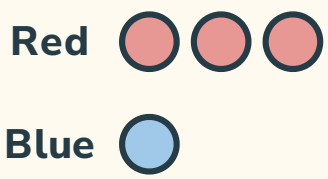
MATHS FIELD GUIDE · GRADE 4

Data and chance answer different questions

OPENING PROBLEM

Draw one counter without looking. Which result is possible but less likely?



02 Read an experiment before predicting
03 Rules and worked cases
04 The colour bag
05 Read a display one mark at a time
06 Check your reasoning

ILLUSTRATED PROBLEM SHEET

Read an experiment before predicting

Identify one trial, its possible results and what counts as success.

1

Red

Blue

Draw one counter without looking. Which result is possible but less likely?

Blue. One of the four equal-chance counters is blue.

2

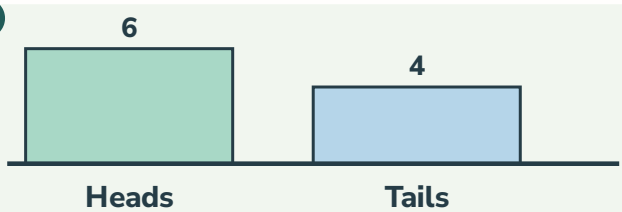
Red

Blue

What changed when the last blue was taken away?

A blue draw became impossible. A red draw is certain.

3



A child records ten coin tosses. Did both outcomes occur?

Yes. Heads occurred more often in this record.

4

Try	1	2	3	4
Colour	R	B	R	R

Return each counter and mix before drawing again. Must B come next?

No. A short run of reds does not force the next colour.

An all-red bag
a red draw is certain.

Add one blue
a red draw is possible but no longer certain.

CHAPTER PROBLEM

If red is more likely than blue, must the next counter be red?

No. Blue can still occur. More likely describes relative chance, not certainty.

MATHS REFERENCE · GRADE 4

Data and chance answer different questions

Data describe recorded results. Chance describes how likely a future outcome is. An event is a collection of outcomes we are interested in.

A probability can range from zero, meaning impossible, to one, meaning certain.

Four cases to recognise

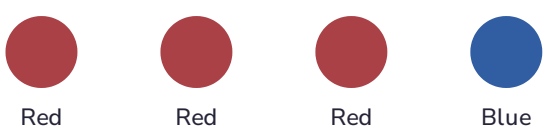
Situation	What to do and why
Bag holds four blue and one red	A blind draw is more likely blue, although red can occur.
Remove the one red	Every remaining counter is blue. Blue is certain.
Add three red to the original bag	Four red and four blue now give equal chances.
Blue appears twice in two draws with replacement	The bag returns to its original mix. Red remains possible on the next draw.

Read the model

Build the idea

Imagine a bag with three red counters and one blue counter. If the counters are equally likely to be selected, red has three of four possible selections.

Now record the colours from actual draws. The record is data. It may not repeat the proportions exactly in a small number of draws.



Why it works

A model uses information about the possible outcomes. An experiment supplies observations. They are connected, but answer different kinds of questions.

A likely event can still fail to happen on one trial. Likely does not mean guaranteed.

outcome One possible result.

event A set of outcomes of interest.

probability A measure of how likely an event is.



Four same-sized counters differ only in colour. On a random draw, which colour is likelier?

Red has three chances out of four. Blue has one.

WORKED INVESTIGATION

The colour bag

Put three red counters and one blue counter in a bag. Mix them and draw one without looking. Red has more equally likely counters.

Look at this part	What it tells you
Red counters	3
Blue counters	1
Green counters	0

Work it through

Green is impossible on this draw. Blue is possible even though red is more likely. Drawing red is not certain.

Catch the mistake

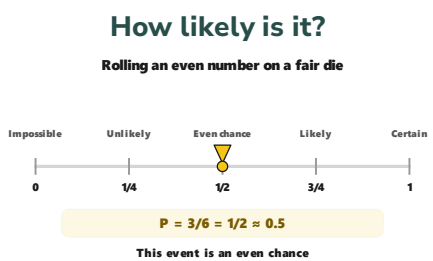
Two colour names do not mean two equal chances. Count the individual counters that can be selected.

Compare the cases

Follow an example

On a fair six-sided die, an even number can be 2, 4 or 6. Three of the six equally likely faces belong to the event.

Half the possible faces are even. We do not know which face will appear on the next roll.



The probability scale runs 0 to 1

What changes? What stays true?

Counting favourable outcomes works as a fraction of all outcomes only when those outcomes are equally likely.

When reading a chart of experiment results, state what happened. Avoid presenting a short experiment as a certainty about the next outcome.

Change one condition

Add two blue counters. Both colours now have three counters, so each is equally likely when the bag is mixed.

Coin 1	Coin 2
H	H
H	T
T	H
T	T

Which results have exactly one head?

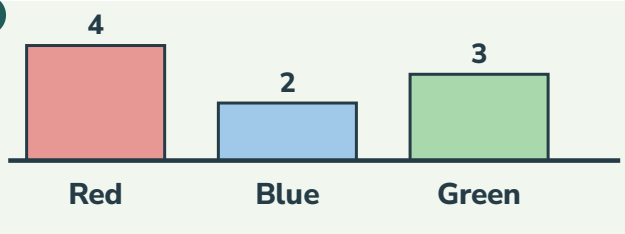
HT and TH. With two independent fair coins that is two of four results.

ILLUSTRATED PROBLEM SHEET

Read a display one mark at a time

The key says what a mark is worth.

1



Which has the most votes?

Red has four. It has one more vote than green.

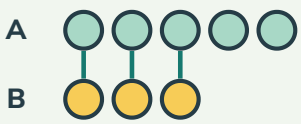
2



Each counter means two votes. How many votes in A?

Three marks represent six votes.

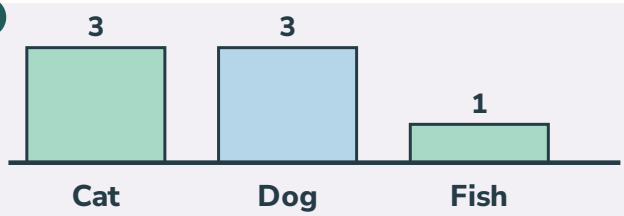
3



With one vote per mark, how many more voted A?

Three pairs match. Two votes remain in A.

4



Is there one winner?

Cat and dog tie with three each. Seven votes were cast.

A row with zero marks
zero recorded votes.

Two equally long rows under the same key
a tie.

CHAPTER PROBLEM

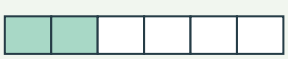
A bag has 4 green counters and 1 blue counter. Which colour is more likely on one random draw? Is it certain?

Green is more likely because four of the five counters are green. Blue can still be drawn.

QUESTION BANK · FOLD OR COVER THE RIGHT COLUMN

Check your reasoning

Try the problem	Solution and reasoning
01 Can you fairly compare two guessing games if one player gets twice as many turns?	Compare successes per turn or give both the same number of turns.
02 If the key changes from one vote per mark to two, do the voters change?	No. Each complete pair of votes now uses one mark.
03 One blue counter is added to the original bag. Is blue now as likely as red?	No. There are two blue and three red among five counters. Red still has more possible draws.
04 A bag has one yellow and nine green. Can yellow occur on the first draw?	Yes. Its chance is small but one yellow outcome exists.
05 Add green counters to a bag holding only red. Can a red draw become impossible this way?	No. As long as a red counter remains, red is still possible.



2 of 6

A fair die wins on 5 or 6. What is the chance of losing?

Four other faces lose. The chance is 4/6, or 2/3.

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