Probability

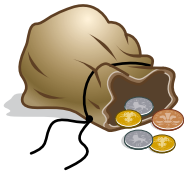
- Finding the probability of an event not occurring
- Using diagrams to record all possible outcomes for two events
- Using diagrams to record all possible outcomes for two successive events

Keywords

You should know

explanation 1a | explanation 1b | online

1 A bag contains two 2p coins, three 10p coins and four £1 coins.
A coin is taken out of the bag at random.



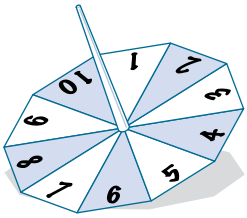
a Find these probabilities as fractions.

i P(2p coin) **ii** P(£1 coin)

iii P(10p coin) **iv** P(not a £1 coin)

b Find P(2p coin) + P(10p coin) + P(£1 coin). Explain your answer.

2 A game uses a ten-sided spinner, numbered from 1 to 10.
Give, as decimals, the probabilities of these events.



a seven **b** an even number

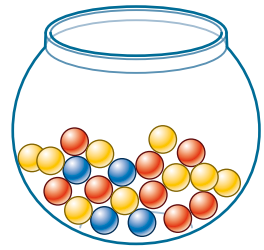
c a multiple of three **d** a factor of twelve

e a prime number **f** a square number

3 The probability that the school football team wins a match is 30% and there is an equal chance of the team either drawing or losing the match.
Copy and complete the table using decimals to describe the probabilities.

Event	Win	Draw	Lose
Probability			

4 There are four blue, eight red and some yellow beads in a jar. One bead is taken from the jar at random. The probability that it is yellow is $\frac{1}{3}$.



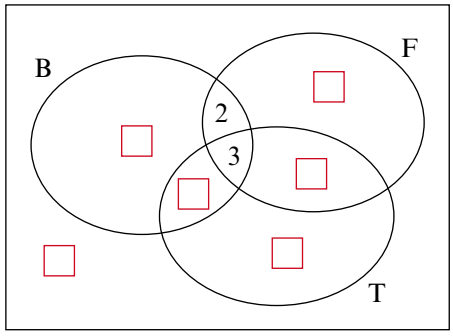
a Explain why the total number of beads in the jar must be a multiple of 3.

b Find **i** P(red) **ii** P(blue)

5 In a class of 32 pupils, 16 play football (F), 11 play badminton (B) and 8 play tennis (T). Only 3 students play all three sports but 5 play both football and badminton, 4 play both badminton and tennis and 4 play both football and tennis.

a Simon draws a diagram to represent this information.

Explain why he has put 3 where the three circles overlap.



b Next he puts 2 in the area for F and B only. Is he right?

c Copy and complete the diagram.

d One person is chosen at random.
Find the probability that they play these sports.

i football only **ii** none of these sports **iii** exactly two of the sports

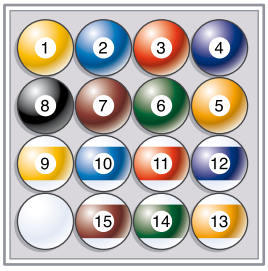
6 A school sells 300 raffle tickets. Tina has bought 4 tickets.
She did not win first prize or second prize.
What is the probability that she wins the third prize?

explanation 2a explanation 2b

7 Copy and complete the table.

Event	Probability that event occurs	Probability that it does not occur
Getting a double six with two dice	$\frac{1}{36}$	
Snow in January	0.58	
Choosing a king from a pack of cards		
Manchester City win a home match	72%	

8 **a** The box contains a set of pool balls. One ball is chosen at random. Find these probabilities.



i P(striped) **ii** P(not striped)

iii P(black 8) **iv** P(not black 8)

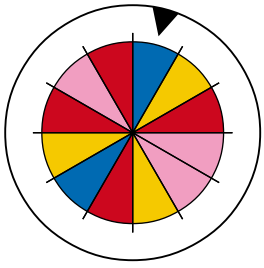
v P(prime number) **vi** P(striped or even numbered)

b The white ball is removed and Gary then chooses one ball at random. It is number 12.

He keeps this ball and selects a second ball at random. Find these probabilities.

i P(second ball is higher than 12) **ii** P(second ball is a factor of 12)

9 Sally spins the wheel of colour and it lands on blue. Work out the probability that her second spin lands on these colours.



a red **b** blue

c pink **d** blue or pink

e not blue **f** not blue or pink

10 Linda's dad picks her up every Tuesday after dance class. The probability that he is early is 0.95 and that he arrives on time is 0.03. What is the probability that he is late?

11 Kevin has a bag containing the old coins shown.

These are the probabilities of picking particular coins.

P(halfpenny) = 0.15 P(penny) = 0.3

P(threepence) = 0.2 P(sixpence) = 0.12

What are these probabilities?

a P(copper or brass coin)

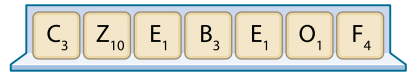
b P(threepence or a sixpence)

c P(not a threepence)

d P(shilling)

12 The probability that Lucy hands her homework in on time is 0.75.
The probability that she hands it in early is 0.1.
What is the probability that she hands her homework in late?

13 One tile is chosen at random from the rack.



Find these probabilities.

a P(vowel)

b P(not a vowel)

c P(the value of the tile is a factor of 30)

explanation 3a explanation 3b online

14 Colin is making a list of all outcomes when three coins are flipped.

1st coin	2nd coin	3rd coin
H	H	H
H	H	T
H	T	H
H	T	T
T		

a Colin has started to show the sample space in this table. Explain how Colin is making his table.

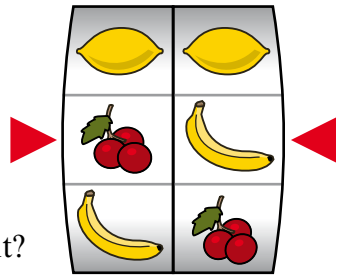
b Copy and complete the sample space.

c Find the probability of getting three heads.

d Find the probability of getting exactly one head.

e Find the probability of getting more heads than tails.

15 A fruit machine has two cylinders with three types of fruit on each. The cylinders are spun round and each fruit is equally likely to appear. The illustration shows the outcome of cherries and a banana.



a List all the possible outcomes.

b What is the probability of getting two identical fruit?

c What is the probability of getting at least one lemon?

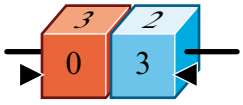
d What is the probability of getting no lemons?

16 A college has four 5-a-side football teams A, B, C, and D. Teams A and D are all-girl teams. Each team plays every other team once. The referee writes down all the possible pairs on paper and puts them in a bag then selects the first pair at random.

a Write what was on the six pieces of paper in the bag.

b What is the probability that teams A and D play the first match?

17 Two four-sided barrels are each labelled with the digits 0, 1, 2 and 3.



Each barrel is spun to make a two-digit number.
03 is 3, 00 is zero.

first digit \ second digit	0	1	2	3
0	00	01		
1	10			
2				
3				

a Copy and complete the sample space diagram.

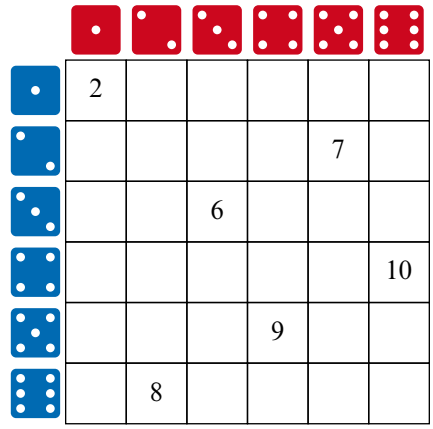
b What is the probability of getting a prime number?

c What is the probability of getting a multiple of 8?

d What is the probability of getting a factor of 30?

e What is the probability of getting a multiple of 9?

18 **a** Abida rolls a red and a blue dice, each numbered from 1 to 6. She adds the scores together. Copy and complete the sample space diagram to show all the possible outcomes.



b Which outcome is most likely?

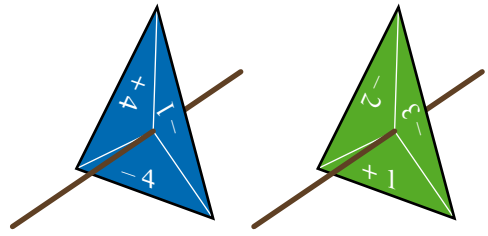
c Use the diagram to find these probabilities.

i P(the same number on both dice)

ii P(the sum of the numbers is less than 10)

iii P(the score on the red dice is exactly double the score on the blue dice)

19 Piers spins two three-sided spinners. He adds the two results. The total score shown is $-4 + +1 = -4 + 1 = -3$.



a Copy and complete the sample space diagram.

+4			
−1			
−4			−3
	−3	−2	+1

b What is the probability of each event?

i The total score is negative.

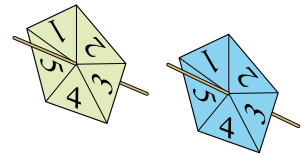
ii The total score is positive.

iii The total score is zero.

iv The total score is 4.

v The total score is greater than −4.

20 Tony spins two five-sided spinners, both with sides numbered 1, 2, 3, 4 and 5. He multiplies together the two numbers landed on.
Draw a sample space diagram to show all the possible outcomes.
Use your diagram to find these probabilities.



a P(an even number)

b P(an odd number)

c P(a multiple of 3)

d P(a factor of 24)

e P(a factor of 3600)