Are you feeling lucky?



Amber

If I close my eyes, I am more likely to get a six!





If there is a 50/50 chance of something happening, 9 times out of 10 it will...



Evie



Sarah

Tomorrow it will rain or it won't. That means there is a 50/50 chance of it raining...



My mother is expecting another baby. The last four have all been boys, so by the law of averages, the next one must be a girl!



Matthew

1 Do these comments sound reasonable to you? Discuss your ideas with a friend.

A fair game?



You are going to play a game this morning.
Your task is to decide if the game is fair.

Miss F

2 What do you mean by a fair game? Discuss your ideas with your partner.



Alice

A fair game is one where you can't predict who is going to win.

A fair game means you have an equal chance of winning.



Matthew



Miss F

You will be playing this game in pairs. You need 9 counters each and one six-sided dice between you.



Miss F

Before you start, decide who will be the RED player and who will be the BLUE player. You will then take it in turns to roll the dice.
If 1, 3 or 5 is rolled, BLUE gives RED that number of counters.
If 2, 4 or 6 is rolled, RED gives BLUE that number of counters.
The winner is the first to gain all of the counters.

3 Do you think this is a fair game? If not, who do you expect to win? Discuss your ideas with your partner.



Jon

It isn't fair. BLUE will always win because he receives more than he has to give.

Not necessarily. If our first two throws are both fives, RED will win.



Sarah



Evie

In that case, it just depends on luck.
So I think it is a fair game.

In that case, let's just play the game and find out for ourselves.



Taro



Miss F

Now play the game five times. Keep a record of your results.
How many times did RED win?
How many times did BLUE win?
So, is this a fair game?
Explain your reasons.



Amber



Sarah

Amber (RED) and SARAH'S (BLUE) SCORECARD

Game 1

Dice	Amber	Sarah
	9	9
2	7	11
5	12	6
2	10	8
3	13	5
6	7	11
1	8	10
5	13	5
3	16	2
4	12	6
5	17	1
1	18	0

Amber wins (RED)

Game 2

Dice	Amber	Sarah
	9	9
2	7	11
3	10	8
1	11	7
4	7	11
2	5	13
4	1	17
2	0	18

Sarah wins (BLUE)

Game 3

Dice	Amber	Sarah
	9	9
4	5	13
6	0	18

Sarah wins (BLUE)

Game 4

Dice	Amber	Sarah
	9	9
1	10	8
2	8	10
2	6	12
6	0	18

Sarah wins (BLUE)

Game 5

Dice	Amber	Sarah
	9	9
5	14	4
5	18	0

Amber wins (RED)

SUMMARY
RED 2 WINS
BLUE 3 WINS

4 How can we be more confident about the fairness of this game?.

We could put all of our results together.
That would give us a lot more useful data.



Matthew

Fair games



Jon

We have collected all of our results and found that
RED won 22 times but BLUE one 48 times.
So I would say the game is NOT FAIR.



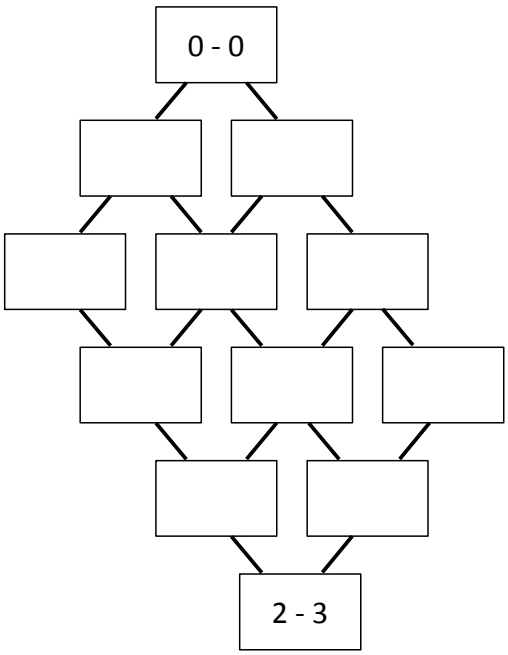
Miss F

Based on our results so far, which of the words listed below would you use to complete these sentences?

1. It is _____ that RED will beat BLUE in one game.
2. It is _____ that RED will beat BLUE over five games.
3. It is _____ that BLUE will beat RED in one games.
4. It is _____ that BLUE will beat RED over five games.

"Quite certain"	"Probable"	"Possible"	"Fairly likely"
"Highly improbable"	"More than likely"	"Beyond a doubt"	"Unlikely"

5 In the game between Taro and Jon, RED won 2 twice and BLUE won three times. Write down the possible scores after each round..



6 How many different ways can the final score be reached?

Strange but reported as true ...


Roswell Daily Record

RAAF Captures Flying Saucer On Ranch in Roswell Region

Claims Army Is Slacking Courts Martial

House Passes Tax Slash by Large Margin

Security Council Paves Way to Talks On Arms Reductions

No Details of Flying Disk Are Revealed

Roswell Hardware Man and Wife Report Disk Seen

Ex-King Carol Weds Mme. Lupescu

Reported on July 7th 1947


1 • Mar. 14, 2005 A Legal Journal serving Madison

Alton attorney accidentally sues himself

By Steve Korris

Alton attorney Emert Wyss

chosen Centerre Title--a company that Wyss owned--close her loans.

In the course of the attorne

Emert

Reported on March 14th 2005


SUNDAY SPORT

Sunday, October 1, 1989

Is Elvis alive?

Free £945 car phone for every reader!

CLAIM YOUR FREE PHONE ON PAGE 11

£1,000,000 FREE DRAW

SEE DETAILS INSIDE TODAY

STATUE OF ELVIS

ANOTHER AMAZING WORLD PICTURE EXCLUSIVE

FULL STORY AND PICTURES — PAGE 7

FOUND ON MARS

Showjumper strips off for her horse... ROMP TO CENTRE PAGES

Reported on October1st 1989


Army vehicle disappears

AN Australian Army vehicle worth $74,000 has gone missing after being painted with camouflage.

Police are seeking public help to find the four-wheel drive, which was

Reported on May 26th 2008

7

Do you believe these stories were actually true? Try to use one of these words in each of your answers.

"Quite certain"	"Probably"	"Maybe"	"Fairly likely"
"Not in a month of Sundays"	"A fighting chance"	"Beyond a doubt"	
"A 50/50 chance"	"More than likely"	"Highly improbable"	

Thinking About Probability

1. Create headlines for the front page of a newspaper, with:



   a) Two news stories that will probably happen today.

   b) Two news stories that probably won't happen today.

   c) Two news stories that might possibly happen later today.

2. From the list below, which stories are you most likely to see on the local news show? Arrange them in order of probability – the most unlikely first. **There is a handout for this activity** (Probability_1A) .

   a) The Queen will be visiting your school tomorrow

   b) Police are concerned about the rising crimes rates in the area

   c) The local football team are likely to sign a £5million player in the next few days

   d) The Prime Minister will be visiting the area in the next week

   e) The Beatles have reformed, with all four original members

   f) The Voice UK today announced they are looking to find a new presenter from this region

   g) Following recent flood warnings, the council have finally begun the promised new flood defences

   h) Over the weekend, bright blue aliens have been sighted locally

   i) Bognor Regis won this year's 'Sunniest Holiday Venue' title

   j) Pupils from local schools have been asked to take part in a televised debate with local politicians

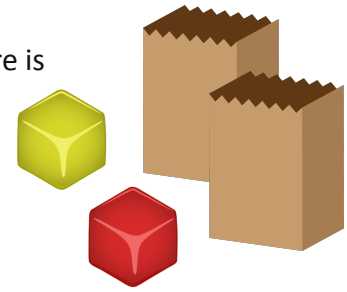
3. Look again at these phrases that are often used to describe the probability of an event happening. Put them in order of probability – the most unlikely first. **There is a handout for this activity (**Probability_1B)

"Quite certain"	"Probably"	"Maybe"	"Fairly likely"
"Not in a month of Sundays"	"A fighting chance"	"Beyond a doubt"	
"A 50/50 chance"	"More than likely"	"Highly improbable"	

4. What other 'probability' phrases do you often hear?

Bags of cubes

Identical bags



1. For a probability experiment, there 12 red cubes and 8 green cubes. The cubes are shared out equally between the two bags so that there is the same number of cubes of each colour in each bag.
   a) What is in each bag?
   b) If you select one cube from either bag, is it more likely to red or green?
   c) Create your own problem based on this puzzle

2. Beginning with 24 cubes that can be either green or red, create 3 identical bags of cubes.
   a) How many cubes are there in each bag?
   b) How many green cubes are in each bag?
   c) How many red cubes are in each bag?
   d) Compare your answers with other pupils. Did you get exactly the same answer?
   e) How many different answers could there be?

How many cubes altogether?

1. There are two bags. One bag contains 7 red cubes, and the other contains 17 blue cubes. How many cubes are there altogether?

2. There are two bags. One bag contains 7 cubes the other contains two more cubes than the first. How many cubes are there in total?

3. There are two bags, and one contains 8 cubes. The other bag contains twice as many cubes as the first. How many cubes are there altogether?

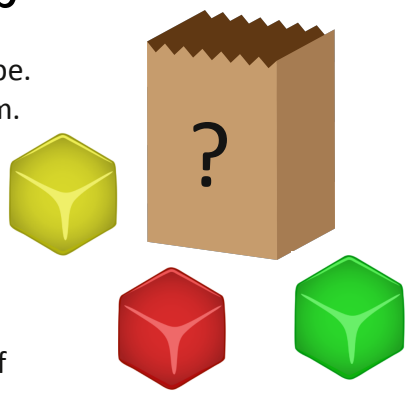
4. There are three bags. There are 6 cubes in one of the bags. Empty the cubes from one bag into another. One bag now contains no cubes. The other two bags now have the same number of cubes. How many cubes are there altogether?

5. Make up your own problem similar to these.

What's in the bag?

1. A bag of cubes contains 8 cubes. Amber picks out a cube without looking, and it is red. She puts it back and then picks out another cube and it is blue. After twenty goes, she has chosen 12 red cubes and 8 blue cubes.
   a) How many red cubes and how many blue cubes might there have been in the bag?
   b) Explain your thinking.

Lucky Dip



1. A lucky dip bag contains 3 red, 2 yellow and 1 green cube. You are going to draw one cube from the bag at random.

   a) How certain are you that your first dip will be red?

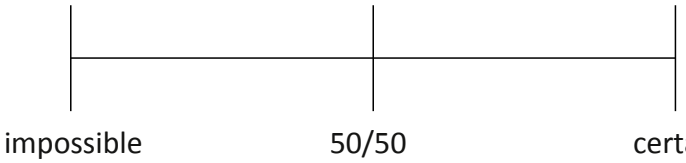
   b) What are the chances of getting a yellow?

   c) What about the chances of getting a green cube?

   d) Use the probability line to show how sure you are of getting each colour

   e) What colour do you think it will be?

Probability Line



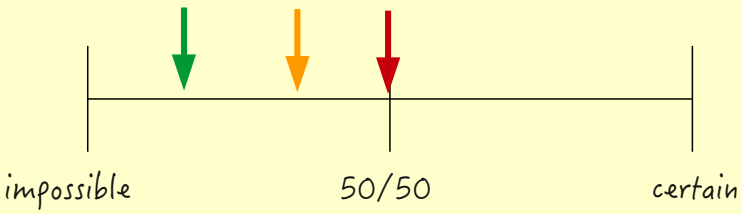
Evie's working



Evie

I think there is a 50/50 chance of getting a red
A reasonable chance of getting a yellow
And a slight chance of getting a green

Probability Line



I think the first cube will be a red

f) Now draw a cube from the bag. Were you right?

g) If you do not replace the cube, how many cubes are left in the bag?

h) What colours are they?

i) You now draw out another cube from the bag. What is the probability of drawing each colour? Draw a probability line to record your results.

j) Now repeat these steps until there are no cubes left in the bag.

The probability line



Evie

Evie's working

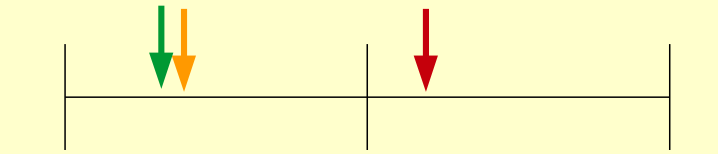
The first cube was yellow, so I was wrong.

There are now 5 cubes left, 3 red, 1 yellow and 1 green.

Red is now more likely to come up; green and yellow have an equal chance, but it isn't likely that they will come up next.

So I think the next one is likely to be red.

Probability Line



Oh no, I was wrong again. It was green



Taro

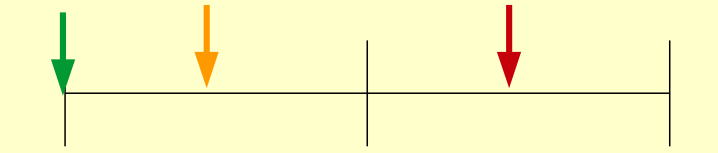
Taro's working

There are only 4 cubes left, 3 red and 1 yellow.

So red is highly likely to come up, yellow unlikely to come up and it is impossible for green to be picked.

I think the next cube will be red.

Probability Line



As I thought, this time it is red

The probability line

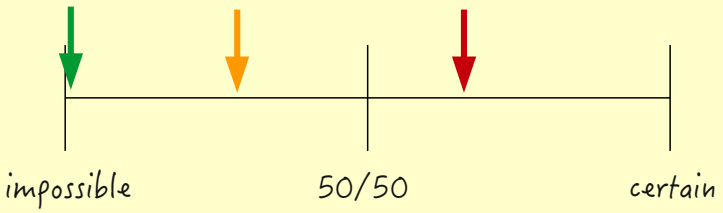


Sarah

Sarah's working

There are now only 3 cubes left.
2 red and 1 yellow. Red is the most likely to come up, but yellow has a one in three chance too.
So I think the next one is likely to be red again.

Probability Line



Oh no, it was yellow!

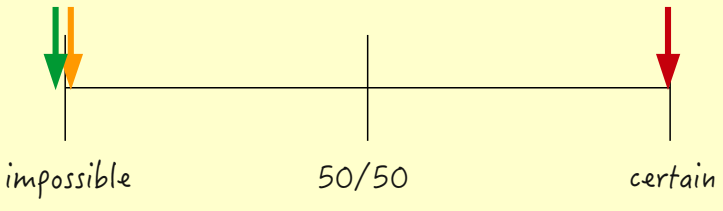


Matthew

Matthew's working

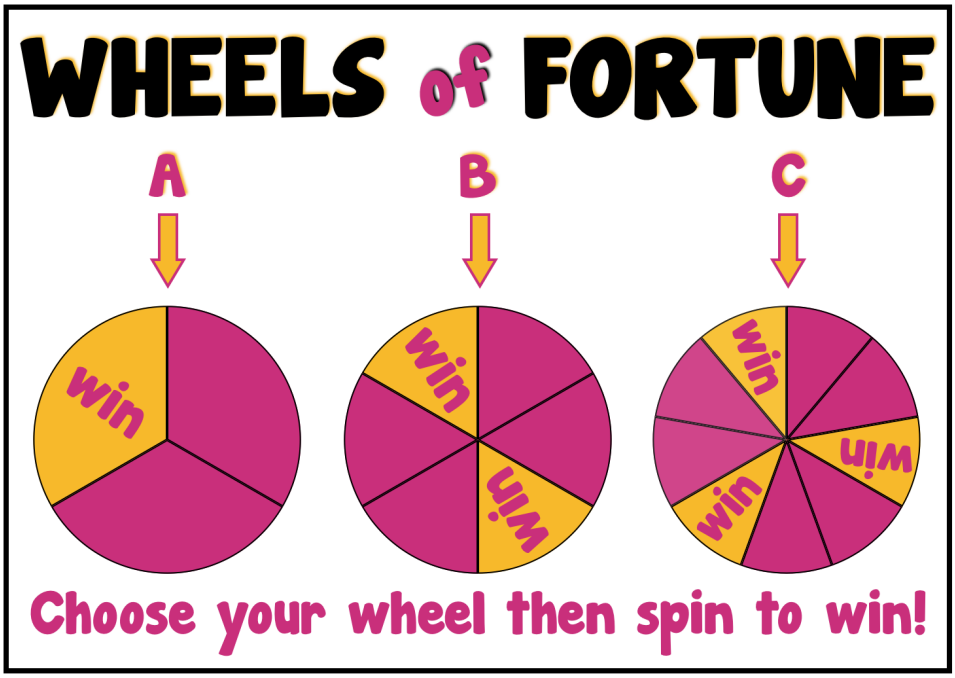
There are only 2 cubes left, both red.
So it is certain that the next cube will be red.
It is impossible to choose yellow or green.
The next cube must be red.

Probability Line



As I said, this time it is red.

Wheels of Fortune





Amber: I think wheel C is best, as there are three ways of winning...

Sarah: No, wheel A is best as there are only two ways of losing...

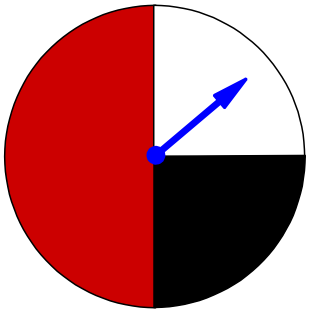


Evie: If I have 3 goes on wheel A, I am sure to win at least once!

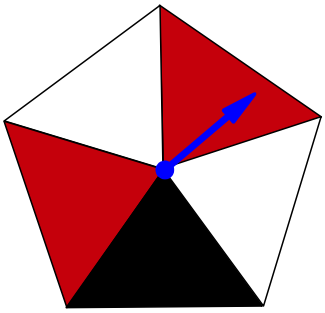
Jon: The wheels are all equal, you either win or lose so it is 50/50

1. What do you think about these statements?
2. Which wheel do you think gives the best chance of winning, and why?
3. Who will come off best in the long run – the person running the game or the players? Or both?
4. Make your own spinners and play!

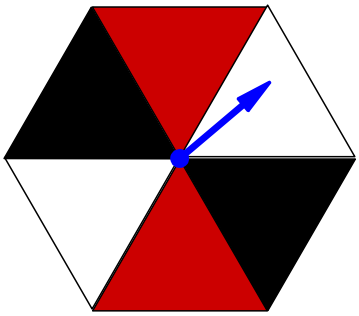
Smart Spinners



A



B



C

Look at these three spinners.

1. Which spinner is most likely to stop on red?
2. Which spinner is most likely to stop on white?
3. Which spinner is most likely to stop on black?
4. Which spinner(s) has an equal chance of stopping on red or white?
5. Which spinner has an equal chance of stopping on red, white or black?
6. Predict about how many times each colour will come up on each spinner if you spin each of them 30 times.
7. Make your own spinners and spin each of them 30 times. Record your results in a tally chart as shown below.



Colour	Tally marks	Total
Red	𝍸 𝍸 ////	14
White	𝍸 ////	9
Black	𝍸 //	7
	Total	30

8. Which spinner do you think these results are from?
9. Did your results match your predictions? Why was this the case?
10. Would the outcome be better if you added everyone's results together for each spinner?
11. Design and make a spinner that, if you spin it 100 times, may give...
    a) 25 red, 25 blue, 25 yellow and 25 green
    b) 25 red, 25 blue and 50 yellow
    c) 25 red, 20 blue, 20 yellow, 25 green and 10 white

Let's think about choices



1. If two coins are tossed, what could happen? Make a list or draw a diagram to show your thinking.

2. Mr and Mrs Amir have three children. The youngest is a girl. Make a list or draw a diagram to show what the family might look like.



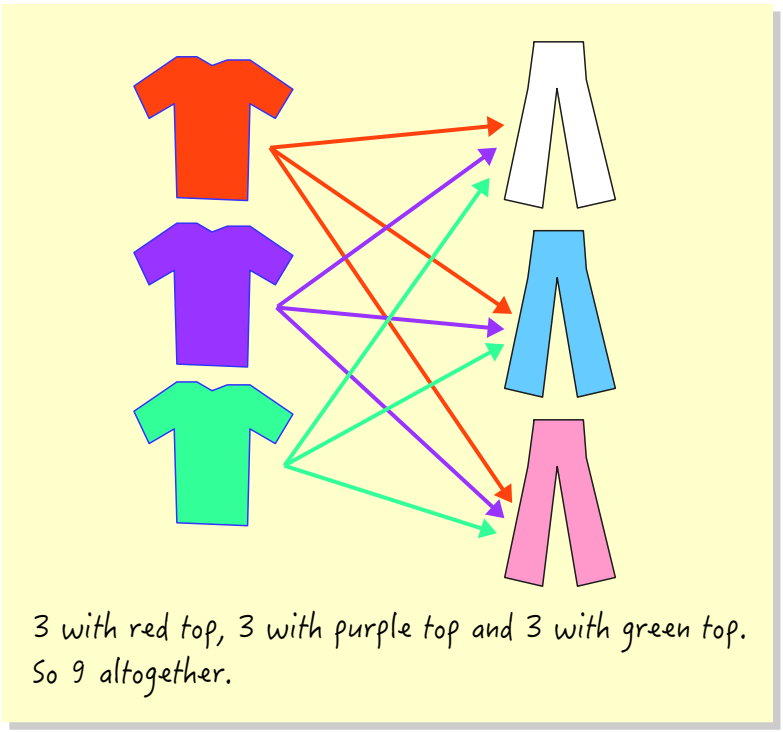
3. Jon has built a set of three flashing lights in line. Each one changes from red to blue continually. Make a list or draw a diagram to show what the lights might look like at any one moment.

4. Amber has taken 3 different summer tops and 3 different pairs of trousers to summer camp.
   How many different outfits could she choose to wear?



Evie

Evie's working on Amber's choices



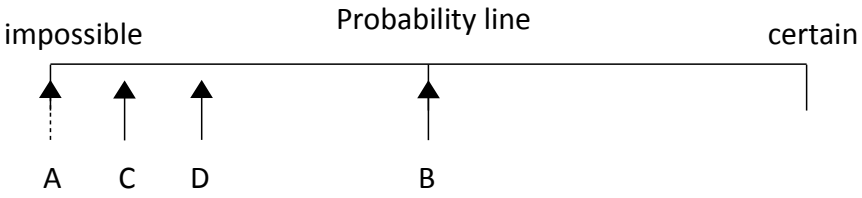
8 What difference would it make if Amber bought one more top?
What if she brought two extra tops?

Probability 1: Mastery questions

There is a bag containing 5 red cubes, 2 blue cubes, 2 green cubes and 1 white cube.

One cube is chosen at random.

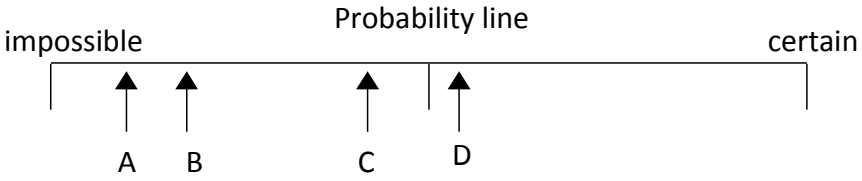
Questions 1 to 4 refer to the cubes in this bag and to the probability line below.



1. Which arrow indicates that the cube chosen was red?
2. Which arrow indicates that the cube chosen was white?
3. Which arrow indicates that the cube chosen was black?
4. Which arrow indicates that the cube chosen was green?

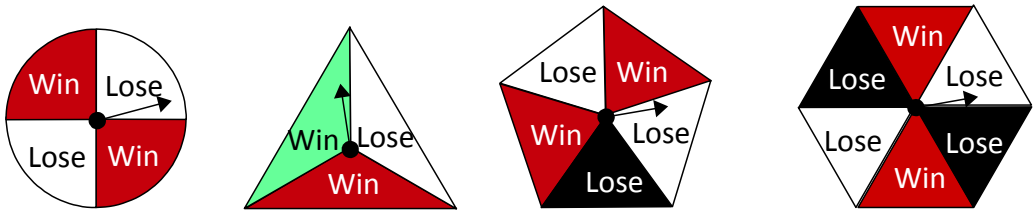
These words are used to describe the probability of an event happening.
Questions 5 to 8 refer to where these phrases belong on a probability line.

"Maybe"	"A 50/50 chance"	"More than likely"	"Highly improbable"



5. Which arrow points to "Maybe"?
6. Which arrow points to "A 50/50 chance"?
7. Which arrow points to "More than likely"?
8. Which arrow points to "Highly improbable"?

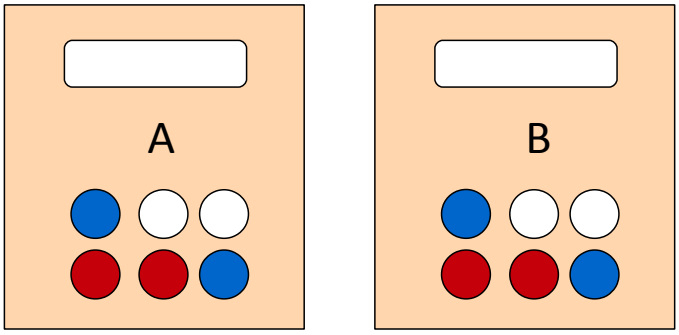
Questions 9 and 10 use the spinners shown below.



9. In the spinners game above, which spinner gives the best chance of winning?
10. In the spinners game above, which spinner gives you the least chance of winning?

In Questions 11 – 12, you must show all of your working.

11. There are two identical bags, each containing 2 red, 2 blue and 2 white balls, as shown below.

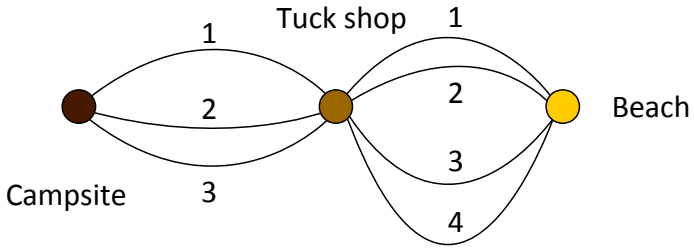


A ball is chosen at random from bag A and placed in bag B.

A ball is then chosen at random and put into bag A.

What balls could now be in bag A?

12. Julian has been camping recently and discovered three possible cycle tracks from the campsite to the tuck shop and four possible routes from the tuck shop to the beach.
How many different routes are there from the campsite to the beach? Explain your thinking.



Notions About Probability – Handout (Probability_1A)

BREAKING NEWS

The Queen will be visiting your school tomorrow

BREAKING NEWS

Police are concerned about the rising crimes rates in the area

BREAKING NEWS

The local football team are likely to sign a £5million player in the next few days

BREAKING NEWS

The Prime Minister will be visiting the area in the next week

BREAKING NEWS

The Beatles have reformed, with all four original members

BREAKING NEWS

The Voice UK today announced they are looking to find a new presenter from this region

BREAKING NEWS

Following recent flood warnings, the council have finally begun the promised new flood defences

BREAKING NEWS

Over the weekend, bright blue aliens have been sighted locally

BREAKING NEWS

Bognor Regis won this year's 'Sunniest Holiday Venue' title

BREAKING NEWS

Pupils from local schools have been asked to take part in a televised debate with local politicians

Notions About Probability – Handout Probability_1B

PROBABILITY PHRASE	PROBABILITY PHRASE
Quite certain	Probably
PROBABILITY PHRASE	**PROBABILITY PHRASE**
Highly improbable	More than likely
PROBABILITY PHRASE	**PROBABILITY PHRASE**
A fighting chance	Not in a month of Sunday's
PROBABILITY PHRASE	**PROBABILITY PHRASE**
Beyond a doubt	Fairly Likely
PROBABILITY PHRASE	**PROBABILITY PHRASE**
A 50/50 chance	