Probability

Educational context

In this activity group, children become familiar with and use the language of probability. They begin to understand that there is a degree of uncertainty around some outcomes, while others are certain or impossible. Children explore the mathematics behind how likely things are to happen, and how mathematics can put a number on the likelihood of individual events occurring. In Activity 1 children are invited to compare and order different outcomes, recording their likelihood of happening on number lines. In Activity 2, they make connections with their understanding of fractions and percentages to describe mathematically the probability of an outcome, e.g. 'a one-in-four chance' or 'the probability of this occurring is one-quarter' or 'there's a 25% chance of…'. Children will be required to work systematically when exploring activities where they need to find all the possibilities, such as in Activity 5. In Activities 2–5, children are given opportunities to notice that the probability of an outcome does not guarantee it will happen that way, for example tossing a balanced coin ten times will not always result in five heads and five tails. This allows children to begin to build an understanding that probability is helpful in making predictions but is not foolproof.

Children have an instinct for 'fairness' in the sense of 'equal chance'. They know when something feels 'fair' or 'unfair' to them, and this forms a basis for their understanding of chance, likelihood and probability. From simple guessing games such as 'which hand?' to the tossing of a coin, children experience probability from a young age, long before it is formally studied in a mathematical context. In this activity group children build on these experiences, learning that probability or 'likelihood' can be predicted, measured and quantified, either as a fraction or decimal between zero and 1 or as a percentage, depending on the number of possible outcomes. Thus we might say that there is a 20% chance of rain, or a $\frac{1}{6}$ chance of rolling a four on a normal 6-sided dice.

Learning opportunities

- To understand that the likelihood of a particular outcome can be suggested by a measure of probability but it is not guaranteed.
- To understand that some things are certain and others are impossible, and that the likelihood of any event will fall somewhere between these two extremes.
- To realize that outcomes or events are not wholly predictable unless they are certain or impossible.
- To compare the probabilities of different events occurring by describing them as a fraction (e.g. $\frac{1}{2}$ or $\frac{1}{4}$).

Words and terms for use in conversation

chance, probability, likely, unlikely, even chance, evens, biased, certain, uncertain, impossible, possible, probable, predict, likelihood, prediction, theoretical, experimental, actual

Assessment opportunities

Look and listen for children who:
- Use the words and terms for use in conversation effectively.
- Explain why some events are more likely than others.
- Calculate simple probabilities from among a finite number of outcomes.
- Express probabilities as a fraction with a value between zero (impossible) and 1 (certain).
- Compare the probabilities of different events using fractions.

📖 Explorer Progress pages

After completing work on this activity group, give small focus groups of children the Explorer Progress pages included at the end of the activity group and ask them to work through the challenges on the pages. As children complete the pages, assess what progress they are making with the central ideas from the activity group. Refer to the assessment opportunities for assistance.

🏠 Explore More Copymaster 11: What are the Chances?

After completing work on Activity 2, give children Explore More Copymaster 11: What are the Chances? to take home.

Focus activities

5

Activity 1: How likely?

Have ready: How Likely? (photocopy master 33), scissors, sticky notes with events written on them (indicated in bold in Step 2)

Step 1

Tell children that they are going to play a game where they order events according to how likely they are to happen. Draw a long horizontal line on the board. Agree that the left-hand end of the line will represent 'impossible' events that will 'definitely not' happen and the right-hand end will represent any events or outcomes which are 'certain' to happen. Mark the centre of the line and ask children what kind of events might sit there. Look and listen for children suggesting events that have an 'even chance' of happening or not happening, see **Fig.1**. Agree that the line is like a scale and that the closer something is placed to 'certain' the more likely we think it is to happen and the closer it is placed to 'impossible' the less likely we think it is to happen.

Step 2

Read each sticky note out and ask children to discuss each one and agree where to place it on the line, giving reasons:

I toss a normal coin and it lands 'heads-up'. (Children may suggest this should go in the centre of the line because there is an 'even chance' of a coin landing on either heads or tails.)

I roll a normal 6-sided dice and get a SIX. (Children may suggest placing this somewhere between the centre and 'impossible' because it is less likely than an even chance, but not impossible. Some children may suggest there is a one-in-six chance of throwing a six.)

I roll a normal 6-sided dice and get a score of MORE than 2. (Children may decide to place this somewhere between the centre and 'certain' because it it more likely than an even chance, but not certain. Some children may suggest there is a four-in-six chance.)

Thursday will follow Wednesday next week. (Listen for children who can explain that is 'certain' because of the pattern our days of the week follow.)

A human will run a marathon in less than one minute in the next year. (Listen for children agreeing this is 'impossible' and supporting their reasoning with explanations of how long a marathon is and what distance might reasonably be covered in one minute.)

Step 3

Discuss whether children think the likelihood of any future event can be placed on this line. Invite children to suggest examples as appropriate to support their reasoning. Agree that nothing can be less likely than impossible or more likely than certain so the likelihood of any event must fit somewhere along the line.

Step 4

When they are ready, give groups of children a copy of the How Likely? sheet and scissors to cut out the cards. Explain that the sheet contains eight imaginary future events, and their task is to discuss and agree which of these events are more or less likely to happen, using reasons to justify their answers. They place the cards in a horizontal line with 'Least likely' at the far left and 'Most likely' at the far right.
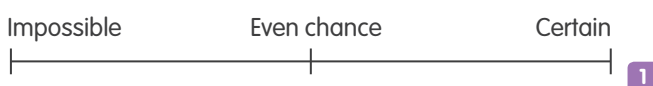
Look and listen for children who reason that some things are more likely to occur than others and who place the cards in order accordingly. Some ideas are equally likely and these can be placed above one another as appropriate, e.g. **Fig. 2**.

Step 5

Once everyone has placed their cards, ask children to read out their order, from least likely to most likely. As they do so, other groups should listen and compare their suggestions to see what similarities and differences occur between groups. Listen for children using language appropriately as they discuss their ideas and for children who reason that the Numicon Shapes card has an even chance of occurring because half of the Shapes 1–8 are odd.
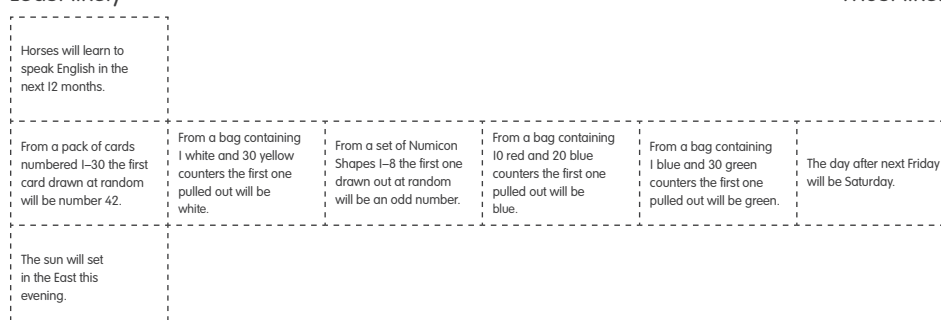
Step 6

Children can stick their own set of cards onto a strip of paper or card as a record.

Impossible	Even chance	Certain

1

Least likely   Most likely

Horses will learn to speak English in the next 12 months.

| From a pack of cards numbered 1–30 the first card drawn at random will be number 42. | From a bag containing 1 white and 30 yellow counters the first one pulled out will be white. | From a set of Numicon Shapes 1–8 the first one drawn out at random will be an odd number. | From a bag containing 10 red and 20 blue counters the first one pulled out will be blue. | From a bag containing 1 blue and 30 green counters the first one pulled out will be green. | The day after next Friday will be Saturday. |

The sun will set in the East this evening.

2

Measurement

5

Activity 2: Peg bag probabilities

Have ready: Numicon Feely Bag, Numicon Coloured Pegs, sticky notes

Step 1

Draw the 'How Likely' scale from Activity 1 on the board, see Fig. 1. Show children 3 red Pegs and 1 yellow Peg. Ask children if you placed the Pegs in a Feely Bag and pulled out one Peg from the bag, how likely is it that the Peg would be red? How likely is it that the Peg would be yellow? Ask children to decide where they would place each possibility on the scale. Agree that it is 'more likely' that you would pull out a red Peg than a yellow Peg, but it isn't guaranteed. Look and listen for children who can explain that pulling out a red Peg would be very likely but not certain, and that selecting the yellow Peg would be unlikely but not impossible, and mark children's decision on the scale using sticky notes e.g. Fig. 3 .

Step 2

Tell children that sometimes numbers are used to explain how likely something is to occur. Ask children to look at the scale they used for the Pegs again (see Fig. 3). Ask them to explore whether they can add numbers to the scale and what they might be. Agree with children that if something is impossible there is zero chance of it happening and label 'Impossible' as '0'. Discuss 'even chance', reminding children of the example of tossing a coin. Agree that with an even chance there is a 1 out of 2 or $\frac{1}{2}$ (or 50%) chance of something happening and label 'Even chance' as '$\frac{1}{2}$'. Discuss with children what number might be used for 'certain' and look and listen for children discussing that if something is certain it is 100% likely to happen. They may make a connection with 100% and 1, or use the scale to deduce that if $\frac{1}{2}$ is in the middle of the scale the right-hand end of the scale must be 1. Agree to label 'Certain' as '1'.
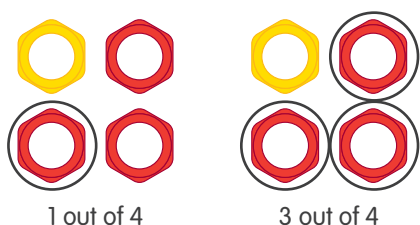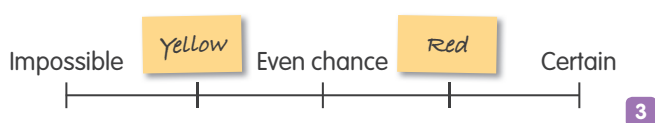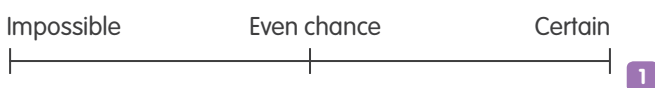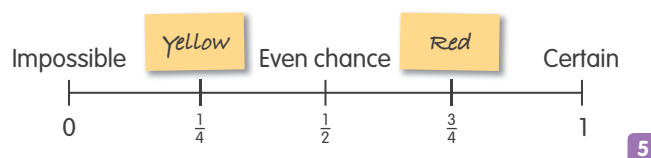
Step 3

Invite children to discuss whether they can use numbers to explain the chance of selecting a yellow or a red Peg from the Feely Bag. Look and listen for children who say there is a 1 out of 4 chance of selecting a yellow Peg and a 3 out of 4 chance of selecting a red Peg and can use the Pegs to explain this, e.g. Fig. 4 . Encourage children to record this as $\frac{1}{4}$ and $\frac{3}{4}$ and to make connections with their understanding of fractions that there is a one-quarter or three-quarter chance of selecting each colour (if it is helpful, relate this to percentages: 25% chance and 75% chance). Explain to children that these fractions are known in maths as 'probabilities', and that we can say things like 'The probability of drawing a red Peg from the Feely Bag is three-quarters and the probability of drawing a yellow Peg from the Feely Bag is one-quarter.' Now ask children to move the 'Yellow' and 'Red' sticky notes to position them accurately on the line, and label them with the fractions $\frac{1}{4}$ and $\frac{3}{4}$; see Fig. 5 .

Step 4

Give groups of children Feely Bags and Pegs and ask them to place one yellow and three red Pegs in their bag and to pull a Peg out, record the colour, return it to the Feely Bag, shake the Feely Bag and then pull out another Peg, repeating until they have selected a Peg four times. Encourage children to predict what colour of Pegs they think they will draw out of the Feely Bag – e.g. one yellow and three red; four red; three yellow and one red – and to give reasons for their predictions. Ask children to repeat this a few times and record their results. Then ask the groups to share their results, e.g. Fig. 6 .

Impossible　　　Even chance　　　Certain

1

Impossible　Yellow　Even chance　Red　Certain

3

1 out of 4　　　3 out of 4

4

Impossible　Yellow　Even chance　Red　Certain

0　　$\frac{1}{4}$　　$\frac{1}{2}$　　$\frac{3}{4}$　　1

5

Game number	Red Pegs	Yellow Pegs
1	2	2
2	4	0
3	3	1
4	1	3
5	4	0
6	3	1
7	0	4

6

5

Step 5

Discuss children's results and encourage them to compare them to the 'probabilities' they came up with for selecting each Peg in Step 2. Look and listen for children who notice that the probability or likelihood of something happening does not mean that it will happen that way. Encourage children to think about whether this is also the case for probabilities of 1 or 0 that are certain or impossible. Support children's understanding by asking them what the probability of drawing a green Peg out of the Feely Bag is. Agree it is 0 or impossible as no matter how many times they draw out a Peg it will be either yellow or red, never green. Place four red Pegs in the Feely Bag and ask children the probability of pulling out a red Peg. Agree it is 1 or certain as no matter how many times they draw out a Peg it will always be red. Listen for children refining their understanding that probability is an indicator of how likely an event is to happen, but (unless the probability is 0 or 1) events are not guaranteed to match the theoretical probability. Allow plenty of time for discussion here.

Step 6

Give children time to explore different probabilities with the Pegs in the Feely Bag, recording their results in a table. For example, some children might be happy adding a third colour of Peg to the Feely Bag, and then calculating the probability of drawing out a Peg of each colour, others may want to reduce the number of Pegs to two (one red, one yellow) and explore 'even chance'. Some children may like to repeat the one yellow and three red combination, recording more games and seeing if collecting more data causes the one yellow and three red combination to be drawn more often.

🏠 After completing work on this activity, give children copies of Explore More Copymaster 11: What are the Chances? to take home. This will allow children to practise comparing probabilities along a scale.

Activity 3: Heads or tails?

Have ready: Heads or Tails? (photocopy master 32), coins with two discernibly different sides (e.g. heads and tails), spreadsheet software (optional)

Step 1

Explain that at the start of a football match the referee tosses a coin to decide which team will kick off the match. Ask children to imagine that the local football referee association are concerned that the coins that their referees are using are 'biased', or unbalanced, and that they fall showing 'tails' more often than 'heads'. They have asked whether the children can investigate and report back.

Heads	||||
Tails	⩲⩲⩲ |

7

Step 2

Give each pair of children a coin. Invite them to say what they would expect to happen if they were to toss the coin 10 times. Look for children who realize that, if the coin is balanced, the most likely outcome is 5 'heads' and 5 'tails' but that this is not certain to happen. Listen for children using the language of probability, such as 'there is an even chance of getting heads or tails', 'one out of two chance' or 'the probability of getting heads is one-half and the probability of getting tails is one-half (or 50%)'.

Step 3

Ask each pair of children to toss their coin 10 times and to record the number of 'heads' or 'tails' that they get, e.g. **Fig. 7**. Talk with them about their results. It is likely that the balance of heads and tails will vary considerably (e.g. some groups might get 2 heads and 8 tails, while others might get 7 heads and 3 tails).

Step 4

Ask children to compare their results to their predictions. Look and listen for children who can explain that while there may be an 'even chance' of landing heads or tails it does not always mean that will be the outcome. Tell children that tossing a coin just ten times may not provide enough data to be sure about the balance of the coin. Give them a copy of the Heads or Tails? sheet and invite them to repeat the experiment ten times (giving 100 tosses in all).

Step 5

Once each pair has 100 results, ask them whether their results suggest that their coin is balanced or biased. Ask children to compare their 100 results to their original 10 results and discuss whether having more data has given them a different picture of the balance of their coin. Look and listen for children comparing their two sets of data and the probability they agreed for getting either heads or tails, to reason about the balance of their coin.

Step 6

Invite every pair to put their data into appropriate spreadsheet software, if available, so that everyone's results are combined, and to discuss what happens. Invite children to make comparisons between the data collected for 10 tosses, 100 tosses and the whole class's tosses. Children are likely to find that the more data that is collected, the closer the proportion of heads and tails will get to a half. Ask children to use the whole-class data to decide what to report to the referee association about the balance of the coins and encourage them to discuss whether they think their tests are conclusive or if more testing might be needed. Children may suggest that combining the data for all coins is not sensible as some coins might be balanced and others not. If so, discuss any suggestions they have for how to change the investigation into testing the coins.

Measurement

5

Activity 4: Probability game

Have ready: Numicon Feely Bag, Numicon Coloured Pegs, Numicon Coloured Counters

Step 1

Explain that children are going to test a game. The game involves 'paying' a Counter to reach into the Feely Bag and withdraw a Peg. Depending on the colour of the Peg they can win or lose Counters.

Step 2

Model a game. Place 1 red Peg and 4 blue Pegs into a Feely Bag. Ask a child to give you a Counter and invite them to reach inside the Feely Bag and remove a single Peg. If it is red, they win 3 Counters, but if it is blue they lose the Counter they 'paid' to play. The Peg is replaced each time.

Step 3

After a few games, ask children if they think that the game favours the player or the Feely Bag holder. Ask them if they can work out the probability of the player winning a game (that is, of pulling out a red Peg at random). Look and listen for children who can explain that the chance or probability of a player winning a game is $\frac{1}{5}$ while the chance of losing is $\frac{4}{5}$, so players might expect to win only one out of every five games, although this outcome is not guaranteed.

Activity 5: Double dice game

Have ready: Numicon Coloured Counters, several 1-6 dice, Double Dice (photocopy master 31)

Step 1

Tell children they are going to play a game called Double Dice in small groups. Explain the rules: each child will have a Double Dice sheet and ten counters. Each group needs two dice. The Double Dice sheet shows all the possible total scores (2–12) when rolling two dice. The idea is for each child to place all their counters into columns on the sheet (anywhere from 2 to 12). Once every player has done this, someone rolls both dice and finds the total rolled. Every player who has a counter placed in the column for the total shown on the dice may remove it. (They may only remove one counter per turn.) The aim of the game is to be the first player to remove all ten of their own counters.

If necessary, demonstrate the game by playing on the board for a few rounds.

Total score	Probability it might occur	Total score	Probability it might occur
2	$\frac{1}{36}$	8	$\frac{5}{36}$
3	$\frac{2}{36}$	9	$\frac{4}{36}$
4	$\frac{3}{36}$	10	$\frac{3}{36}$
5	$\frac{4}{36}$	11	$\frac{2}{36}$
6	$\frac{5}{36}$	12	$\frac{1}{36}$
7	$\frac{6}{36}$		

8

Step 2

Once children understand the rules of the game, ask them which columns it would be sensible to place their counters in and why. Discuss children's different strategies, e.g. using probability to work out which totals are most likely to be rolled.

Step 3

Ask children to work out how many possible different rolls there are for two dice. Agree there are 36: (1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (2,1), (2,2) and so on, look and listen for children working systematically. Invite children to work in pairs to find out the different totals each roll would give and then to work out what the probability, or likelihood, is of each possible total occurring (see **Fig. 8**), e.g. since there is only one way to make a total of 2 (1,1), agree that the probability of this occurring is just $\frac{1}{36}$, so very unlikely.

Step 4

Ask children how they can use their findings to help them decide where to place their counters in the game. Look and listen for children suggesting that 6, 7 and 8 are the most likely totals so they might concentrate most of their counters there. Some children may use their experience from previous probability games to suggest that while 6, 7 and 8 are the most likely totals they are not guaranteed and may suggest placing counters on some other totals too, e.g. **Fig. 9** .

Step 5

Give children time to play the game and test their theories. Look and listen for children refining their strategies and explaining their choices.

Name .... Date ..../......./.......

Double Dice   **31**

2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**

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9

Measurement

Practice and discussion

5

Whole-class

- Discuss with children how and when the mathematics they have been learning could help them in solving problems.
- Describe events for children to decide if they are impossible, unlikely, even chance, likely or certain, e.g. July will follow June this year; selecting a red apple from a box of 3 red and 3 green apples.
- Invite children to suggest events that are: impossible; unlikely; even chance; likely or certain. Discuss their events to see if all children agree.
- Give children events to order according to how likely they think they are to occur.
- Use Numicon Numeral Cards 1–9 or Numicon Shapes 1–9 in a Numicon Feely Bag and ask children to record the likelihood or probability of selecting: an odd number ($\frac{5}{9}$), an even number ($\frac{4}{9}$), a multiple of 3 ($\frac{3}{9}$), a multiple of 4 ($\frac{2}{9}$), a prime number ($\frac{4}{9}$). For children who need further support with identifying prime numbers, refer to the *Number, Pattern and Calculating 5 Teaching Resource Handbook*, Pattern and Algebra 3.
- Play probability games involving selecting Numicon Coloured Pegs from a Numicon Feely Bag and ask children to record the probability of selecting each colour on a probability scale or number line and to assign it a fraction.
- Shuffle a pack of playing cards and ask children to work out the probability that the top card will be red. (There are 26 red and 26 black cards in the pack, so the theoretical probability of the top card being red is $\frac{1}{2}$.) Turn over the top card and record its colour. Repeat this 20 times to see how many red and how many black cards are turned up. Discuss the fact that the expected (theoretical) probability is not always guaranteed to happen during experiments. Look and listen for children who can explain why the result will not always be 10 red and 10 black.
- Invite children to use their understanding of probability to invent games for the class to play. Encourage children to make predictions about outcomes and test them.

Independent

Paired work for Activity 1
Have ready: plain paper, rulers, sticky notes

Ask children to draw a continuous line to represent probabilities from impossible to certain. Invite them to write a series of possible future events on sticky notes and place them in the appropriate place on the line. Encourage them to think of something impossible, something certain, something likely, something unlikely and something that has an even chance of occurring.

Group work for Activity 1
Have ready: children's sticky notes from Paired work for Activity 1

Ask children to work together to order all their events from least likely to most likely to occur. Events that have the same chance of occurring can be placed above each other.

Paired work for Activity 2
Have ready: Numicon Feely Bag, Numicon Coloured Pegs

Give children a Feely Bag and a selection of Pegs, and ask them to create scenarios where the chance of something happening is $\frac{1}{2}$, then $\frac{1}{3}$, then $\frac{2}{3}$, then $\frac{3}{4}$, then $\frac{4}{5}$ (and so on).

Individual work for Activity 3
Have ready: packs of cards

Give children an equal number of red and black cards each. Ask them to record the probability of drawing a red or black card ($\frac{1}{2}$, even chance). Ask them to shuffle the pack and then draw a card and record its colour, before putting the card back into the pack. Ask them to repeat this a certain number of times and compare results with other children on their table to see how many red or black cards they each drew. Children should compare this with the probability they recorded and discuss why all their results might not match the probability.

Paired work for Activity 4
Have ready: Numicon Feely Bag, Numicon Coloured Pegs

Ask children to take turns to place five coloured pegs of their choice into the Feely bag. Encourage the children to discuss and record the probability of drawing out different coloured Pegs.

Paired work for Activity 5
Have ready: dice, plain paper, rulers, counters

Invite the children to create a game called 'Triple Dice'. The game is similar to Double Dice from Activity 5, but this time children must roll three dice and find the total rolled. Ask them to design a table to use as a game board, to think of the best strategy for playing the game and to try playing it.

Photocopy masters

These photocopy masters include an individual pupil assessment record that lists the key words and terms and assessment opportunities from this Activity Group to help you assess each child.

They also include a variety of helpful resources designed to support the focus and practice activities from this Activity Group. Some are designed to be cut out and laminated for reuse in future activities or for display. Others are created as worksheets for children.

However, as we suggest in the 'What writing or drawing might children do in mathematics if the activities are mainly practical?' section of the *Geometry, Measurement and Statistics 6 Implementation Guide* (page 30), children are encouraged to record in their exercise books to provide a bank of evidence of how their communicating is developing over time.

31. Double Dice

32. Heads or Tails?

33. How Likely?

34. Measurement 5 Assessment Grid

Name .... Date ..../.............../........................

	12
	11
	10
	9
	8
	7
	6
	5
	4
	3
	2

Name .... Date ..../.................../........................

Test Number	Heads	Tails
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
Total:	**Heads:** _____	**Tails:** _____

Horses will learn to speak English in the next 12 months.

From a set of 1–8 the first one drawn out at random will be an odd number.

From a bag containing 1 white and 30 yellow counters the first one pulled out will be white.

From a pack of cards numbered 1–30 the first card drawn at random will be number 42.

The day after next Friday will be Saturday.

From a bag containing 1 blue and 30 green counters the first one pulled out will be green.

From a bag containing 10 red and 20 blue counters the first one pulled out will be blue.

The sun will set in the East this evening.

Date ....   Group ....

Words and terms for use in conversation

chance, probability, likely, unlikely, even chance, evens, biased, certain,
uncertain, impossible, possible, probable, predict, likelihood, prediction,
theoretical, experimental, actual

ASSESSMENT OPPORTUNITIES Look and listen for children who:	Name	Name	Name	Name	Name	Name
• Use the words and terms for use in conversation effectively.						
• Explain why some events are more likely than others.						
• Calculate simple probabilities from among a finite number of outcomes.						
• Express probabilities as a fraction with a value between zero (impossible) and 1 (certain).						
• Compare the probabilities of different events using fractions.						
Additional notes/ways forward:						

Explore More Copymaster and Explorer Progress pages

Contents

In this section you will find the Explore More Copymaster and the two Explorer Progress pages that accompany the new Measurement 5 Activity Group.

The Explore More Copymasters offer children one practice activity to do at home for each core activity group in the Geometry, Measurement and Statistics 6 teaching programme. On the following page, there is also a copy of the guidance letter available with the full Explore More resources that accompany Geometry, Measurement and Statistics 6.

This guidance letter can be sent home to parents and carers giving them more details about how they can play an active role helping their child with their maths learning, explaining about the special equipment that Numicon makes use of and giving them an idea of roughly how long activities will take.

You can add your own information to this letter touching upon some of the administrative details that are relevant to your school, e.g. the day homework will be sent home, when it should be returned and what parents and carers should do if they have further questions. The letter also refers parents and carers to the Numicon website to find out more about Numicon, and to the Oxford Owl website for more general help and advice that might be useful for them.

Dear Parent/Guardian

The children in our school are learning maths using Numicon.

Numicon is a method of teaching maths that uses concrete resources to give children a picture of number ideas. We find that this approach helps all children to succeed. We will be sending home a piece of homework to accompany each topic children learn about in their Geometry and Measurement maths work so that you can support your child as they practise what they have been learning at school.

How can I help my child with maths?

As adults, it's easy to forget how long it took us when we were children to understand maths ideas, so we tend to think they are simple. However, to a child, they are not simple and it often takes time and lots of practice to understand them.

You are not expected to teach your child these ideas, but you can help by making sure your child knows what to do and discussing their ideas with them.

To help you understand the purpose of each piece of homework, the maths involved in each activity is explained on a sheet of paper for you. This sheet includes: information on how the activity will help your child; words and phrases that your child is learning in their maths lessons; what to look for as your child does the activity; what you will need and what to do in order to complete the activity. There are also some 'Next steps…' suggestions if you want to extend the practice further.

Will I need any special equipment?

Many of the homework activities involve household items, e.g. cardboard boxes, coins, paper clips, a book, a dice, colouring pencils.

How long will it take?

The homework activity will take between ten and twenty minutes once a week. There are also suggestions of other things you can do to extend the homework idea. Some of these are solving word problems, or playing a game. There are also suggestions of things to look out for and talk about around the home or when out and about.

If you would like to find out more about helping your child as they learn maths, www.oxfordowl.co.uk has some help and advice for parents.

To find out more about Numicon, visit the Numicon website: www.oxfordprimary.co.uk/numicon where there are short videos explaining the background to Numicon and how to use it.

Yours sincerely,

Measurement 5, Probability

What are the Chances?

How this will help your child

- This activity will help your child to practice their work on chance and probability.
- It will encourage them to think about how many possible outcomes there are in a given situation to calculate likelihood of something occurring.

Words and phrases to use

chance, probability, likely, unlikely, certain, possible, probable, improbable, impossible, even chance

You will need

- Scissors

During the activity, look at what your child can do

- Find the total number of outcomes in a given scenario, e.g. rolling a normal 6-sided dice.
- Find the number of possible outcomes that satisfy a condition, e.g. 'A normal 6-sided dice rolls a number 4.'
- Express these two numbers as a probability, e.g. 'There is a one-in-six chance of rolling a 4 on a normal 6-sided dice.'

What to do

- Cut out the twenty cards and spread them out, face up. You may like to keep the scenario cards and probability cards in two separate groups.
- Explain to your child that you are going to play a game involving matching each scenario to the probability of it occurring.
- Ask your child to choose a scenario card and find its matching probability card. Encourage them to reason aloud, first working out how many different outcomes the scenario has, e.g. 'There are six outcomes of rolling a normal 6-sided dice. Only two of the outcomes are greater than 4, so there is a two-in-six chance of rolling a number greater than 4.'
- If your child chooses a matching pair, they keep the cards. If the cards do not match, then they return them to the table. There are ten pairs exactly. **1**
- Take turns to choose pairs of cards. When it is your turn, ask your child to help you find the number of outcomes.
- When all the cards have been matched correctly ask your child to count how many pairs they found. The winner is the person with more pairs.
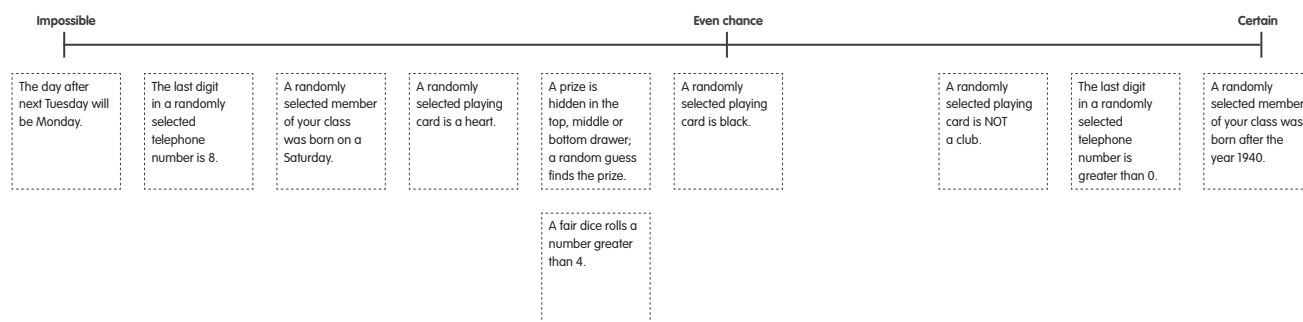
The last digit in a randomly selected telephone number is 8.	A randomly selected member of your class was born after the year 1940.	A randomly selected member of your class was born on a Saturday.	The last digit in a randomly selected telephone number is greater than 0.	A randomly selected playing card is black.
one-in-ten chance	certain	one-in-seven chance	nine-in-ten chance	one-in-four chance
A fair dice rolls a number greater than 4.	A randomly selected playing card is NOT a club.	A prize is hidden in the top, middle or bottom drawer; a random guess finds the prize.	A randomly selected playing card is a heart.	The day after next Tuesday will be Monday.
two-in-six chance	three-in-four chance	one-in-three chance	even chance	impossible

1

Next steps …

- Invite your child to place the scenario cards in order along an imaginary number line from impossible to certain, in ascending order of likelihood **2** .
- When playing board games or card games with your child, encourage them to work out simple probabilities, e.g. 'What is the probability that you will roll a six?'

Impossible   Even chance   Certain

| The day after next Tuesday will be Monday. | The last digit in a randomly selected telephone number is 8. | A randomly selected member of your class was born on a Saturday. | A randomly selected playing card is a heart. | A prize is hidden in the top, middle or bottom drawer; a random guess finds the prize. | A randomly selected playing card is black. | | A randomly selected playing card is NOT a club. | The last digit in a randomly selected telephone number is greater than 0. | A randomly selected member of your class was born after the year 1940. |

A fair dice rolls a number greater than 4.

2

What are the Chances?

✂

The last digit in a randomly selected telephone number is 8.	A randomly selected member of your class was born after the year 1940.	A randomly selected member of your class was born on a Saturday.	The last digit in a randomly selected telephone number is greater than 0.
A randomly selected playing card is a heart.	A normal 6-sided dice rolls a number greater than 4.	A randomly selected playing card is NOT a club.	A prize is hidden in the top, middle or bottom drawer; a random guess finds the prize.
A randomly selected playing card is black.	The day after next Tuesday will be Monday.		

✂

impossible	three-in-four chance	certain	one-in-ten chance
even chance	nine-in-ten chance	one-in-seven chance	one-in-three chance
one-in-four chance	two-in-six chance		

Date ..../ ..../ ....

Picture Card Problem

Dai has a pack of picture cards.
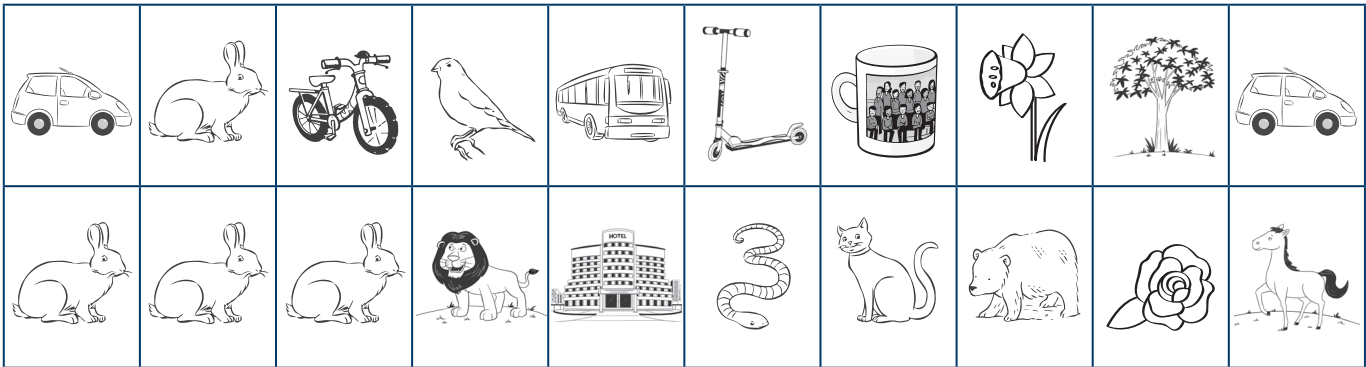
What is the probability that a randomly selected card will show:

a) A vehicle

b) A living thing

c) A rabbit

d) A snake

e) An animal

f) Something larger than a wasp

g) A planet?

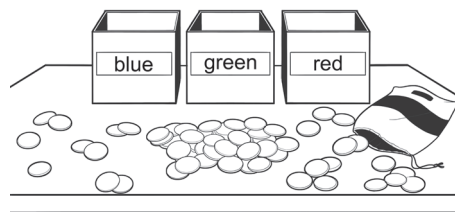Can you place the letters (a) to (g) on the scale to show the probabilities?

0   1

Teacher notes

Date ..../ ..../ ....

Feely Bag Probabilities

What could you put into the bag to give you an even chance of pulling out a blue counter?

Is there another way you could do it?

What could you put in the bag to have $\frac{1}{4}$ chance of pulling out a green counter?

Can you show other probabilities with the counters?

Teacher notes