is **one less** than the number on the dice.

If the coin lands on tails, her score is **two more** than the number on the dice

(a) Complete the table to show all possible scores

(b) Find the probability of scoring a 0

(c) Find the probability of scoring a 5

(d) Find the probability of scoring a number less than 4

(e) Find the probability of scoring a square number

		Dice					
		1	2	3	4	5	6
Coin	Heads						
	Tails						

Question 5: Two fair spinners are spun.  
Spinner 1 has four equal sections labelled 1, 2, 3 and 4.  
Spinner 2 has three equal sections labelled 1, 2 and 3.  
Each spinner is spun once.  
The score is the **difference** between the numbers



Spinner 1



Spinner 2

(a) Complete the table to show all possible scores

(b) Find the probability of scoring a 1

(c) Find the probability of scoring a 2 or more

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

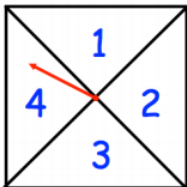
## Challenges:

Complete the sample space diagrams and decide if the probabilities are true or false

<p><b>A</b> Two coins are flipped.</p> <table border="1"> <tr><td></td><td>H</td><td>T</td></tr> <tr><td>H</td><td>HH</td><td>HT</td></tr> <tr><td>T</td><td></td><td></td></tr> </table> <p>P (Tails &amp; Tails) = 0.25</p>		H	T	H	HH	HT	T			<p><b>B</b> Two coins are flipped.</p> <table border="1"> <tr><td></td><td>H</td><td>T</td></tr> <tr><td>H</td><td></td><td></td></tr> <tr><td>T</td><td></td><td></td></tr> </table> <p>P (At least 1 Tails) = 0.5</p>		H	T	H			T			<p><b>C</b> A coin is flipped &amp; a dice is thrown.</p> <table border="1"> <tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr> <tr><td>H</td><td>H, 1</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>T</td><td>T, 1</td><td></td><td></td><td></td><td></td><td></td></tr> </table> <p>P (Tails &amp; Odd) = 1/4</p>		1	2	3	4	5	6	H	H, 1						T	T, 1																																																			
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<p><b>D</b> Two 4-sided spinners are spun &amp; their scores added.</p> <table border="1"> <tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>1</td><td>2</td><td></td><td></td><td></td></tr> <tr><td>2</td><td>3</td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td></tr> </table> <p>P (6) = 4/16</p>		1	2	3	4	1	2				2	3				3					4					<p><b>E</b> Two 4-sided spinners are spun &amp; their scores multiplied.</p> <table border="1"> <tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>1</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>2</td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td></tr> </table> <p>P (More than 4) = 11/16</p>		1	2	3	4	1	1	2	3	4	2					3					4					<p><b>F</b> A 6-sided dice and a 4-sided spinner: scores added.</p> <table border="1"> <tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr> <tr><td>1</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td>3</td><td>4</td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> <p>P (7 or less) = 0.75</p>		1	2	3	4	5	6	1	2	3					2	3	4					3							4						
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## Exam Practice:

Jordan is playing a game with a fair four sectioned spinner and a fair coin.



(b) Write down the probability that Jordan gets a score of

(i) 4

.....  
(1)

(ii) 5 or more

.....  
(2)

He spins the spinner and flips the coin.

If the coin lands on heads, his score is **one more** than the number on the spinner.

If the coin lands on tails, his score is the number on the spinner **doubled**.

(iii) a prime number

.....  
(2)

(a) Complete the table to show all the possible shows that Jordan can get.

		Spinner			
		1	2	3	4
Coin	Heads				
	Tails				

(2)

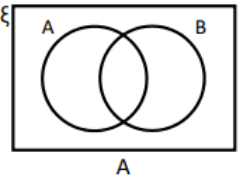
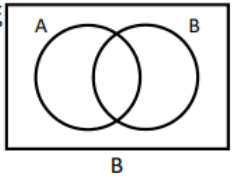
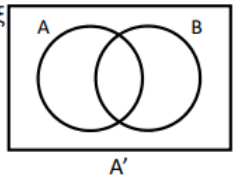
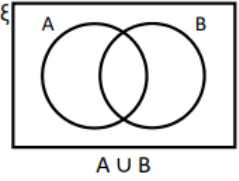
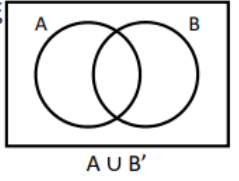
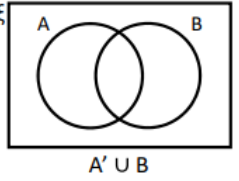
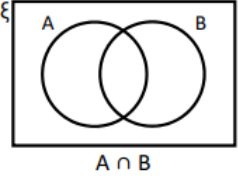
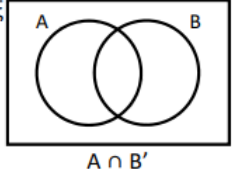
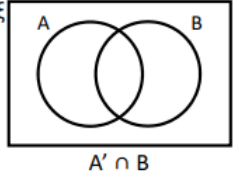
**Week 4:**

- LI: I understand Venn diagram notation

**Demonstration Videos:**

<https://www.youtube.com/watch?v=h0aEMCj2a8o>  
<https://corbettmaths.com/2019/03/27/set-notation/>

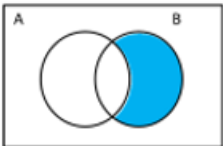
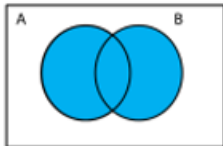

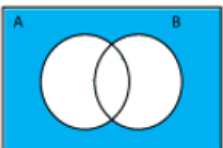
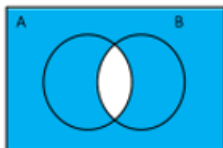
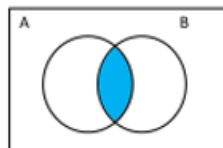
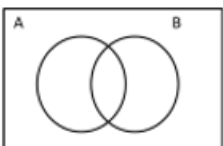
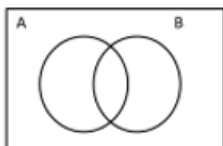
**Tasks:**

<b>Complement: ' </b>	<b>Intersection: <math>\cap</math></b>	<b>Union: <math>\cup</math></b>
The <u>opposite</u> of a set. $B' =$ everywhere not in B	The <u>overlap</u> of regions. $A \cap B =$ everywhere A and B overlap	The <u>sum</u> of regions. $A \cup B =$ A added to B
		
$A$	$B$	$A'$
		
$A \cup B$	$A \cup B'$	$A' \cup B$
		
$A \cap B$	$A \cap B'$	$A' \cap B$

Match the following probabilities to the Venn diagram that represents them.

For the remaining two, shade in the spare Venn diagrams to represent these probabilities.

- $P(A \cap B)$
- $P(A \cup B)$
- $P(A' \cap B)$
- $P(A' \cup B)$
- $P(A \cap B')$
- $P(A \cup B')$
- $P(A' \cap B')$
- $P(A' \cup B')$



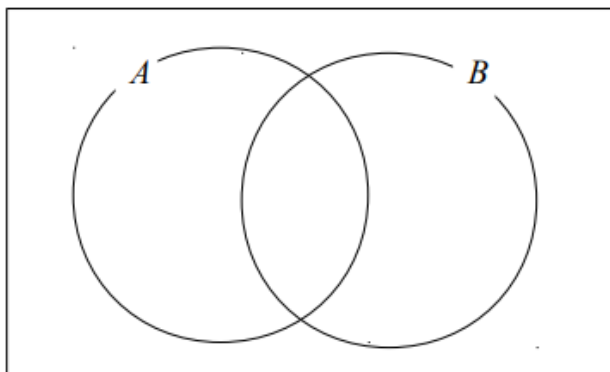
## Challenges:

Draw a Venn diagram for each set and decide if the set notation statement is true or false.

<b>1</b> $\xi = \{1 \text{ to } 20 \text{ Inclusive}\}$ $A = \{\text{Square Numbers}\}$ $B = \{\text{Odd Numbers}\}$ $A \cap B = \{1, 9\}$	<b>2</b> $\xi = \{1 \text{ to } 30 \text{ Inclusive}\}$ $A = \{\text{Cube Numbers}\}$ $B = \{\text{Square Numbers}\}$ $A \cup B = \{1, 4, 8, 9, 16, 25, 27\}$	<b>3</b> $\xi = \{3, 5, 8, 9, 10, 12, 14\}$ $A = \{3, 5, 9, 12\}$ $B = \{5, 8, 10, 14\}$ $A \cap B = \{3, 5, 9, 12\}$	<b>4</b> $\xi = \{1 \text{ to } 10 \text{ Inclusive}\}$ $A = \{\text{Even Numbers}\}$ $B = \{\text{Odd Numbers}\}$ $A' = \{1, 3, 5, 7, 9\} = B$
<b>5</b> $\xi = \{15 \text{ to } 20 \text{ Inclusive}\}$ $A = \{\text{Odd Numbers}\}$ $B = \{\text{Square Numbers}\}$ $B' = \{15, 17, 18, 19\}$	<b>6</b> $\xi = \{0, 4, 6, 7, 8, 11, 14\}$ $A = \{4, 7, 8\}$ $B = \{0, 4, 11\}$ $A \cup B = \{0, 4, 7, 8, 11\}$	<b>7</b> $\xi = \{\text{INTELLIGENT}\}$ $A = \{\text{Vowels}\}$ $B = \{\text{IITLLEE}\}$ $A \cup B = \{\text{ITLLIT}\}$	<b>8</b> $\xi = \{\text{MISSISSIPPI}\}$ $A = \{\text{MSSSS}\}$ $B = \{\text{IIII}\}$ $(A \cup B)' = \{\text{PP}\}$
<b>9</b> $\xi = \{1 \text{ to } 20 \text{ Inclusive}\}$ $A = \{\text{Prime Numbers}\}$ $B = \{\text{Odd Numbers}\}$ $A \cap B = \{1, 3, 5, 7, 11, 13, 17, 19\}$	<b>10</b> $\xi = \{\text{MAXIMUM}\}$ $A = \{\text{MAX}\}$ $B = \{\text{Vowels}\}$ $A' \cap B' = \{\text{MM}\}$	<b>11</b> $\xi = \{25, 28, 31, 44, 45, 48\}$ $A = \{\text{Numbers} > 30\}$ $B = \{\text{Numbers} < 40\}$ $A = \{31, 44, 45, 48\}$	<b>12</b> $\xi = \{0 \text{ to } 20 \text{ Inclusive}\}$ $A = \{\text{Even Numbers}\}$ $B = \{\text{Factors of } 24\}$ $B = \{2, 3, 6, 8, 12\}$
<b>13</b> $\xi = \{\text{GIRAFFE}\}$ $A = \{\text{GRAFF}\}$ $B = \{\text{IE}\}$ $A \cap B = \{ \}$	<b>14</b> $\xi = \{1 \text{ to } 20 \text{ Inclusive}\}$ $A = \{\text{Factors of } 18\}$ $B = \{\text{Odd Numbers}\}$ $A \cap B' = \{1, 3, 9\}$	<b>15</b> $\xi = \{1 \text{ to } 10 \text{ Inclusive}\}$ $A = \{3, 5, 6, 8, 10\}$ $B = \{2, 4, 5, 8, 9\}$ $A' \cup B = \{1, 2, 4, 5, 7, 8, 9\}$	<b>16</b> $\xi = \{\text{ELEPHANT}\}$ $A = \{\text{Consonants}\}$ $B = \{\text{EELPAT}\}$ $A \cap B = \{\text{LPHNT}\}$

## Exam Practice:

For each of the following questions draw the Venn Diagram below



- 2 Shade the region that represents  $(A \cap B)$   


---

**(1 mark)**
- 3 Shade the region that represents  $(A \cup B)$   


---

**(1 mark)**
- 4 Shade the region that represents  $(A' \cap B')$   


---

**(1 mark)**
- 5 Shade the region that represents  $(A' \cup B)$   


---

**(1 mark)**
- 6 Shade the region that represents  $(A \cap B')$   


---

**(1 mark)**

- LI: I understand how a Venn diagram shows the probability of two events occurring at the same time

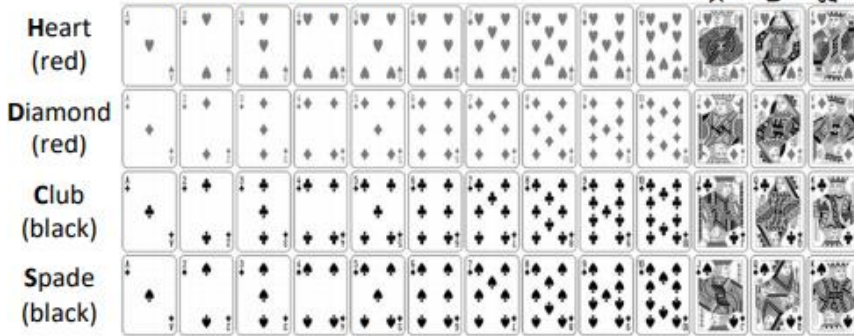
**Demonstration Videos:**

<https://corbettmaths.com/2016/08/07/venn-diagrams/>  
<https://www.mathsgenie.co.uk/venn-diagrams.html>

**Tasks:**

**Pack of Venns**

A complete pack of cards:



Complete each Venn diagram with totals.

a) King Black	b) Red Value of 9
c) Spade Jack	d) Queen Heart
e) Black Number	f) Club Face Card
g) Even Red	h) Diamond Odd
i) Lower than 5 Spade	j) Prime Black

Complete the Venn diagram for each set and decide if the statement is true or false

<b>A</b> 12 had a dog (D) 11 had a cat (C) <p>4 had a dog and a cat</p>	<b>B</b> 16 had a fish (F) 14 had a dog (D) <p>5 only had a dog</p>	<b>C</b> 13 studied maths (M) 4 studied maths & drama (D) <p>8 only studied drama</p>	<b>D</b> 15 studied science (S) 11 studied art (A) <p>9 didn't study science or art</p>
<b>E</b> 15 played football (F) 12 played netball (N) <p>6 played neither</p>	<b>F</b> 20 played rugby (R) 15 swam (S) <p>9 played rugby and swam</p>	<b>G</b> 14 ate pizza (P) 11 drank water (W) <p>8 had neither pizza or water</p>	<b>H</b> 24 ate pasta (P) 8 drank soda (S) <p>22 didn't drink soda</p>
<b>I</b> 10 played on phone (P) 11 played on console (C) <p>5 used both a phone and a console</p>	<b>J</b> 23 used a tablet (T) 15 used a PC (P) <p>10 used both a tablet and a PC</p>	<b>K</b> 7 liked action (A) 16 liked sci-fi (S) <p>14 didn't like action or sci-fi</p>	<b>L</b> 8 only read fiction (F) 9 only read non-fiction (N) <p>12 read fiction and non-fiction</p>
<b>M</b> 16 like maths (M) 24 don't like science (S) <p>7 like science</p>	<b>N</b> 14 don't like english (E) 4 like technology (T) <p>11 don't like English or technology</p>	<b>O</b> 20 have a sister (S) 7 don't have a brother (B) <p>10 people only have one sibling</p>	<b>P</b> 12 have a brother (B) 21 don't have a sister (S) <p>9 people have a sister</p>

## Challenges:

Complete a Venn diagram for each question.	
a) 50 people were surveyed about their pets. 15 people had a dog and a cat. 10 people had only a dog. 15 people didn't have a dog or a cat.	c) 100 people were surveyed about their lunch. 40 people bought an apple and a soda. 60 people bought an apple. 50 people bought a soda. How many bought neither?
b) 70 people were surveyed. 24 people had long hair. 32 people had black hair. 30 people didn't have long or black hair.	d) 80 people were asked whether they liked apples, bananas or cherries. 10 only liked apples. 8 only liked bananas. 12 liked apples and bananas. 14 like bananas and cherries. 12 only liked cherries. 9 liked all three. 6 didn't like any.

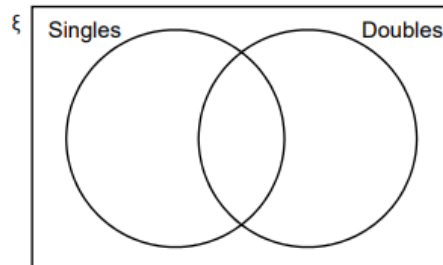
## Exam Practice:

1 In a squash tournament,

106 players took part in the singles only  
33 players took part in the doubles only  
twice as many players took part in the singles  
as took part in the doubles.

How many players took part in both the singles **and** the doubles?  
You may use the Venn diagram to help you.

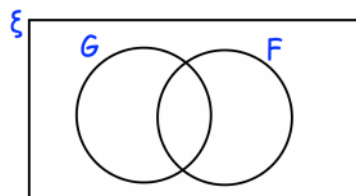
[4 marks]



3. There are 80 students in year 11.

9 students study French and German.  
35 students only study French  
2 students do not study French or German.

(a) Complete the Venn diagram



(2)

(b) Work out how many students study only German.



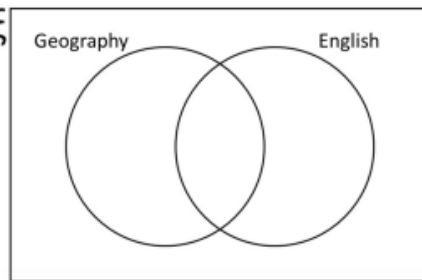
.....  
(1)

- **LI: I understand how to represent the outcomes of an event in a Venn diagram and list probabilities**

### Demonstration Videos:

<https://corbettmaths.com/2016/08/07/venn-diagrams/>  
<https://www.mathsgenie.co.uk/venn-diagrams.html>

### Tasks:

②   

50 students were asked if they study Geography or English.

- 5 study Geography and not English.
- 25 study English and not Geography.
- 20 study English and Geography.

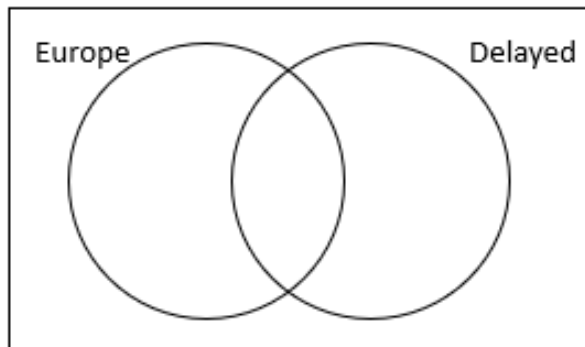
If I pick a student at random, what is the probability they...

$$P(\text{study English}) =$$

$$P(\text{study Geography}) =$$

$$P(\text{study Geography AND English}) =$$

150 planes flying to and from Heathrow were surveyed regarding where they were going and if they were on time. 81 planes were flying to Europe, 43 planes were delayed, and 30 planes were both late and flying to Europe.



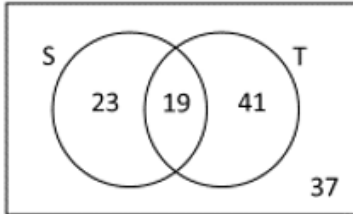
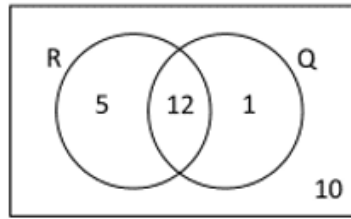
- Complete the Venn diagram
- What is the probability of selecting a delayed plane?
- What is the probability of selecting a delayed plane which was not flying to Europe?
- What is the probability of selecting a plane which was either delayed or flying to Europe?
- Given that the plane was flying from Europe, what is the probability it was delayed

## Challenges:

1. The Venn diagram on the right shows the events R and Q.

Find:

- $P(R \cap Q)$
- $P(R')$
- $P(R' \cap Q)$
- $P(R \cup Q)$
- $P(R' \cup Q)$



2. The Venn diagram on the left shows the events S and T.

Find:

- $P(S \cap T')$
- $P(T)$
- $P(S' \cap T')$
- $P(S \cup T)$
- $P(S \cup T')$

## Exam Practice:

6. A gym runs two fitness classes, spinning and circuits.

On Saturday 100 people visited the gym.  
 18 people attended the spinning class.  
 10 people attended both classes.  
 56 people did not attend either class.

- (a) Represent this information on a Venn diagram



A person who attended the gym is selected at random.

Find the probability that this person

- (b) attended only circuits

.....  
(2)

- (c) attended exactly one class

.....  
(2)

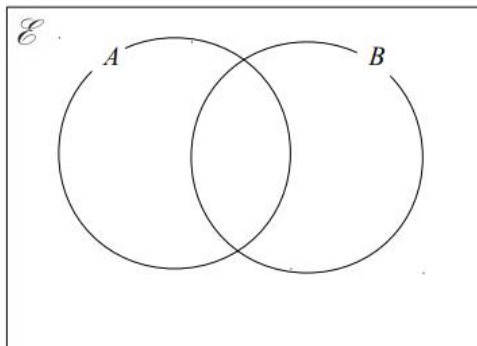
- (d) attended spinning, given that they attended circuits

.....  
(2)

(3)

- 11  $\mathcal{E} = \{\text{even numbers between 1 and 31}\}$   
 $A = \{2, 4, 8, 14, 18, 22, 28\}$   
 $B = \{8, 10, 16, 18, 22, 30\}$

- (a) Complete the Venn diagram to represent this information.



(4)

A number is chosen at random from the universal set,  $\mathcal{E}$

- (b) What is the probability that the number is in the set  $A \cup B$ ?

.....  
(2)

**Week 5:**

- LI: I understand how to draw a tree diagram to display the outcomes of two or more dependent/independent events

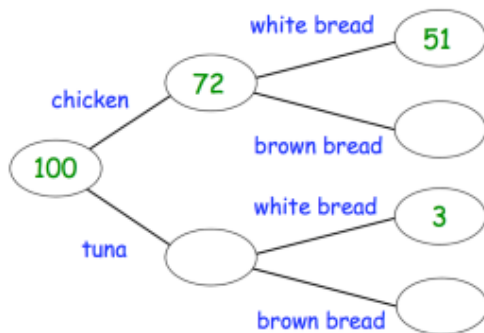
**Demonstration Video:**

<https://corbettmaths.com/2017/03/26/frequency-trees/>  
<https://www.mathsgenie.co.uk/frequency-trees.html>

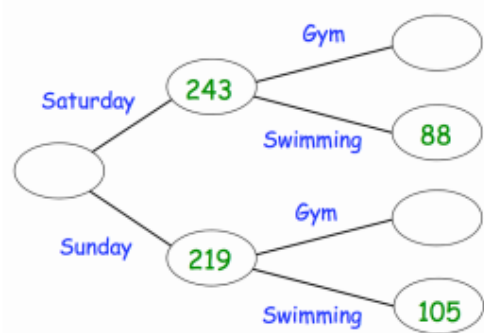
**Tasks:**

Question 1: Complete the following frequency trees.

(a)



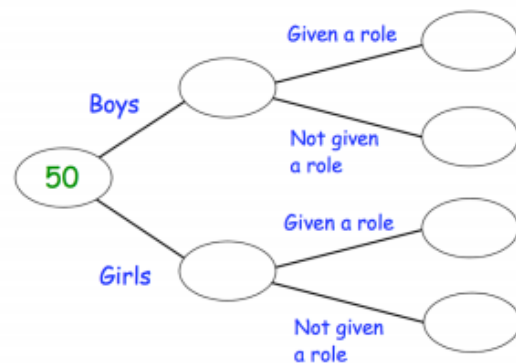
(b)



Question 2: 50 children audition for the school play.

18 of the children are boys.  
 15 children were given a role in the play.  
 8 girls were given a role in the play.

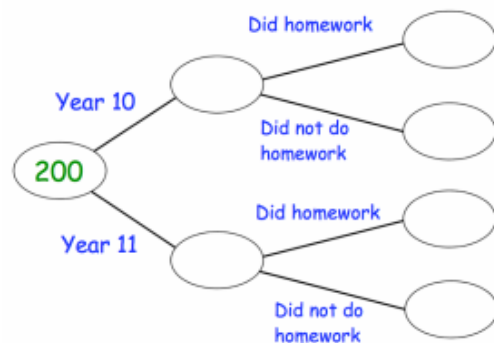
- (a) Complete the frequency tree.  
 (b) What fraction of the boys were given a role in the play?



Question 4: 200 students were given some homework.

102 of these students are in Year 11.  
 182 of the 200 students did their homework  
 14 of the Year 10 students did not do their homework.

- (a) Complete the frequency tree.  
 (b) What percentage of students in Year 11 did their homework?

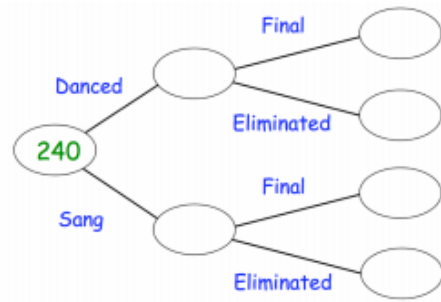


## Challenges:

Question 1: 240 acts took part in a talent show.

20% of the acts danced and the rest sang.  
30 acts made it through to the final.  
21 of the acts in the final sang.

Show this information on a frequency tree.



Question 2: During a weekend 60 buses arrive in a village.

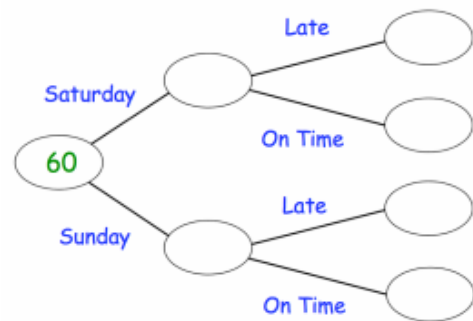
43 of the 50 buses that arrive on a Saturday are on time.  
2 of the buses that are on a Sunday are late.

(a) Show this information on the frequency tree.

Tiernan says

“it is more likely a bus will be late on a Saturday than on a Sunday.”

(b) Explain why Tiernan is wrong.



## Exam Practice:

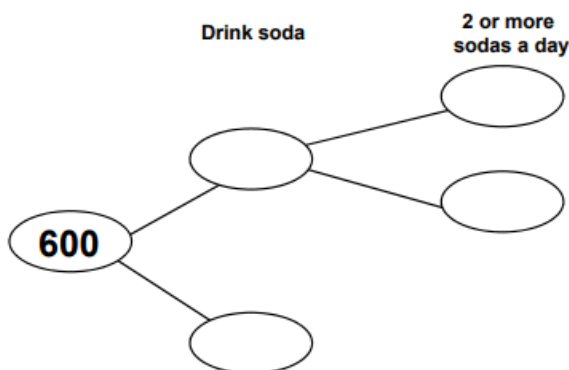
1 600 students were asked if they drink soda.

$\frac{3}{10}$  say Yes.

40% of the students who say Yes drink 2 or more sodas a day.

1(a) Complete the frequency tree.

[4 marks]



1(b) What fraction of the 600 students drink 2 or more sodas a day?

Give your answer in its simplest form.

[2 marks]

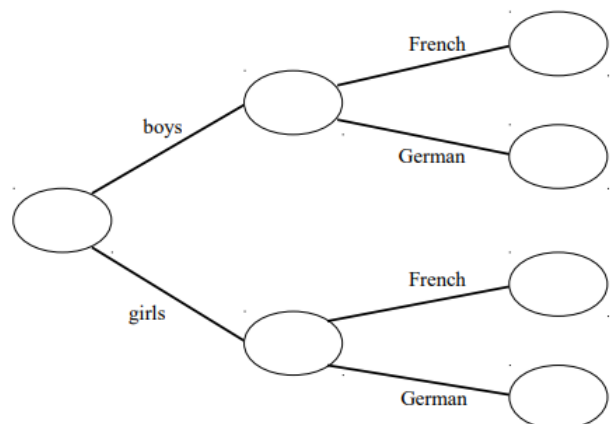
6 60 students study a language at a school.  
Each student either studies French or German.

36 of the students are boys.

$\frac{2}{3}$  of the boys study French

40 students study French

Use this information to complete the frequency tree.



(Total for question 6 is 4 marks)

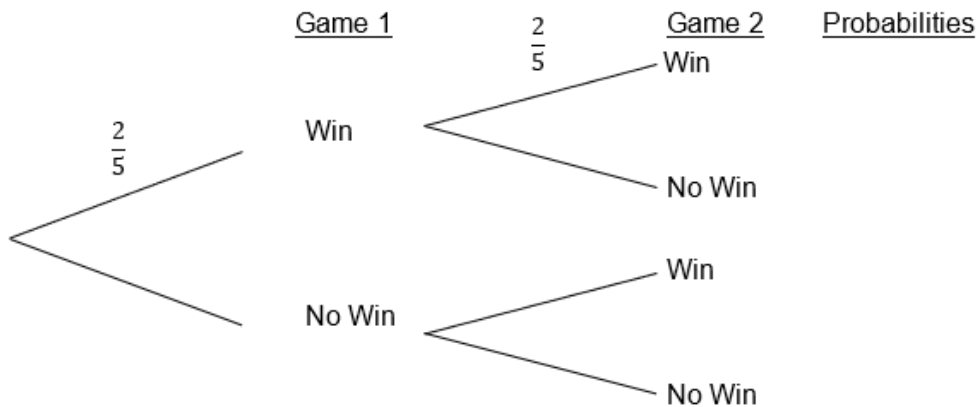
- LI: I understand to calculate probability of two independent events from a tree diagram

**Demonstration Video:**

<https://corbettmaths.com/2013/05/07/tree-diagrams/>

**Tasks:**

1. The probability that Neil wins a game of chance is  $\frac{2}{5}$ . He plays 2 games.  
Complete the tree diagram below.



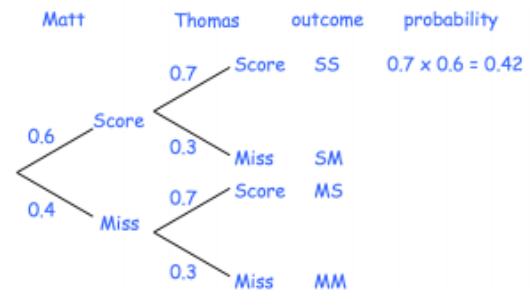
Find the probability that:

- a) He wins both games      b) He losses both games  
 P(wins both) =                      P(losses both) =

**Question 2:** Matt and Thomas each take a penalty.

The probability that Matt scores is 0.6  
 The probability that Thomas scores is 0.7

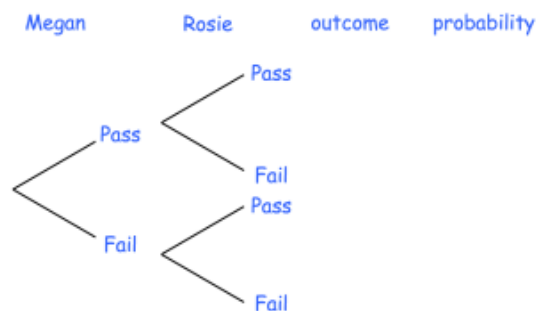
- (a) Find the probability of both boys missing  
 (b) Find the probability of one boy scoring



**Question 3:** Megan and Rosie sit their driving tests.

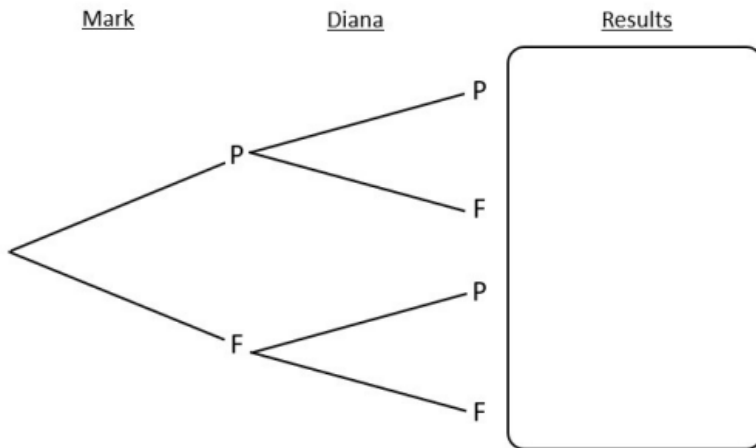
The probability that Megan passes the test is 0.8  
 The probability the Rosie fails the test is 0.3

- (a) Copy and complete the tree diagram  
 (b) Find the probability that both women pass  
 (c) Find the probability that Megan fails and Rosie passes



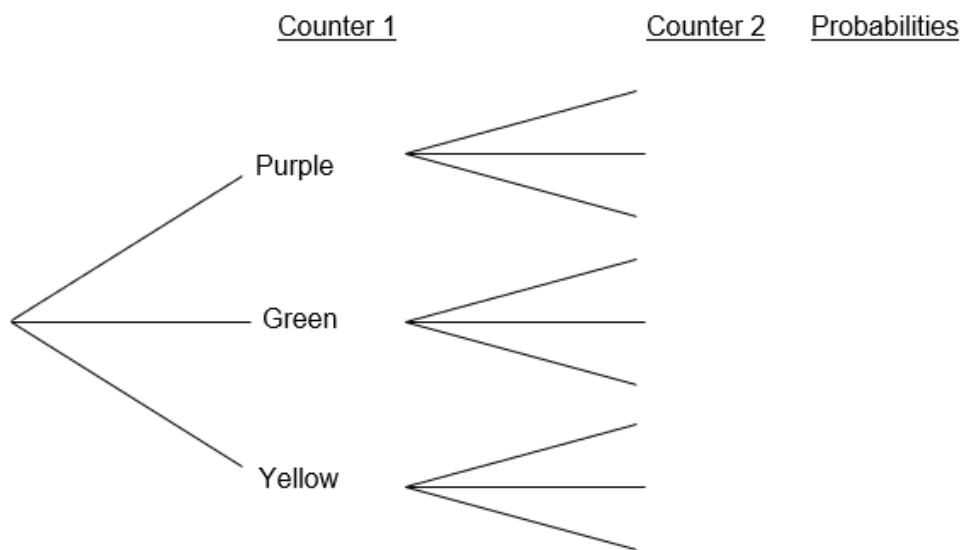


The probability Mark passes his driving test is  $\frac{1}{3}$ . The probability Diana passes is  $\frac{5}{6}$ .  
Complete the Tree Diagram and find the probability they both pass their tests.



### Challenges:

- A bag contains 3 purple counters, 2 green ones and 5 yellow ones. A counter is taken from the bag at random and then replaced. A second counter is then drawn from the bag. Complete the tree diagram:



**Question 4:** Freddie and Martha have dentist appointments.

The probability that Freddie is on time to his appointment is 0.9

The probability that both Freddie and Martha are on time to their appointments is 0.72

(a) Draw a tree diagram for this information

(b) Find the probability that both people are late for their appointments

**Exam Practice:**

- 1** Tina has two bags of counters, Bag A and Bag B.

There are 5 red counters and 3 blue counters in bag A.  
There are 4 red counters and 5 blue counters in bag B.

Tina takes at random a counter from each bag.

- (a) Draw a probability tree to represent this information (2)  
(b) Work out the probability that Tina takes two blue counters. (2)

**(Total for question 1 is 4 marks)**

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- 2** Hannah is going to play one game of chess and one game of backgammon.

The probability she will win the game of chess is 0.6  
The probability she will win the game of backgammon is 0.7.

- (a) Draw a probability tree to represent this information (2)  
(b) Work out the probability that Hannah will win both games. (2)

**(Total for question 2 is 4 marks)**

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- 6** Jon plays a game where he can win, draw or lose.

The probability Jon wins any game 0.5.  
The probability Jon draws any game is 0.3

Jon plays two games.

- (a) Draw a probability tree to represent this information (2)  
(b) Work out the probability Jon wins both games. (2)

**(Total for question 6 is 4 marks)**

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**Week 6:**

- LI: I understand how to calculate the probability of more than one event from a tree diagram

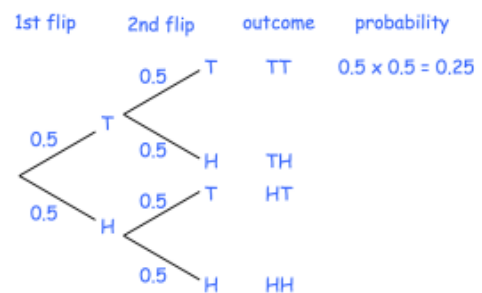
**Demonstration Video:**

<https://corbettmaths.com/2013/05/07/tree-diagrams/>

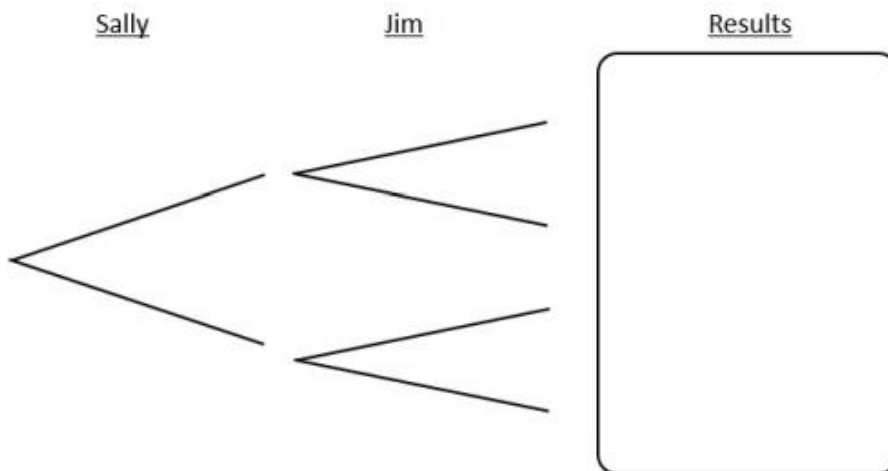
**Tasks:**

Question 1: A fair coin is flipped twice.

- Find the probability of getting two heads
- Find the probability of getting a head and then a tail
- Find the probability of getting at least one head



- The probability Sally passes her history test is  $\frac{4}{5}$ . The probability Jim passes is  $\frac{2}{3}$ .
  - Complete the Tree Diagram and find the probability they both fail their tests.
  - What is the probability at least one of them passes?



- The probability Jim passes his maths test is  $\frac{7}{10}$ . The probability he passes English is  $\frac{4}{5}$ .
  - Complete a Tree Diagram and find the probability he passes both tests.
  - What is the probability he fails both tests?
  - What is the probability he passes only one test?
- The probability Helen passes her English test is  $\frac{4}{9}$ . The probability she passes History is  $\frac{3}{7}$ .  
Complete a Tree Diagram and find the probability she passes at least one test.

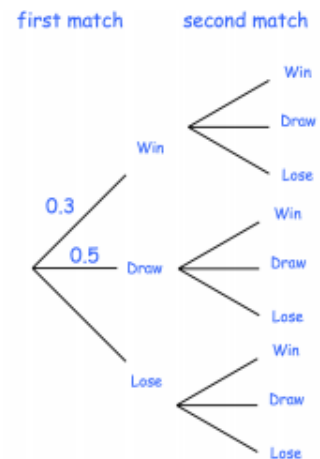
## Challenges:

Question 2: A football team has two matches to play.

The probability that the team wins is 0.3  
The probability that the team draws is 0.5

A win is worth 3 points, a draw 1 point and a loss 0 points.

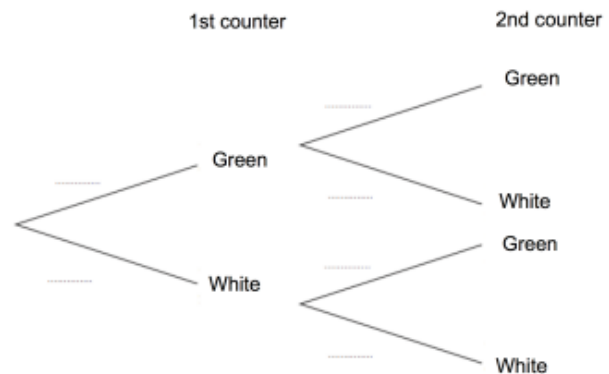
Calculate the probability that the team will score at least 3 points over the two matches.



Question 6: There are 10 counters in a bag, 7 are green and the rest of white.

Erin takes out a counter at random and records its colour.  
Without replacement, Erin takes out another counter, at random.

- Complete the tree diagram
- Find the probability that both counters are different colours
- Find the probability that both counters are the same colour



Question 7: Jenson is going to choose a ball at random from a bag and then flip a coin.

There are 5 balls in the bag, 2 white and 3 black.  
A ball is picked at random from the bag and its colour is recorded.

If the ball is white, a fair coin is flipped.  
If the ball is black, a biased coin is flipped, where heads has a probability of  $\frac{7}{8}$

- Draw a tree diagram to show this information

Jenson selects a ball and flips the appropriate coin.

- Find the probability that he obtains a tail.

**Exam Practice:**

**5** Each day Paul wears either a black tie or a red tie to work.

On any day the probability he wears a black tie is  $\frac{5}{9}$

(a) Draw a probability tree for Monday and Tuesday.

(2)

(b) Work out the probability Paul wears different coloured ties on Monday and Tuesday .

(2)

**(Total for question 5 is 4 marks)**

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**7** Bradley gets the bus on Saturday and Sunday.

The probability that Bradley's bus will be late on any day is 0.2

(a) Draw a probability tree to represent this information

(2)

(b) Work out the probability that Bradley's bus is late on at least one of these days.

(2)

**(Total for question 7 is 4 marks)**

- LI: I understand how to calculate the probability of two dependent events from a tree diagram

Demonstration Video:

<https://corbettmaths.com/2013/06/18/conditional-probability/>

Tasks:

Question 2: There are 10 chocolates in a bag.  
Four are milk chocolate and six are dark chocolate.  
Two chocolates are taken out at random **without** replacement.

- (a) Copy and complete the tree diagram
- | 1st chocolate       | 2nd chocolate      | outcome | probability                                       |
|---------------------|--------------------|---------|---|
| $\frac{4}{10}$ Milk | $\frac{3}{9}$ Milk | MM      | $\frac{4}{10} \times \frac{3}{9} = \frac{12}{90}$ |
|                     | $\frac{6}{9}$ Dark | MD      |   |
| $\frac{6}{10}$ Dark | $\frac{4}{9}$ Milk | DM      | $\frac{6}{10} \times \frac{4}{9} = \frac{24}{90}$ |
|                     | $\frac{5}{9}$ Dark | DD      |   |
- (b) Find the probability of getting two dark chocolates.
- (c) Find the probability of getting one chocolate of each flavour.
- (d) Find the probability of getting at least one milk chocolate.

Question 4: There are 12 sweets in a bag  
7 are lemon and 5 are orange.  
Two sweets are taken out at random **without** replacement.

- (a) Work out the probability that the two sweets are both lemon  
(b) Work out the probability that the two sweets are both orange  
(c) Work out the probability that the two sweets are the same flavour  
(d) Work out the probability that the two sweets are different flavours

Question 5: There are five counters in a bag.  
One counter is pink, one counter is green and three counters are yellow.  
A counter is selected at random from the bag **without** replacement.  
Then a second counter is taken at random.

- (a) Find the probability that both counters are yellow.  
(b) Find the probability of a pink counter then a yellow counter.



Question 8: There are three flavours of crisps in a cafe.  
There are 3 packets of salt and vinegar  
5 packets of cheese and onion  
1 packet of roast chicken  
Bella takes two packets of crisps at random.

- (a) Work out the probability that she takes 2 packets of crisps that are the **same** flavour.  
(b) Work out the probability that she takes 2 packets of crisps that are **different** flavours.

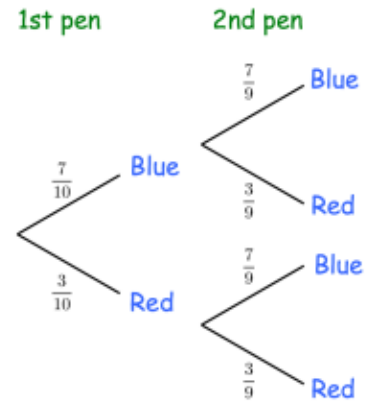
## Challenges:

**Question 1:** Samantha has 10 pens.  
7 of the socks are blue and the rest are red.  
Samantha takes a pen at random without replacement.  
She then takes a second pen at random.

Samantha drew this tree diagram.

(a) Write down what is wrong with the probabilities in the tree diagram.

(b) Calculate the probability that Samantha picks at least one red pen.



**Question 3:** There are 20 passengers on a coach.  
70% of the passengers are going to Bristol.  
The rest are going to Bath.  
Four passengers are chosen at random to complete a survey.

Calculate the probability that all four passengers are going to Bath.

**Question 4:** Ethan has 12 coins.  
There are three 10p coins and nine 20p coins.  
Ethan chooses 3 coins at random.  
Work out the probability that he takes exactly 50p.

**Question 5:** There are 50 students in Year 11.  
Each student studies one language.

	French	German
Female	11	12
Male	7	20

Two of these students are selected at random.

Calculate the probability that the chosen students will be a female studying French and any male.

**Exam Practice:**

- 1 There are 12 cubes in a box.  
7 are yellow and 5 are blue.

Two pens are taken out at random **without** replacement.

Work out the probability that the two pens are **different** colours.

**[4 marks]**

2. There are 9 cubes in a bag.

7 of the cubes are red.  
2 of the cubes are black.

Rick takes at random two cubes from the bag.

Work out the probability that Rick takes one cube of each colour.  
You must show your working.

**[4 marks]**

3.  
There are three different types of sandwiches on a shelf.

There are

4 egg sandwiches,  
5 cheese sandwiches  
and 2 ham sandwiches.

Erin takes at random 2 of these sandwiches.

Work out the probability that she takes 2 different types of sandwiches.





Questions	Question Title
1	Recognising cube numbers
2	Probability of single events
3	Comparing decimals and fractions
4	Recognising units of capacity
5	Direct proportion
6a	Systematic listing
6b	Fractions of amounts
7a	Plotting coordinates
7b	Area of a triangle
8a/b	Writing algebraic expressions
9	Arithmetic problem solving
10	Multiple of a number
11	Single event probability, mutually exclusive events
12a	Substituting into formulae
12b/c	Factorising expressions, substitution
13	Surface area of a cube, converting units of length
14	Simple interest
15a	Scale diagrams
15b	Scale diagrams with bearings
16	Fractions of amounts, worded problems
17	Solving linear equations
18	Writing inequalities
19	Comparing statistics
20	Using Venn diagrams to count sets
21a	Calculating time given speed and distance
21b	The effect of speed on time
22	Multi-step angle problems
23	Square numbers and powers
24	Algebraic inverse proportion
25	Calculating pressure
26a	Completing a frequency tree
26b	Reverse percentages
27a	Changing the subject of a formula
27b	Units of speed and acceleration
28	Expanding double brackets