Planner

Chance and probability

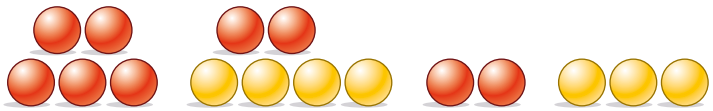
- Calculating the probability of an event for equally likely outcomes
- Constructing a sample space diagram
- Understanding that random processes are unpredictable

Keywords

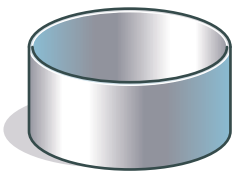
You should know

explanation 1a | explanation 1b | explanation 1c | online

1 Lee has four groups of beads. He chooses two groups, mixes them up in a tin and a bead is selected at random.



group 1 group 2 group 3 group 4



a The probability of choosing a red is 1.
Which two groups did he mix in the tin and what is the probability of picking a yellow bead?

b Which two groups should he mix to get the lowest probability of picking a red?

c Which two groups should he mix to get an even chance of picking a red or yellow bead?

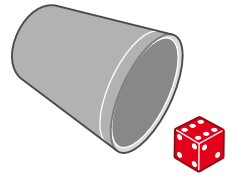
2 **a** Lee mixes all the groups from question **1** in the tin.
What is the probability of picking these beads?

i a red bead **ii** a yellow bead

b Lee adds one more red bead and one more yellow bead to the tin.
What effect does this have on the probability of choosing each colour bead?
Explain your answer.

explanation 2a | explanation 2b | explanation 2c | online

3 An experiment consists of rolling a dice.



a Draw a sample space diagram.

b Describe an event where the outcome is impossible.

c Draw a sample space diagram with an event that has an even chance of happening.

d Describe an event that is certain to happen.

e The dice is rolled 100 times.
How many times would you expect to get a prime number?

f Sam rolled the dice 30 times and got a prime number 17 times.
Is there anything wrong?

4 A pack of 52 playing cards is shuffled and the top card is turned over.

a Describe the sample space.

b Describe these events.

i An impossible event

ii A certain event

iii An event with an even chance

c What is the probability of turning over a heart?

d John shuffles the cards, looks at the top card then puts it back.
He repeats this 12 times. How many hearts would he expect to see?

e Repeat John's experiment. How many hearts did you get?
Explain any differences.

5 Nadeem, David, Cathy and Kim each have six counters. The counters are either red, blue or yellow and they each select a counter at random.

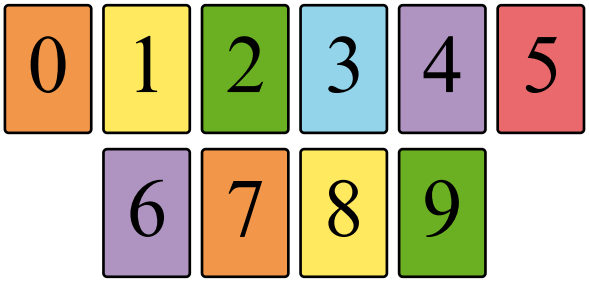
a Nadeem has two yellow counters. What other counters must Nadeem have if the probability of choosing a red counter is 0?

b The probability that David chooses a blue counter is $\frac{1}{2}$.

Describe the possibilities for the colour of David's counters.

c What colour counters does Cathy have if the probability of choosing red is $\frac{1}{3}$ and the probability of choosing yellow is $\frac{1}{2}$?

6 Zak has a set of ten different cards. He chooses a card at random.



a How many possible outcomes are there?

b What is the probability that he chooses an odd number?

c What is the probability that he chooses a prime number?

d What is the probability that he chooses a multiple of 8?

e What is the probability that he chooses a factor of 36?

7 David, Kim and Zoe design a poster.
They want to add their names to the bottom.
To decide the order they write each name on a piece of paper, put it in a box and get a friend to pull the names out at random.

1st	2nd	3rd
D	K	Z
D		

a Complete the list to show the sample space.

b What is the probability that a girl's name is first?

c David does not think this method is fair because there is more chance that a girl will be first. Is he right?

8 Sarah is carrying out an experiment with a coin.

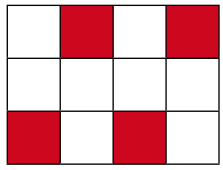
a If her coin is fair, how many heads should she expect to get in 12 throws?

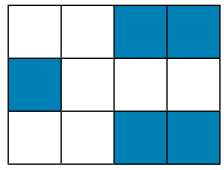
b Sarah throws the coin 12 times and gets 9 heads.

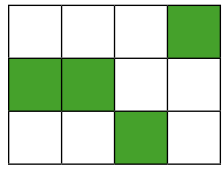
i Do you think that her coin must be biased?

ii What could she do to make her experiment more reliable?

9 Three different scratch cards, A, B and C, all have some coloured squares as shown below. All 12 squares on each card are hidden, and you may reveal just one square on each card.

A 

B 

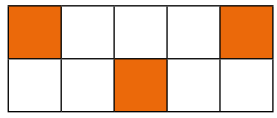
C 

a On which card are you most likely to reveal a hidden coloured square?

b Explain your answer to part **a**.

c Here are two more scratch cards.

D 

E 

Peter thinks there is less chance of revealing a coloured square on card E than on card D because they are more spaced out. Is he right?

10 Two bags contain red, blue and green counters.
Copy and complete each table.

a

Event	Number	Probability of event
Pick red	5	
Pick green	3	
Pick blue		$\frac{1}{5}$

b

Event	Number	Probability of event
Pick red	6	
Pick green		$\frac{1}{3}$
Pick blue	10	