

# *Spring Progress Check Revision Material*

*Year 9 Set 7 - 8*

*Foundation 2*

*Test Date: Friday 26 Jan*

*How to revise for Maths?*

- *Practise is key! Attached you will find some questions to help you do that.*
- *Once you've answered the questions – mark your work.*
- *If you get something wrong, look back on what you did and try work out where your mistake is. Unsure? Take your answers to your teacher or to Maths club on a Thursday and get help ahead of the test!*
- *Good luck!*



### 3 Check up

Log how you did on your Student Progression Chart.

#### Tables

- 1 Mandy measures the height of some students in metres.  
1.35, 1.28, 1.36, 1.42, 1.33, 1.29, 1.23, 1.41, 1.40, 1.34, 1.34, 1.46  
Use the information to copy and complete the table.

Height (m)	Tally	Frequency
$1.2 \leq h < 1.3$		
$1.3 \leq h < 1.4$		
$1.4 \leq h < 1.5$		

- 2 Here is part of a train timetable from Peterborough to London.
- Which station should the train leave at 09:01?
  - The train arrives in Sandy at 09:12. How many minutes should it wait there?
  - The train should take 41 minutes to travel from Arlesey to London. What time should the train arrive in London?

Station	Time of leaving
Peterborough	08:44
Huntingdon	09:01
St Neots	09:08
Sandy	09:15
Biggleswade	09:19
Arlesey	09:24

- 3 The two-way table shows numbers of tickets sold at a theatre.
- Write the number of adults who chose luxury seats.
  - Copy and complete the two-way table.

	Budget seats	Standard seats	Luxury seats	Total
Adult		17	19	
Child	24		30	
Total	39			130

#### Graphs and charts

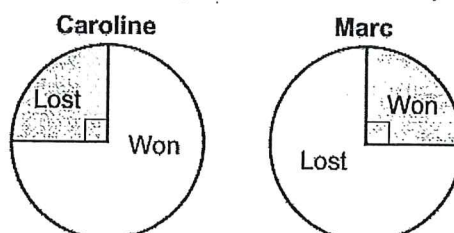
- 4 The table gives information about the numbers of fish in a lake. Draw an accurate pie chart to display this information.

Fish	Frequency
Perch	10
Bream	23
Carp	39

- 5 The table shows the number of sunny days and windy days in a four-month period.

	May	Jun	Jul	Aug
Sunny days	14	22	18	23
Windy days	16	13	8	5

- Draw a comparative bar chart to display the data.
  - Write a statement comparing the number of sunny and windy days during the four-month period.
- 6 **Reasoning** Caroline and Marc are in a darts team. The pie charts show the number of games Caroline and Marc won and lost last year. Caroline played 52 games. Marc played 160 games. How many more games did Marc win than Caroline?



- 7 Amrita recorded the heart rate (in beats per minute) of 15 people. She asked them to walk up some stairs and recorded their heart rates again. She showed her results in a back-to-back stem and leaf diagram.

		Before				After			
		9	8			5			
7	6	6	4	1		6	5	8	8
		9	8	6		7	2	4	7
		4	1	8		8	5	6	8
						9	1	3	7
						10	2		

Did more people have a higher heart rate after walking up the stairs than before? Explain how you know.

**Key**

Before

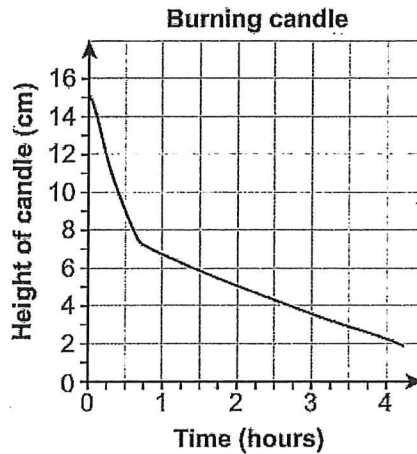
8 | 5 means 85 bpm

After

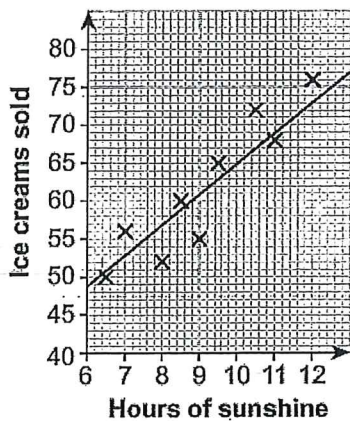
6 | 5 means 65 bpm

**Time series and scatter graphs**

- 8 The graph shows the height of a candle as it burns.
- What is the height of the candle after 2 hours?
  - How long does the candle take to burn down from 15 cm to 4 cm?



- 9 A beach café sells ice creams. Describe the relationship between the number of hours of sunshine and the number of ice creams sold.



- 10 How sure are you of your answers? Were you mostly  
 Just guessing 😞 Feeling doubtful 😐 Confident 😊

What next? Use your results to decide whether to strengthen or extend your learning.

**\* Challenge**

- 11 Design a data collection sheet for a traffic survey to be carried out near a primary school. Decide what the purpose of the survey will be and the types of data you need to collect.



Reflect

### 3 Strengthen

#### Tables

- 1 Erin measures the length of some runner beans from her garden.  
14.7, 12.0, 13.8, 8.9, 14.9, 12.4, 9.0, 13.7, 7.0, 9.7, 11.5, 11.9, 14.2, 11.0, 12.5  
Use the information to copy and complete the frequency table.

Length, $l$ (cm)	Tally	Frequency
$7 \leq l < 9$		
$9 \leq l < 11$		
$11 \leq l < 13$		
$13 \leq l < 15$		

**Q1 hint** The first class includes all lengths up to, but not including, 9.0 cm. Which class should include the length 9.0 cm? Add tally marks to your table as you read through the data set. Total your tallies to complete your frequency column.

- 2 Jack carries out a survey of the type of pets students in his class have.  
Design a data collection sheet for Jack.

**Q2 hint** What pets do you expect people to have? Include an 'Other' category for any more unusual pets. You will need a column for tallies and for one frequency.

- 3 **Real** Here is part of a train timetable from Dundee to London.

Dundee	5:56 am	6:30 am	7:28 am
Peterborough	11:30 am	12:20 pm	1:20 pm
London	12:35 pm	1:35 pm	2:40 pm

**Q3 hint** Count on in hours from 6:30 am until you reach 1:30 pm. Add on the minutes to get the total amount of time.

How long does it take the 6:30 am train from Dundee to get to London?

- 4 **Real** Here is part of a railway timetable.

New Street	10 13	10 30	10 33
Marston Green	10 26	↓	10 41
Birmingham International	10 29	10 39	10 45
Hampton-in-Arden	10 32	↓	10 48
Tile Hill	10 40	↓	10 55
Coventry	10 47	10 49	11 00

**Q4a hint** Count on in minutes.

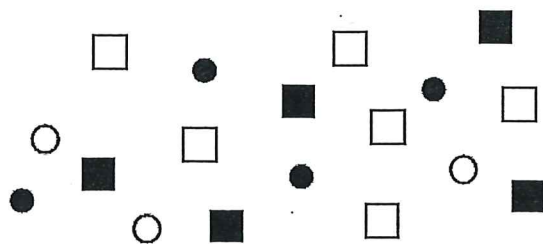
- a Work out how long the 10:13 train takes to travel from New Street to Coventry.  
b Harry is at Birmingham International. He needs to be at Tile Hill by 10:50.

**Q4b hint** A train leaves Birmingham International at 10:29, 10:39 and 10:45. Read down each column until you reach the row for Tile Hill. Which of the trains get into Tile Hill by 10:50?

What time is the latest train from Birmingham International he can catch?

- 5 The diagram shows some shapes.  
Copy and complete the two-way table to show the number of shapes in each category.

	White	Black
Circle		
Square		



6 A group of students were asked their favourite zoo animal.

	Monkey	Lion	Giraffe	Elephant	Zebra
Girls	2	3	6	4	8
Boys	4	7	3	9	4

- How many more boys than girls chose elephants?
- How many more girls than boys chose zebras?
- Which animal was chosen by the greatest number of students?

Q6c hint Find the total number of students who chose each animal.

7 The two-way table shows how 100 students travelled to school on one day.

	Walk	Car	Bicycle	Total
Boys	15		14	54
Girls		8	16	
Total	37			100

- Work out the number of girls who walked to school.
- Work out the number of boys who travelled to school by car.
- Copy and complete the rest of the table.

Q7c hint Total the 'Girls' row and the 'Car' and 'Bicycle' columns.

8 80 students went on a school trip. They went to either London or York.

23 boys and 19 girls went to London.

14 boys went to York.

Use this information to complete the two-way table.

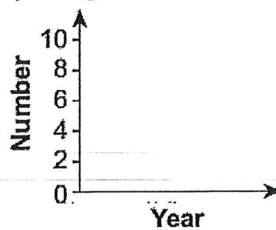
	London	York	Total
Boys			
Girls			
Total			

Q8 hint Fill in the information you already know. (Make sure you include the total number of students.) Find a column or row with just one value missing. Work out the value using the method from Q7.

### Graphs and charts

1 The table shows the number of computer games and DVDs Ted bought in 2013 and 2014.

	Games	DVDs
2013	7	9
2014	10	6



- Draw a comparative bar chart.
- Write a statement comparing the numbers of games and DVDs he bought each year.

Q1a hint What is the highest value you need to plot?

Q1b hint In ..... he bought more ..... than .....

2 The table shows the average daily hours of sunshine in Majorca and Crete over a five-month period.

	April	May	June	July	August
Majorca	9	9	11	11	10
Crete	6	8	11	13	12

- Display the data in a comparative bar chart.
- Write a statement comparing the hours of sunshine in Majorca and Crete during the five-month period.

Q2a hint Plot the month on the horizontal axis and the hours on the vertical axis.

### Unit 3 Graphs, tables and charts

- 3 Dexter has a tube of sweets. The table shows the number of sweets of each colour in the tube.

Colour	Number of sweets	Angle
Red	10	
Green	5	
Yellow	6	
Orange	9	
<b>Total</b>		360°

- Work out the total number of sweets.
- Work out the angle for one sweet in a pie chart.
- Work out the angle for the 10 red sweets.
- Work out the angle for the green, yellow and orange sweets.
- Draw the pie chart. Give it a title and label the sectors (or make a key).

Q3b hint

$$\div \square \text{ sweets is } 360^\circ$$

$$1 \text{ sweet is } \square^\circ \div \square$$

- 4 **STEM** In a chemistry experiment, Juan recorded the mass of chemical produced by a reaction (in grams). He repeated the experiment 15 times. Here are his results.

105, 112, 117, 127, 123, 103, 110, 125,  
121, 108, 113, 125, 114, 119, 125

- Write the data in order, starting with the smallest.
- Draw an ordered stem and leaf diagram to show this information.

Q4b hint The tens and hundreds digits are the stem. The units digits are the leaves.

10	3
11	2
12	

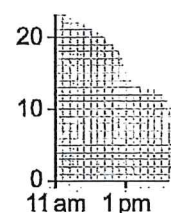
### Time series and scatter graphs

- 1 The table shows the temperature in a school greenhouse every 2 hours.

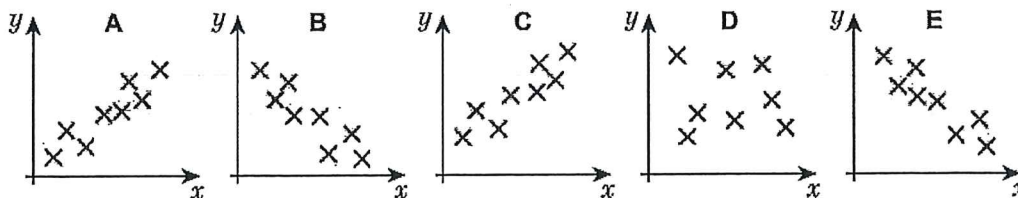
Time	11am	1pm	3pm	5pm
Temperature (°C)	12	20	29	25

- Draw a time series graph for the data.
- What is the time when the temperature is 25°C?
- Estimate the temperature when the time is 4 pm.
- Estimate the difference between the temperature at midday and the temperature at 5 pm.

Q1a hint



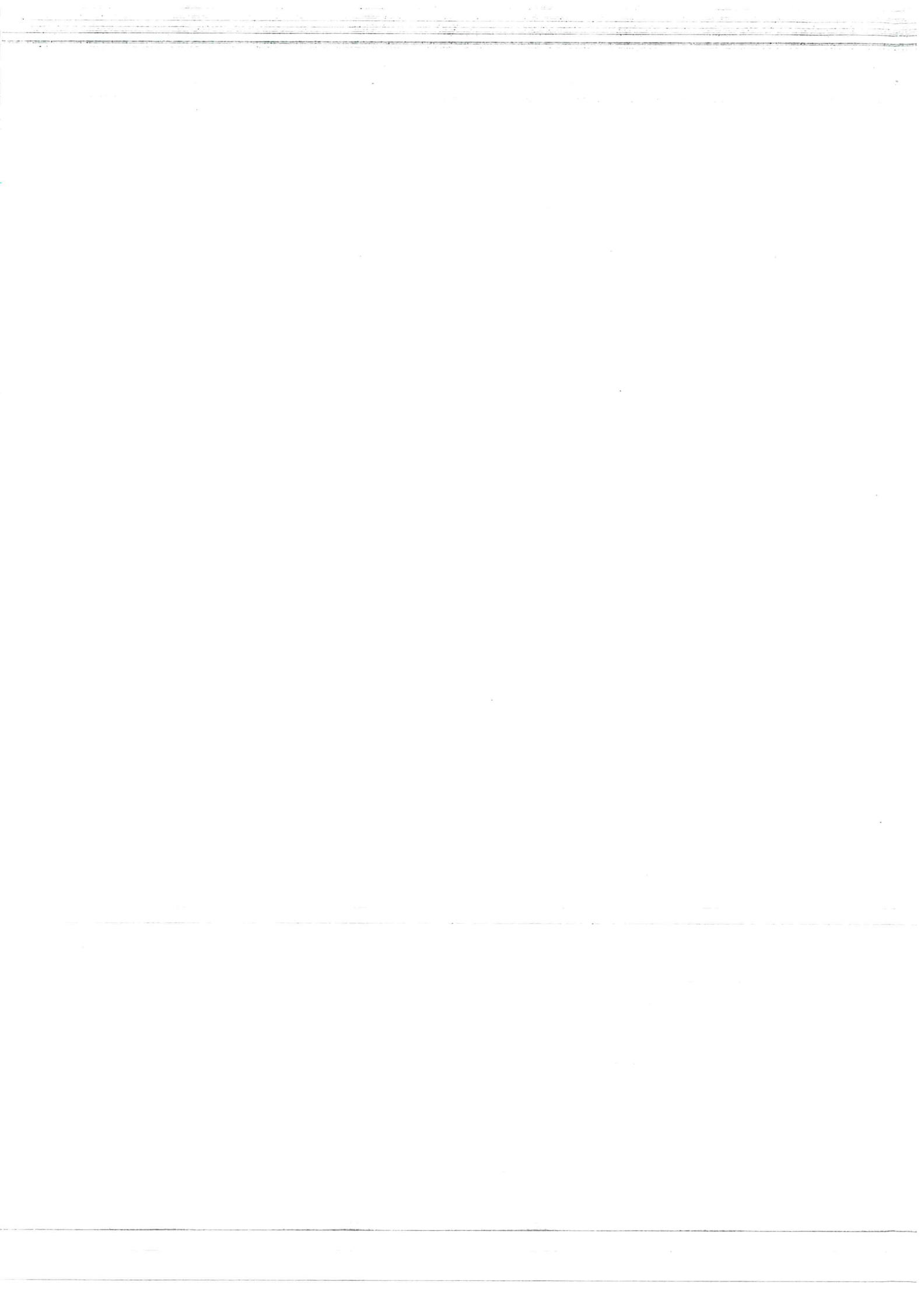
- 2 For each graph, decide whether it shows positive correlation, negative correlation or no correlation.



Q2 hint **Positive correlation** – looking from (0, 0), the points go 'uphill': the values are increasing.

**Negative correlation** – looking from (0, 0), the points go 'downhill': the values are decreasing.

**No correlation** – the points are not close to a straight line, uphill or downhill.





## 13 Check up

Log how you did on your Student Progression Chart.

## Calculating probabilities

- 1 The probability of getting a 4 on a spinner is  $\frac{1}{4}$ . Write the probability of not getting a 4.
- 2 The letters from the word STATISTICS are written on cards and placed in a bag. One card is chosen at random.

Work out

- a  $P(S)$                                   b  $P(\text{a vowel})$                                   c  $P(\text{not } S \text{ or } T)$

- 3 The table shows the probabilities of certain outcomes on a spinner with 3 colours.

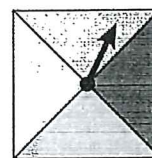
Colour	Red	Yellow	Blue
Probability	0.3	0.2	

Work out  $P(\text{blue})$ .

## Experimental probability

- 4 Pierre and Guillermo do an experiment with a spinner. The table shows their results.

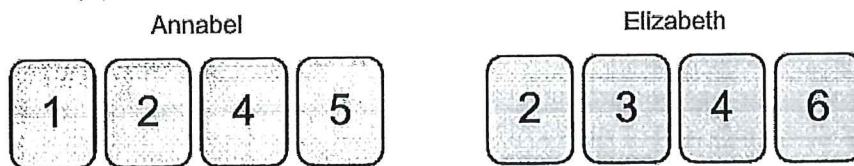
	Yellow	Blue	Green	Red
Pierre	32	25	22	31
Guillermo	18	15	17	20



- a Estimate the experimental probability of spinning blue using Pierre's results.
- b Estimate the experimental probability of spinning blue using Guillermo's results.
- c Which experimental results are more accurate?
- 5 Luca flips a coin 200 times. The coin comes down heads 80 times.
- a Write the experimental probability of getting a head.
- b Write the theoretical probability of getting a head.
- c How many heads would you predict in 200 flips of a fair coin?
- d Is Luca's coin biased? Explain.

## Probability diagrams

- 6 Two fair coins are flipped.
- a Draw a sample space diagram.
- b What is the probability that both coins land on tails?
- c What is the probability that one coin lands heads and the other lands tails?
- 7 Annabel and Elizabeth each have a set of cards. Florence picks one card from each set and adds the numbers.

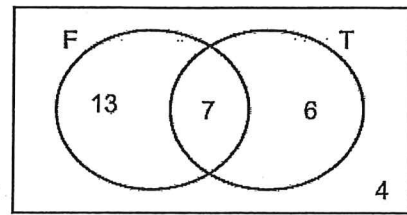


- a Draw a sample space diagram showing the possible total scores.
- b How many possible outcomes are there?
- c What is the probability that Florence picks cards with
- i a total of 7                                  ii a total greater than 5?

### Unit 13 Probability

8 Zainab asks students in her class whether they like football or tennis. The Venn diagram shows the results.

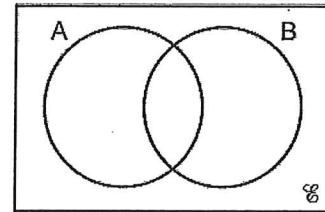
- How many people are in Zainab's class?
- How many people like football?
- What is the probability that a person chosen at random likes football but not tennis?
- Work out
  - $P(F \cup T)$
  - $P(F \cap T)$



9 a Copy and complete the Venn diagram for these sets.

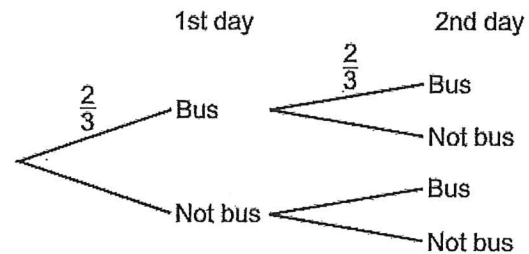
- $\mathcal{U} = \{\text{integers} < 10\}$   
 $A = \{\text{odd numbers} < 10\}$   
 $B = \{\text{factors of } 8\}$

- Write these sets.
  - $A \cap B$
  - $A \cup B$
  - $A'$



10 The probability that Julianne gets the bus to school each day is  $\frac{2}{3}$ .

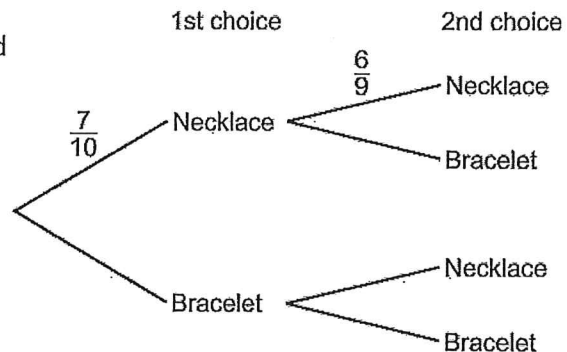
- Copy and complete the tree diagram.
- What is the probability that Julianne gets the bus on both days?
- What is the probability that she gets the bus on just one day?



### Dependent events

11 **Reasoning** A box contains 7 necklaces and 3 bracelets. Philippa chooses an item from the box at random, puts it on and then chooses another item.

- Copy and complete the tree diagram.
- What is the probability that she is wearing two necklaces?
- What is the probability that she is wearing one necklace and one bracelet?



12 How sure are you of your answers? Were you mostly

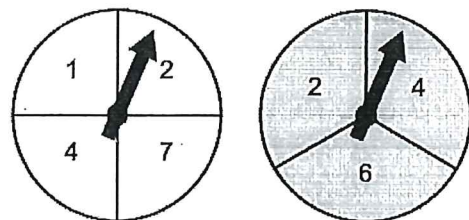
Just guessing 😞 Feeling doubtful 😐 Confident 😊

What next? Use your results to decide whether to strengthen or extend your learning.

### \* Challenge

13 A fairground game involves spinning two wheels. You win if your total score is less than 7.

- Is the game fair? Explain.
- The fairground game operator suggests changing the rules so that you win if the difference in the scores is less than 3. Is the game fair now? Explain.



# 13 Strengthen

## Calculating probabilities

1 The letters from the word MATHEMATICS are placed in a hat.

- a One letter is selected at random.  
How many possible outcomes are there?
- b What is the probability of
  - i selecting an M
  - ii selecting a C
  - iii selecting a vowel
  - iv *not* selecting an A?

Q1a hint How many different letters are there in the word?

Q1b i hint  $\frac{\text{Number of Ms}}{\text{Total number of letters}}$

Q1b iv hint How many letters are *not* 'A'?

2 A bag contains 7 blue balls, 5 red balls and 1 green ball. What is

- a P(blue)?
- b P(blue or red)?
- c P(not red)?

Q2 hint P(blue) means probability of blue.

3 Cards numbered 1–5 are put in a bag. One card is picked at random.



Work out

- a P(odd)
- b P(even)
- c P(square number)
- d P(not square number)

**Discussion** Are all the numbers 1–5 odd or even? Can a number be both odd and even? What is P(even) + P(odd)?

4 The probability of getting a six on a fair dice is  $\frac{1}{6}$ . Write the probability of not getting a six.

Q4 hint  $P(\text{not } 6) = \frac{P(6)}{6} = \frac{1}{6}$

5 The table shows the probabilities of trains arriving early, late or on time.

Arrival	Early	Late	On time
Probability	0.1		0.6

Work out the probability of a train arriving late.

Q5 hint Early, late or on time are the only possible outcomes.

## Experimental probability

1 **Communication** Maddie rolls a dice and records the number of times she gets a 2. Freya does the same with a different dice.

	Maddie	Freya
Number of rolls	60	90
Number of 2s	12	30

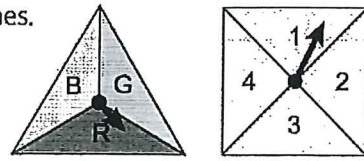
- a Write the theoretical probability of rolling a 2.
- b Write the experimental probability of
  - i Maddie getting a 2
  - ii Freya getting a 2?
- c Compare the experimental probabilities with the theoretical probability. Do you think either dice is biased? Explain your answer.

Q1a hint What is the probability of rolling a 2 on a fair dice?

**Unit 13 Probability**

- 2 In an experiment, Hermione spins these two spinners 120 times. Her results are shown in the table.

	1	2	3	4
Green	12	14	13	10
Blue	13	9	12	6
Red	11	9	6	5



- a How many times did she get green and 2 together?  
 b Estimate the experimental probability of  
 i green and 2  
 ii red and 3  
 iii green and odd.

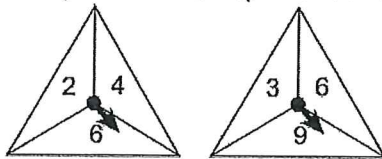
Q2b i hint:  $\frac{\text{number of 'green and 2' results}}{\text{total number of spins}}$

- 3 **Reasoning** Seb flips a coin 10 times and gets 7 heads.  
 a Explain why he thinks the coin might be biased.  
 He flips the same coin 200 times and gets 102 heads.  
 b Explain why he now thinks the coin is fair.  
 c Which is his most accurate estimate of the experimental probability of getting a head? Explain.

Q3c hint More \_\_\_\_\_ → more accurate estimate.

**Probability diagrams**

- 1 Rachel spins these two spinners. One possible outcome is (2, 3).



- a Complete the sample space diagram to show all the possible outcomes.

	2	4	6
3	(2, 3)		
6			
9			

- b How many possible outcomes are there?  
 c Work out the probability of  
 i getting (4, 6)  
 ii both numbers being at least 4  
 iii getting two even numbers.

Q1d hint Draw a new sample space diagram to show the totals. How many are more than 8?

- d Rachel now adds the scores together. What is the probability of getting a total greater than 8?

- 2 Denise rolls two fair, six-sided dice and records the product of the two numbers.

- a Copy and complete the sample space diagram.  
 b How many possible outcomes are there?  
 c What is the probability of getting a  
 i product of 1  
 ii product greater than 20  
 iii product that is a square number?

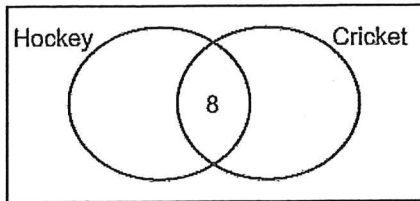
Dice 2

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

Dice 1

Q2 communication hint Product means multiply.

- 3 At a sports club, 15 members play hockey, 17 play cricket and 8 play both. 10 members play neither.
- a Copy and complete the Venn diagram.



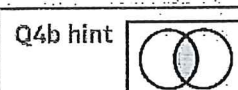
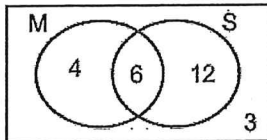
Q3a hint Subtract the members who play both from the total for hockey and from the total for cricket. How many members are left over?

- b Work out the total number of members?
- c What is the probability that a member chosen at random
- plays hockey
  - plays both hockey and cricket
  - plays hockey but not cricket.
  - plays neither hockey nor cricket?

Q3b hint Add up all the numbers in every section.

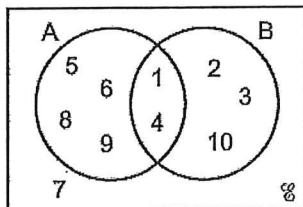
Q3c hint  $\frac{\text{number who play hockey}}{\text{total number of members}}$

- 4 Francis asks 25 students in his class if they play music or sports outside school. The Venn diagram shows the results.



Work out the probability that a person picked at random

- plays music or sport or both.
  - plays music and sport.
  - doesn't play music.
- 5 Look at this Venn diagram.



Q5c hint 'In  $A \cup B$ ' means in A or B or both.

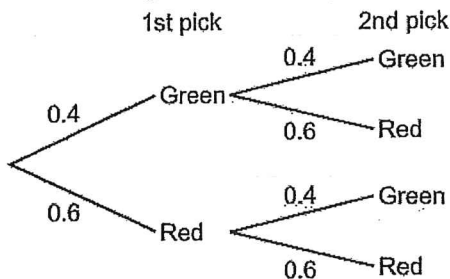
Q5d hint 'In  $A \cap B$ ' means in A and B.

Q5e hint  $\%$  includes A and B.

List the numbers

- in A
- in B
- in  $A \cup B$
- in  $A \cap B$
- in  $\%$

- 6 Menna picks a ball from a bag containing 4 green balls and 6 red balls. She replaces the ball and then selects another. The tree diagram shows the probabilities.



Q6a hint Move along the branches for green, then green. Are 2 greens more or less likely than 1 green? Do you add or multiply?

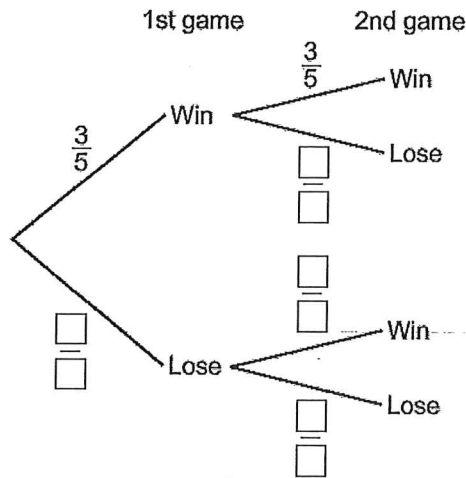
- Work out the probability of picking 2 green balls.
- Work out the probability of picking
  - red then green
  - 1 red ball and 1 green ball *in any order*.

Q6b ii hint This means (red, green) or (green, red). Is the probability of these two outcomes greater than the probability of just one of them? Do you add or multiply?

**Unit 13 Probability**

**7** Daphne plays online chess against a friend. The probability of Daphne winning each game is  $\frac{3}{5}$ . The friends never draw a game.

a What is the probability that Daphne loses a game?

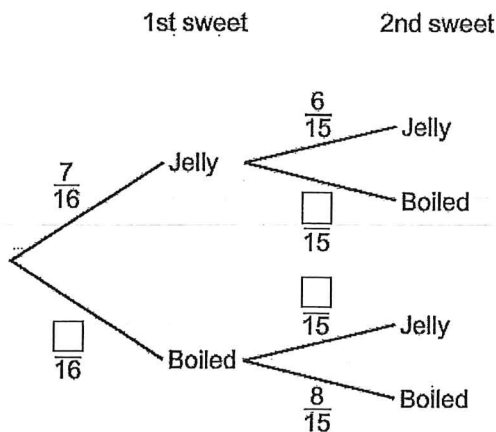
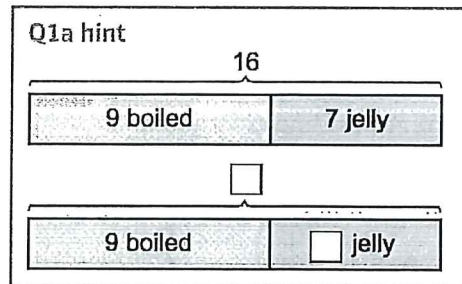


- b Copy and complete the tree diagram showing the possible outcomes from two games.
- c What is the probability that Daphne wins both games?
- d What is the probability that Daphne loses both games?
- e What is the probability that Daphne wins one game and loses one game?

**Dependent events**

**1 Reasoning** Geeta's pack of sweets contains 7 jelly sweets and 9 boiled sweets. She picks one sweet at random, eats it and then picks a second sweet.

- a If her first sweet is jelly, the probability that her second sweet is jelly is  $\frac{6}{15}$ . Explain why.
- b If her first sweet is boiled, the probability that her second sweet is boiled is  $\frac{8}{15}$ . Explain why.
- c Copy and complete the tree diagram.



- d Work out the probability that Geeta eats
  - i 2 jelly sweets
  - ii 1 jelly sweet and 1 hard-boiled sweet.

### 3 Check up

1

Height (m)	Tally	Frequency
$1.2 \leq h < 1.3$		3
$1.3 \leq h < 1.4$		5
$1.4 \leq h < 1.5$		4

2 a Huntingdon                                    b 3 minutes                                    c 10:05

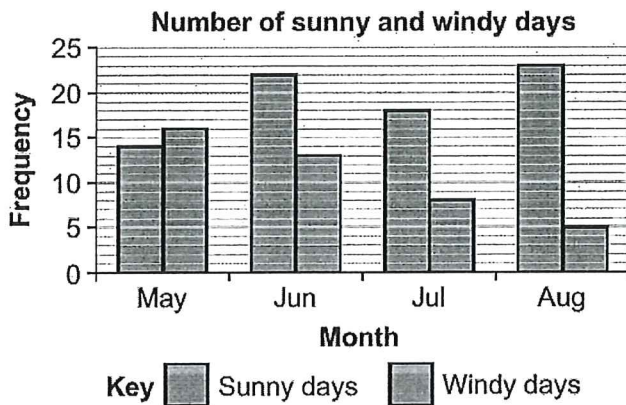
3 a 19

b

	Budget seats	Standard seats	Luxury seats	Total
Adult	15	17	19	51
Child	24	25	30	79
Total	39	42	49	130

4 Accurate pie chart drawn with perch  $50^\circ$ , bream  $115^\circ$  and carp  $195^\circ$ .

5 a



b e.g. There are more sunny days than windy days during the four-month period.

6 1 – Marc won 40 games and Caroline 39

7 e.g. After, because more people had beats per minute over 80 after walking up the stairs.

8 a 5 cm            b Allow 2 hours 35 minutes to 2 hours 45 minutes

9 e.g. As the temperature increases, ice cream sales increase. Positive correlation.

10. Any suitable data collection sheet.

### 3 Strengthen

Tables

1

Length, $l$ (cm)	Tally	Frequency
$7 \leq l < 9$		2
$9 \leq l < 11$		2
$11 \leq l < 13$		6
$13 \leq l < 15$		5

2 Any suitable data collection sheet.

3 7 hours 5 minutes

4 a 34 minutes b 10:29

5

	White	Black
Circle	3	4
Square	6	5

6 a 5 b 4 c Elephant

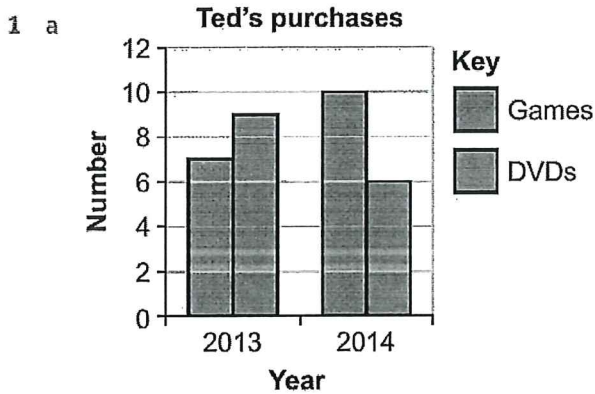
7 a 22 b 25 c

	Walk	Car	Bicycle	Total
Boys	15	25	14	54
Girls	22	8	16	46
Total	37	33	30	100

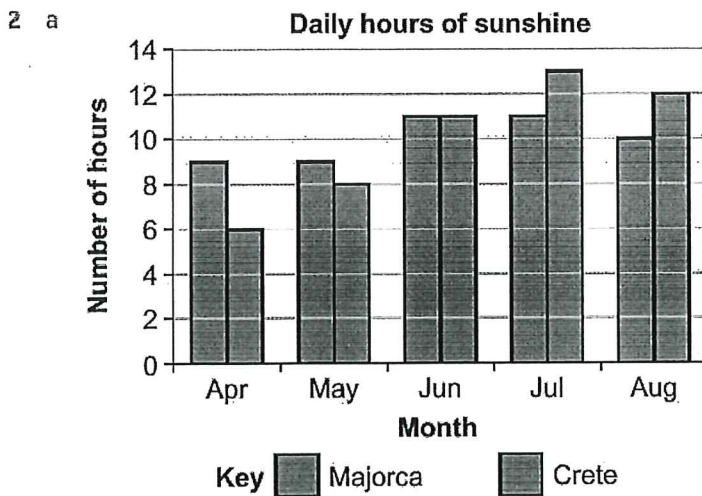
8

	London	York	Total
Boys	23	14	37
Girls	19	24	43
Total	42	38	80

Graphs and charts



b e.g. In 2013 he bought more DVDs than games but in 2014 he bought more games than DVDs. He bought the same number, 16, of games and DVDs combined in both years.



b e.g. In April and May Majorca has more sunshine hours. In July and August Crete has more.

3 a 30 b 12° c 120° d Green 60°, yellow 72°, orange 108°

e Accurate pie chart drawn with red 120°, green 60°, yellow 72°, orange 108°. All labelled correctly.

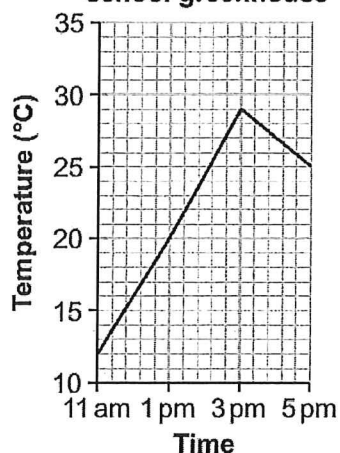


4 a 103, 105, 108, 110, 112, 113, 114, 117, 119, 121, 123, 125, 125, 125, 127

b  $\begin{array}{l|l} 10 & 3\ 5\ 8 \\ 11 & 0\ 2\ 3\ 4\ 7\ 9 \\ 12 & 1\ 3\ 5\ 5\ 5\ 7 \end{array}$  **Key**  
 $1013 = 103$  grams

Time series and scatter graphs

1 a **Temperature in a school greenhouse**      b 2 pm and 5 pm      c  $27^\circ$       d  $9^\circ (25^\circ - 16^\circ)$



2 A-positive, B-negative, C-positive, D-no correlation, E-negative

3 Extend

1 a  $3m$       b  $2.5m$       c  $1.5m$

2 14

3 Students' own answers

4 He is not correct.  $50 + 110 + 220 + 140 = £520$ ,  $\frac{520}{12} = £43.33$ , so he needs to pay £43.33 per month.

5 Accurate pie chart drawn with Tennis  $89^\circ$ , Football  $144^\circ$ , Swimming  $44^\circ$ , Basketball  $83^\circ$

6 a 58%      b 54%

c e.g. No, the chart tells us the about the proportion of mice in the two areas. It does not tell us anything about the numbers of mice.

7 a June      b December      c 18 hours.

8 Accurate bar chart or line graph.

9 e.g. Harrow Lane – Swipe Crescent 08:02 – 08:41      Swipe Crescent – Harrow Lane 15:16 – 15:49

3 Unit test

1 a 29 [1]      b 5 [1]

2 a 75 [1]      b False [1], the graph only specifies numbers not individuals. [1]

3 a 573 km [1]      b 662 km [1]      c 295 km [1]

### 13 Check up

1  $\frac{3}{4}$

2 a  $\frac{3}{10}$       b  $\frac{3}{10}$       c  $\frac{4}{10}$

3 0.5

4 a  $\frac{25}{110}$       b  $\frac{15}{70}$       c Pierre's: more trials

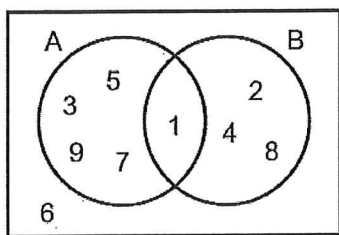
5 a  $\frac{80}{200}$       b  $\frac{1}{2}$       c 100      d Possibly; 80 is fewer than the 100 heads predicted.

6 a Any suitable sample space diagram.      b  $\frac{1}{4}$       c  $\frac{1}{2}$

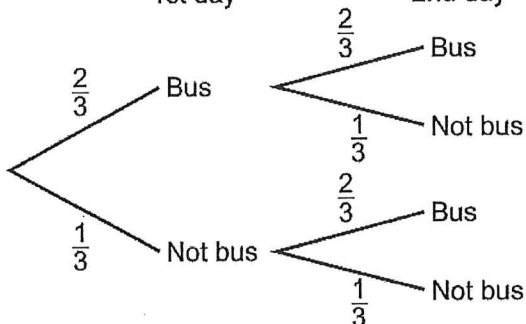
7 a Any suitable sample space diagram.      b 16      c i  $\frac{3}{16}$       ii  $\frac{11}{16}$

8 a 30      b 20      c  $\frac{13}{30}$       d i  $\frac{26}{30}$       ii  $\frac{7}{30}$

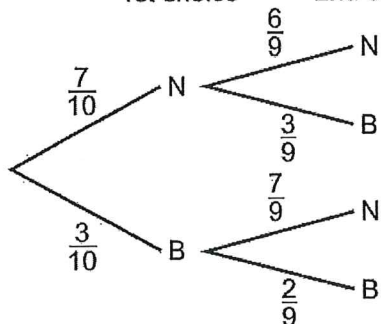
9 a      b i {1}      ii {1,2,3,4,5,7,8,9}      iii {2,4,6,8}



10 a      1st day      2nd day      b  $\frac{4}{9}$       c  $\frac{4}{9}$



11 a      1st choice      2nd choice      b  $\frac{42}{90}$       c  $\frac{42}{90}$



13 a No;  $P(\text{win}) = \frac{5}{12}$       b Yes;  $P(\text{win}) = \frac{7}{12}$

### 13 Strengthen

#### Calculating probabilities

1 a 11      b i  $\frac{2}{11}$       ii  $\frac{1}{11}$       iii  $\frac{4}{11}$       iv  $\frac{9}{11}$

2 a  $\frac{7}{13}$       b  $\frac{12}{13}$       c  $\frac{8}{13}$

3 a  $\frac{3}{5}$       b  $\frac{2}{5}$       c  $\frac{2}{5}$       d  $\frac{3}{5}$

4  $\frac{5}{6}$

5 0.3

Experimental probability

1 a  $\frac{1}{6}$       b i  $\frac{12}{60}$  or  $\frac{1}{5}$     ii  $\frac{30}{90}$  or  $\frac{1}{3}$

c Freya's dice is biased as  $\frac{1}{3}$  is very different from the theoretical probability of  $\frac{1}{6}$ .

2 a 14      b i  $\frac{14}{120}$     ii  $\frac{6}{120}$     iii  $\frac{25}{120}$

3 a The experimental probability is  $\frac{7}{10}$ , which is a lot higher than the theoretical probability of  $\frac{1}{2}$ .

b The experimental probability is  $\frac{102}{200}$ , which is close to the theoretical probability of  $\frac{1}{2}$ .

c His second estimate is more accurate as more trials give a more accurate result.

Probability diagrams

1

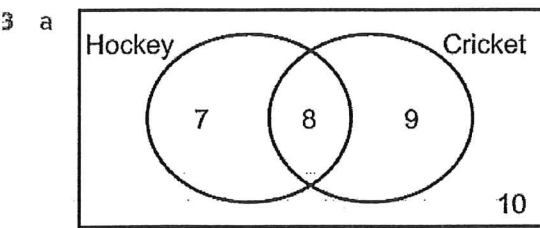
	2	4	6
3	(2, 3)	(4, 3)	(6, 3)
6	(2, 6)	(4, 6)	(6, 6)
9	(2, 9)	(4, 9)	(6, 9)

b 9      c i  $\frac{1}{9}$     ii  $\frac{4}{9}$     iii  $\frac{3}{9}$       d  $\frac{6}{9}$

2 a

	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

b 36      c i  $\frac{1}{36}$     ii  $\frac{6}{36}$     iii  $\frac{8}{36}$



b 34      c i  $\frac{15}{34}$     ii  $\frac{8}{34}$     iii  $\frac{7}{34}$     iv  $\frac{10}{34}$

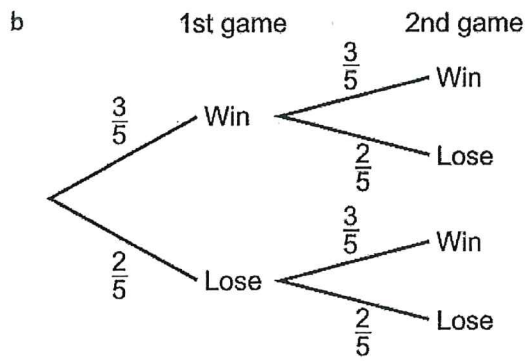
4 a  $\frac{22}{25}$       b  $\frac{6}{25}$       c  $\frac{15}{25}$

5 a 1, 4, 5, 6, 8, 9      b 1, 2, 3, 4, 10      c 1, 2, 3, 4, 5, 6, 8, 9, 10

d 1, 4      e 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

6 a 0.16      b i 0.24    ii 0.48

7 a  $\frac{2}{5}$



c  $\frac{9}{25}$

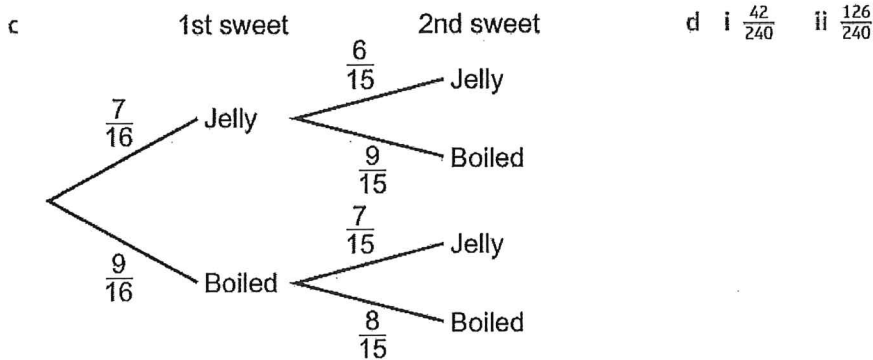
d  $\frac{4}{25}$

e  $\frac{12}{25}$

Dependent events

1 a After she has eaten one jelly, there are 15 sweets remaining, of which  $7 - 1 = 6$  are jellies. Therefore the new probability of picking a jelly is  $\frac{6}{15}$ .

b After she has eaten one boiled, there are 15 sweets remaining, of which  $9 - 1 = 8$  are boiled. Therefore the new probability of picking a boiled is  $\frac{8}{15}$ .

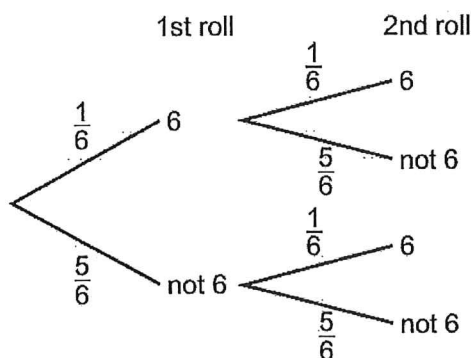


13 Extend

1  $0.74 = 74\%$

2 a  $\frac{8}{15}$  b 9

3 a  $\frac{1}{6}$  b



c  $\frac{1}{6} \times \frac{1}{6}$

d  $\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$

e  $(\frac{1}{6})^n$

4 a i  $\frac{2}{5}$  ii  $\frac{3}{5}$  b 8

5 a  $P(\text{green}) = 0.15 = \frac{3}{20}$ . You could not get this with 10 counters. b 20