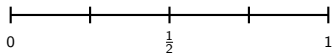
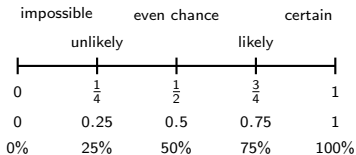


Probability: Starters

Starter

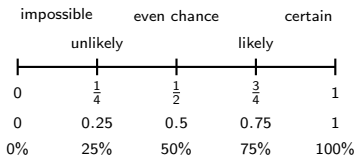


- A** a fair coin lands on heads
B a day chosen at random is a Saturday
C an ordinary dice is rolled and shows a number less than 7
D a counter taken from a bag of 3 red and 1 blue counters is red

- Write 0.25 as a fraction in its simplest form.
- Write $\frac{3}{5}$ as a decimal and as a percentage.
- Every probability is a number from ____ to ____.
- Mark events **A**, **B**, **C** and **D** on the empty scale.
- Complete the table.

Description	Probability
impossible	0
unlikely	between 0 and ____
even chance	between ____ and 1
likely	between ____ and 1
certain	1
- Write a probability that is unlikely but not impossible, as a fraction, a decimal and a percentage.
- Ravi says "the probability that it rains tomorrow is 1.4". Explain why he is wrong.

Starter

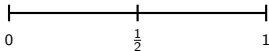
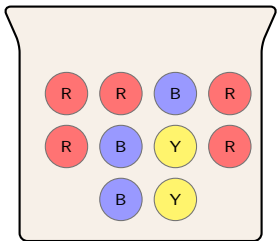


- A** a fair coin lands on heads
B a day chosen at random is a Saturday
C an ordinary dice is rolled and shows a number less than 7
D a counter taken from a bag of 3 red and 1 blue counters is red

- Write 0.25 as a fraction in its simplest form. $\frac{1}{4}$
- Write $\frac{3}{5}$ as a decimal and as a percentage.
 $0.6 = 60\%$
- Every probability is a number from 0 to 1.
- Mark events **A**, **B**, **C** and **D** on the empty scale.
- Complete the table.

Description	Probability
impossible	0
unlikely	between 0 and 0.5
even chance	0.5
likely	between 0.5 and 1
certain	1
- Write a probability that is unlikely but not impossible, as a fraction, a decimal and a percentage. Between 0 and 0.5, such as $\frac{1}{10} = 0.1 = 10\%$.
- Ravi says "the probability that it rains tomorrow is 1.4". Explain why he is wrong.
No probability is greater than 1; a probability of 1 means certain.

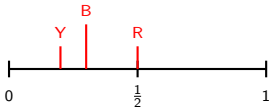
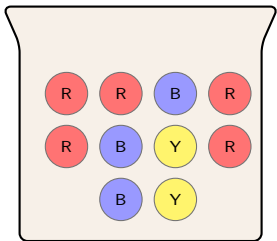
Starter



One counter is taken from the bag at random. The probability that the counter is red is written $P(\text{red})$.

1. Write $\frac{1}{2}$ as a decimal and as a percentage.
2. Write 30% as a fraction in its simplest form.
3. How many counters are in the bag altogether?
4. Write $P(\text{red})$ as a fraction in its simplest form.
5. Write $P(\text{blue})$ as a fraction, a decimal and a percentage.
6. Mark $P(\text{red})$, $P(\text{blue})$ and $P(\text{yellow})$ on the probability scale.
7. Write $P(\text{not red})$ as a fraction in its simplest form.
8. What does $P(\text{red}) + P(\text{blue}) + P(\text{yellow})$ come to, and why?
9. Only red counters are added to the bag, until $P(\text{red})$ is $\frac{3}{4}$. How many red counters are added?

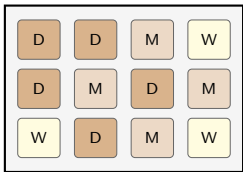
Starter



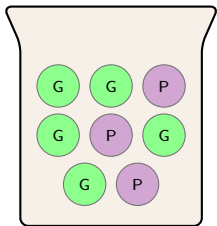
One counter is taken from the bag at random. The probability that the counter is red is written $P(\text{red})$.

1. Write $\frac{1}{2}$ as a decimal and as a percentage.
 $0.5 = 50\%$
2. Write 30% as a fraction in its simplest form. $\frac{30}{100} = \frac{3}{10}$
3. How many counters are in the bag altogether? 10
4. Write $P(\text{red})$ as a fraction in its simplest form. $\frac{5}{10} = \frac{1}{2}$
5. Write $P(\text{blue})$ as a fraction, a decimal and a percentage.
 $\frac{3}{10} = 0.3 = 30\%$
6. Mark $P(\text{red})$, $P(\text{blue})$ and $P(\text{yellow})$ on the probability scale.
8. What does $P(\text{red}) + P(\text{blue}) + P(\text{yellow})$ come to, and why? 1; the counter is certain to be one of the three colours.
9. Only red counters are added to the bag, until $P(\text{red})$ is $\frac{3}{4}$. How many red counters are added? 10, giving 15 red counters out of 20, and $\frac{15}{20} = \frac{3}{4}$.

Starter



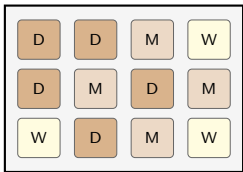
a box of dark, milk and white chocolates



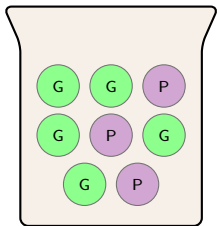
a bag of green and purple counters

1. Write $\frac{3}{4}$ as a decimal and as a percentage.
2. Write 0.08 as a percentage and as a fraction in its simplest form.
3. One chocolate is taken at random. Write $P(\text{white})$ in its simplest form.
4. Write $P(\text{not milk})$ in its simplest form.
5. Write $P(\text{green})$ for the bag as a fraction, a decimal and a percentage.
6. Which is more likely: a dark chocolate, or a purple counter? Show your working.
7. A counter is taken from the bag at random and then replaced. This is done 200 times. How many green counters would you expect?
8. Another bag holds only red and blue counters. It holds 12 red counters, and $P(\text{red}) = 0.4$. How many counters are in it?

Starter



a box of dark, milk and white chocolates



a bag of green and purple counters

1. Write $\frac{3}{4}$ as a decimal and as a percentage.
 $0.75 = 75\%$
2. Write 0.08 as a percentage and as a fraction in its simplest form. $8\% = \frac{8}{100} = \frac{2}{25}$
3. One chocolate is taken at random. Write $P(\text{white})$ in its simplest form. $\frac{3}{12} = \frac{1}{4}$
4. Write $P(\text{not milk})$ in its simplest form. $\frac{8}{12} = \frac{2}{3}$
5. Write $P(\text{green})$ for the bag as a fraction, a decimal and a percentage. $\frac{5}{8} = 0.625 = 62.5\%$
6. Which is more likely: a dark chocolate, or a purple counter? Show your working. $\frac{5}{12} = \frac{10}{24}$ and $\frac{3}{8} = \frac{9}{24}$, so the dark chocolate.
7. A counter is taken from the bag at random and then replaced. This is done 200 times. How many green counters would you expect?
 $\frac{5}{8} \times 200 = 125$
8. Another bag holds only red and blue counters. It holds 12 red counters, and $P(\text{red}) = 0.4$. How many counters are in it? $12 \div 0.4 = 30$

Starter

Choose a sandwich



C cheese H ham T tuna

and a drink



W water J juice

	W	J
C		
H		
T		

1. Write $\frac{2}{5}$ as a decimal and as a percentage.
2. Write 65% as a fraction in its simplest form.
3. A spinner lands on red, blue or green only.
 $P(\text{red}) = 0.35$,
 $P(\text{blue}) = 0.4$. Write $P(\text{green})$.
4. Complete the table to list every lunch deal.
5. How many different lunch deals are there?
6. A deal is chosen at random. Write $P(\text{juice})$ in its simplest form.
7. Write $P(\text{cheese with water})$.
8. A third drink is added. How many deals are there now?
9. Two fair coins are flipped. List all the outcomes systematically, then write $P(\text{one head and one tail})$.

Starter

Choose a sandwich



C cheese H ham T tuna

and a drink



W water J juice

	W	J
C	CW	CJ
H	HW	HJ
T	TW	TJ

- Write $\frac{2}{5}$ as a decimal and as a percentage.
 $0.4 = 40\%$
- Write 65% as a fraction in its simplest form.
 $\frac{65}{100} = \frac{13}{20}$
- A spinner lands on red, blue or green only.
 $P(\text{red}) = 0.35$,
 $P(\text{blue}) = 0.4$. Write $P(\text{green})$.
 $1 - 0.35 - 0.4 = 0.25$
- How many different lunch deals are there? 6
- A deal is chosen at random. Write $P(\text{juice})$ in its simplest form.
 $\frac{3}{6} = \frac{1}{2}$
- Write $P(\text{cheese with water})$. $\frac{1}{6}$
- A third drink is added. How many deals are there now? $3 \times 3 = 9$
- Two fair coins are flipped. List all the outcomes systematically, then write $P(\text{one head and one tail})$.
HH, HT, TH, TT, so $\frac{2}{4} = \frac{1}{2}$

Starter

Two fair, ordinary dice are rolled, and the two numbers on them are added together.

		second dice					
first dice	+	1	2	3	4	5	6
	1	2	3	4	5	6	
	2	3	4	5	6	7	
	3	4	5	6	7	8	
	4	5	6	7	8	9	
	5	6	7	8	9	10	
	6						
the sum of the two dice							

1. Write $\frac{1}{3}$ as a decimal and as a percentage.
2. Write 0.36 as a fraction in its simplest form.
3. Write the missing sums in the table.
4. How many outcomes are there altogether?
5. Write $P(\text{the sum is } 7)$ in its simplest form.
6. Write the probability that the sum is more than 10, in its simplest form.
7. Which sum is the most likely? Use its probability as a percentage to decide whether that sum is likely or unlikely.
8. The two dice are rolled 180 times. How many times would you expect a sum of 5?

Starter

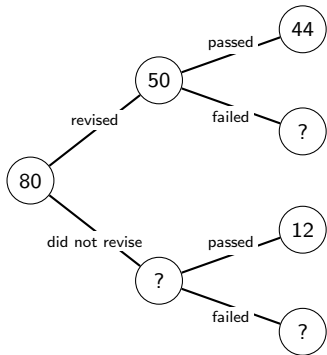
Two fair, ordinary dice are rolled, and the two numbers on them are added together.

		second dice					
first dice	+	1	2	3	4	5	6
	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12
the sum of the two dice							

1. Write $\frac{1}{3}$ as a decimal and as a percentage.
 $0.\dot{3} = 33.\dot{3}\%$
2. Write 0.36 as a fraction in its simplest form. $\frac{36}{100} = \frac{9}{25}$
3. Write the missing sums in the table.
4. How many outcomes are there altogether?
 $6 \times 6 = 36$
5. Write $P(\text{the sum is 7})$ in its simplest form.
 $\frac{6}{36} = \frac{1}{6}$
6. Write the probability that the sum is more than 10, in its simplest form. $\frac{3}{36} = \frac{1}{12}$
7. Which sum is the most likely? Use its probability as a percentage to decide whether that sum is likely or unlikely. **7 is the most likely sum, but $\frac{1}{6} = 16.\dot{6}\%$, which is below 50%, so a sum of 7 is still unlikely.**
8. The two dice are rolled 180 times. How many times would you expect a sum of 5? $\frac{4}{36} = \frac{1}{9}$, and $\frac{1}{9} \times 180 = 20$ times

Starter

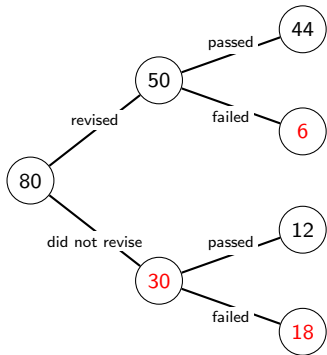
80 pupils sat a test. 50 of them revised. Of the pupils who revised, 44 passed. Of the pupils who did not revise, 12 passed. One of the 80 pupils is then chosen at random.



1. Write $\frac{3}{8}$ as a decimal and as a percentage.
2. A bag holds 9 red and 1 blue counter. Is taking a red counter likely? Give $P(\text{red})$ as a percentage.
3. Complete the frequency tree.
4. How many pupils passed the test altogether?
5. Write $P(\text{revised})$ in its simplest form.
6. Write $P(\text{revised and failed})$ in its simplest form.
7. Write $P(\text{passed})$ as a fraction, a decimal and a percentage.
8. Is a pupil who revised more likely to pass than a pupil who did not revise? Use probabilities to explain your answer.

Starter

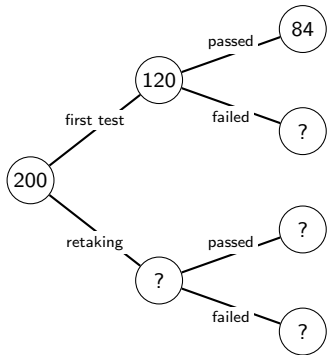
80 pupils sat a test. 50 of them revised. Of the pupils who revised, 44 passed. Of the pupils who did not revise, 12 passed. One of the 80 pupils is then chosen at random.



1. Write $\frac{3}{8}$ as a decimal and as a percentage.
 $0.375 = 37.5\%$
2. A bag holds 9 red and 1 blue counter. Is taking a red counter likely? Give $P(\text{red})$ as a percentage.
 $\frac{9}{10} = 90\%$, so likely.
3. Complete the frequency tree.
4. How many pupils passed the test altogether?
 $44 + 12 = 56$
5. Write $P(\text{revised})$ in its simplest form.
 $\frac{50}{80} = \frac{5}{8}$
6. Write $P(\text{revised and failed})$ in its simplest form.
 $\frac{6}{80} = \frac{3}{40}$
7. Write $P(\text{passed})$ as a fraction, a decimal and a percentage.
 $\frac{56}{80} = \frac{7}{10} = 0.7 = 70\%$
8. Is a pupil who revised more likely to pass than a pupil who did not revise? Use probabilities to explain your answer. Yes: $\frac{44}{50} = 88\%$ of those who revised passed, against $\frac{12}{30} = 40\%$ of those who did not.

Starter

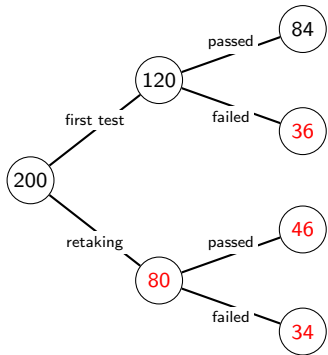
200 people took a driving test. 120 of them were taking it for the first time, and 84 of those passed. Altogether 130 people passed.



1. Write 0.65 as a fraction in its simplest form.
2. Write $\frac{7}{8}$ as a percentage.
3. A bag holds 7 green and 3 red counters. Write $P(\text{green})$ as a percentage.
4. Complete the frequency tree.
5. Write $P(\text{passed})$ in its simplest form and as a percentage.
6. Write the probability that a person took the test for the first time and passed.
7. What percentage passed on a first test, and what percentage passed on a retake?
8. Jo says "people are more likely to pass a retake, because they have had more practice". Do these figures support Jo?

Starter

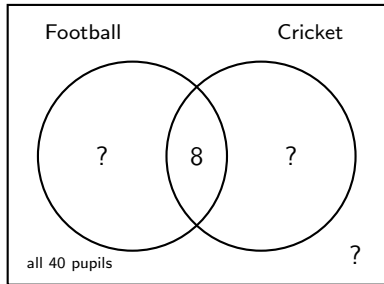
200 people took a driving test. 120 of them were taking it for the first time, and 84 of those passed. Altogether 130 people passed.



1. Write 0.65 as a fraction in its simplest form.
 $\frac{65}{100} = \frac{13}{20}$
2. Write $\frac{7}{8}$ as a percentage. **87.5%**
3. A bag holds 7 green and 3 red counters. Write $P(\text{green})$ as a percentage.
 $\frac{7}{10} = 70\%$
4. Complete the frequency tree.
5. Write $P(\text{passed})$ in its simplest form and as a percentage.
 $\frac{130}{200} = \frac{13}{20} = 65\%$
6. Write the probability that a person took the test for the first time and passed.
 $\frac{84}{200} = \frac{21}{50}$
7. What percentage passed on a first test, and what percentage passed on a retake?
 $\frac{84}{120} = 70\%$ and $\frac{46}{80} = 57.5\%$
8. Jo says "people are more likely to pass a retake, because they have had more practice". Do these figures support Jo? **No: 70% passed on a first test, but only 57.5% on a retake.**

Starter

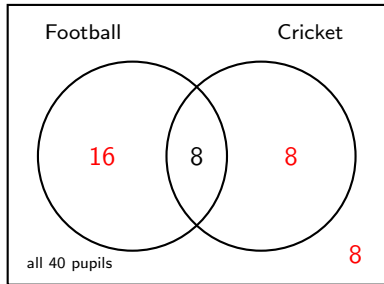
40 pupils were asked which sports they play. 24 play football, 16 play cricket, and 8 play both. One pupil is then chosen at random.



1. Write 0.2 as a fraction in its simplest form and as a percentage.
2. A café sells 4 sandwiches and 3 drinks. How many deals of one sandwich and one drink are there?
3. How many pupils play football but not cricket?
4. Complete the Venn diagram.
5. Write $P(\text{cricket})$ in its simplest form and as a percentage.
6. Write $P(\text{neither sport})$ in its simplest form.
7. Write $P(\text{football or cricket})$ in its simplest form and as a percentage.
8. $P(\text{football}) + P(\text{cricket}) = \frac{3}{5} + \frac{2}{5} = 1$, but $P(\text{football or cricket}) = \frac{4}{5}$. Explain why these are different.

Starter

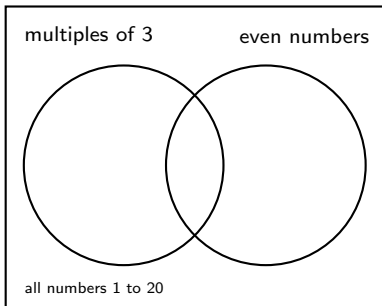
40 pupils were asked which sports they play. 24 play football, 16 play cricket, and 8 play both. One pupil is then chosen at random.



1. Write 0.2 as a fraction in its simplest form and as a percentage.
 $\frac{1}{5} = 20\%$
2. A café sells 4 sandwiches and 3 drinks. How many deals of one sandwich and one drink are there?
 $4 \times 3 = 12$
3. How many pupils play football but not cricket?
 $24 - 8 = 16$
4. Complete the Venn diagram.
5. Write $P(\text{cricket})$ in its simplest form and as a percentage.
 $\frac{16}{40} = \frac{2}{5} = 40\%$
6. Write $P(\text{neither sport})$ in its simplest form.
 $\frac{8}{40} = \frac{1}{5}$
7. Write $P(\text{football or cricket})$ in its simplest form and as a percentage. $\frac{32}{40} = \frac{4}{5} = 80\%$
8. $P(\text{football}) + P(\text{cricket}) = \frac{3}{5} + \frac{2}{5} = 1$, but $P(\text{football or cricket}) = \frac{4}{5}$. Explain why these are different. The 8 who play both are in both circles, so they are counted twice.

Starter

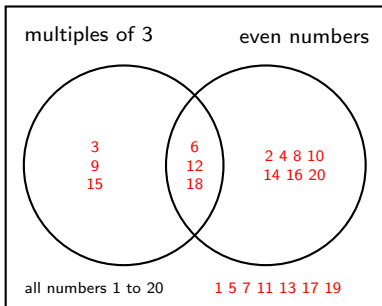
One of the numbers from 1 to 20 is chosen at random.



1. Write $\frac{3}{20}$ as a decimal and as a percentage.
2. Write 35% as a fraction in its simplest form.
3. Write each number from 1 to 20 in the correct region.
4. A number goes in the overlap when it is a multiple of ____.
5. Write $P(\text{multiple of 3})$ in its simplest form.
6. Write the probability that the number is neither even nor a multiple of 3.
7. Is the number likely or unlikely to be a multiple of 3? Use its probability as a percentage to explain.
8. Choose two new labels for the circles so that the overlap must be empty, and explain why.

Starter

One of the numbers from 1 to 20 is chosen at random.



1. Write $\frac{3}{20}$ as a decimal and as a percentage.
 $0.15 = 15\%$
2. Write 35% as a fraction in its simplest form.
 $\frac{35}{100} = \frac{7}{20}$
3. Write each number from 1 to 20 in the correct region.
4. A number goes in the overlap when it is a multiple of 6.
5. Write $P(\text{multiple of 3})$ in its simplest form.
 $\frac{6}{20} = \frac{3}{10}$
6. Write the probability that the number is neither even nor a multiple of 3. $\frac{7}{20}$
7. Is the number likely or unlikely to be a multiple of 3? Use its probability as a percentage to explain. $\frac{3}{10} = 30\%$, which is below 50%, so unlikely.
8. Choose two new labels for the circles so that the overlap must be empty, and explain why.
For example "odd" and "even": no number is both odd and even.