Repeated Trials, Variation in Results.

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Differentiate and Assess

Not every student will be ready to investigate this concept at this Level and so we will need to differentiate to ensure every student is learning at their leading edge. Select the Differentiate button on this screen.

Integrate

Every mathematical concept is integrally related to other mathematical concepts. Teaching and learning related concepts simultaneously develops deep relational understanding. Select the Integrate button on this screen.

Intervene

Some students may not yet be ready to investigate this concept at any Level, and so we will need to provide some intervention. Select the Intervention button on this screen.

REPEATED TRIALS, VARIATION IN RESULTS.

EXPLICIT TEACHING PLAN OVERVIEW PAGE

THIS PAGE IS A SUMMARY OF THE EXPLICIT TEACHING PLAN, INCLUDING STRATEGIC QUESTIONS, AND DESRIBING THE SEQUENCE WHICH WILL OCCUR OVER MULTIPLE LESSONS.

RESOURCES: PENCIL, RULER, 1 CENTIMETRE GRID PAPER, COMPUTER SPREADSHEET PROGRAM

WHAT COULD WE DO?	WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?
Children: • Conduct a chance experiment with a die. • Identify possible outcomes. • Identify the chance of each outcome. • Predict the number of times each outcome will be rolled. • Compare actual results with predicted results. • Compare results with other groups. • Predict if they would get the same results if the experiment was repeated. • Repeat the experiment. • Record the results in a column graph. • Conduct the experiment with a spinner.	Children ask one another questions about conducting repeated trials of chance experiments, identifying possible outcomes, and explaining variation in results , for example: ► If we roll this die, what outcomes could we possibly get? ► Is there an equal chance that we will get each number? ► Let's predict how many times we predict we'll get each number. ► Have a look at your predicted outcomes and your actual outcomes - were they exactly the same? ► Let's compare our results with another pair of children - were they exactly the same? ► If you repeated the experiment, do you think you'd get the same results, or different results? ► Are you likely to get different results because it's up to chance what number is rolled? ► Could we record the results in a column graph? ► Could we conduct the experiment with a spinner?

REPEATED TRIALS, VARIATION IN RESULTS.

EXPLICIT TEACHING PLAN

FULL EXPLICIT TEACHING PLAN, EMBEDDING DEEP RELATIONAL UNDERSTANDING, METALANGUAGE, AND QUESTIONS THAT MAY BE USED OVER MULTIPLE LESSONS.

WHAT COULD WE DO?	WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?
Children think about, talk and listen to a friend about, then have the opportunity to share what they already know.	► Today brings an investigation about chance and data. ► What do you know about chance and data? ► Talk about chance and data with a friend. ► Is anyone ready to share what they are thinking about chance and data?
Record, for example, chance	► We've investigated chance. ► And we found that chance described how likely it is that an event will happen.
Record, for example, data is information	► We've investigated data. ► And we found that data is another word for information.
Display a standard die, for example, 	► Today we're going to conduct a chance experiment. ► An outcome is an event that could happen. ► If we roll this die, what outcomes could we possibly get? ► Could we get a 1? ► Could we get a 2? ► Could we get a 3? ► Could we get a 4? ► Could we get a 5? ► Could we get a 6?

Children construct a table listing the outcomes 1 to 6, for example,

Outcome
1
2
3
4
5
6

- Let's list our outcomes in a table

Children look closely at their die, identifying that each face is the same size, and each number occurs once.

- Let's look closely at our die.
- How many faces are there?
- Is each face the same size?
- Is each number recorded on only one face?
- Is there an equal chance that we will get each number?
- If we roll the die, is there an equal chance we will get any of the numbers?

Children add a column to the right to record the number of times the children predict the die will show each number if the die is rolled 10 times, for example,

Outcome	Prediction
1	2
2	3
3	1
4	1
5	1
6	2

- We're going to roll the die, and record how many times we get each outcome.
- How many times could we roll the die?
- Could we roll the die 10 times?
- Before we do that, let's predict how many times we predict we'll get each number.
- If we roll the die 10 times, how many times do you predict it might land on 1?
- If we roll the die 10 times, how many times do you predict it might land on 2?
- If we roll the die 10 times, how many times do you predict it might land on 3?
- If we roll the die 10 times, how many times do you predict it might land on 4?
- If we roll the die 10 times, how many times do you predict it might land on 5?
- If we roll the die 10 times, how many times do you predict it might land on 6?
- Do we know how many times it will land on each number, or are we just predicting based on the numbers on a die?

- So now that we have predicted how many times we think each outcome will

occur, can we roll the die?

- Will we record the actual outcome of each roll?
- How could we record the data?
- Will we collect the data one at a time?
- Could we use tally marks?
- Let's add a column to record the results of our chance experiment using tally marks

Children add a column to the right to record the number of times the die shows each time as the die is rolled 10 times, for example,

Outcome	Prediction	Results
1	2	
2	3	
3	1	
4	1	
5	1	
6	2	

- Let's start the experiment!
- In pairs, roll the die 10 times, recording the number the die shows each time using a tally mark in the column next to that number.

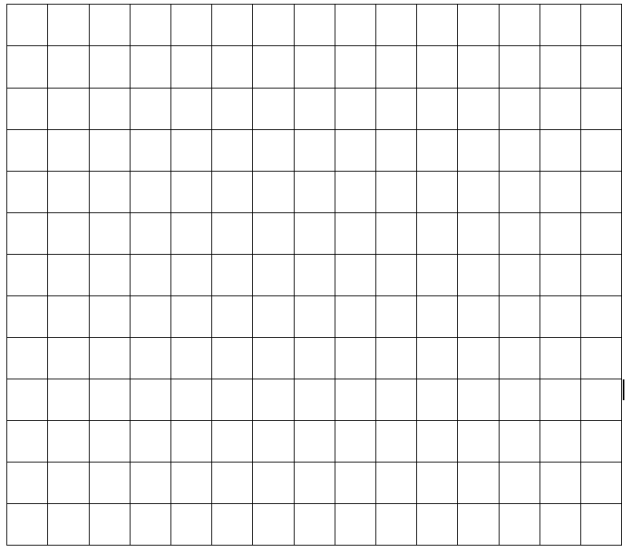
In pairs, children roll the die 10 times, recording a tally mark in the column next to each number that the die shows, for example,

Outcome	Prediction	Results
1	2	I
2	3	II
3	1	
4	1	IIII
5	1	I
6	2	II

- Let's compare the results of our investigation

Children compare their predicted outcomes with their actual outcomes.	► Have a look at your predicted outcomes and your actual outcomes. ► Were they exactly the same? ► Did the die show each number an equal number of times? ► Why not? ► Is there an equal chance of each number being rolled? ► Is it just up to chance which number the die shows each time?
Children join up with another pair of children to compare results.	► Let's compare our results with another pair of children. ► Compare which number your die showed the highest number of times. ► Was it the same number for both results? ► Why? ► Compare which number your die showed the least times. ► Was it the same number for both results? ► Why? ► Compare which number of times your die showed each outcome. ► Was it the same number for both results? ► Why?
	► If you repeated the experiment, do you think you'd get the same results, or different results? ► Are you likely to get different results because it's up to chance what number is rolled?
	► We've recorded our data in a table using tally marks.

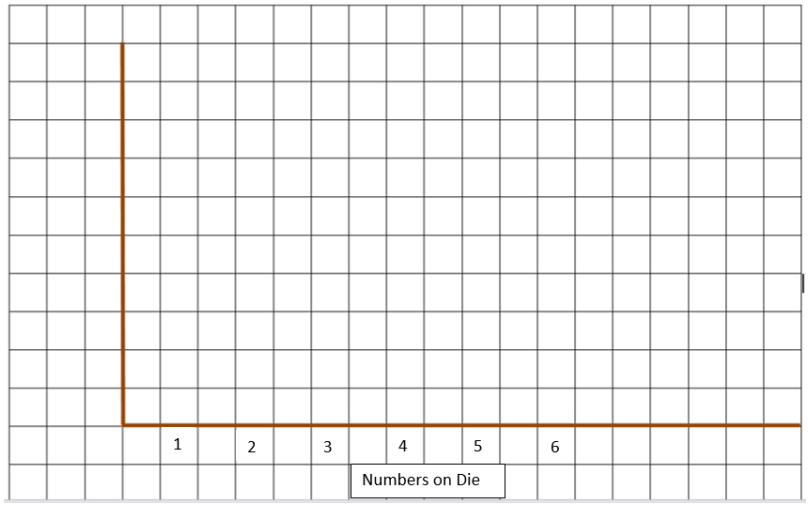
Distribute some paper with a 1 centimetre grid on it, for example,



Record the vertical and horizontal axes, for example,

- How else do you think we could record our data?
- Do you think we could record our data in a graph?
- How could we record this data in a graph?
- Let's record the vertical and horizontal axes
- Let's record the numbers that is was possible for the die to show on the horizontal axis

Record the numbers that is was possible for the die to show at on the horizontal axis, and label the horizontal axis 'Numbers on Die', for example,

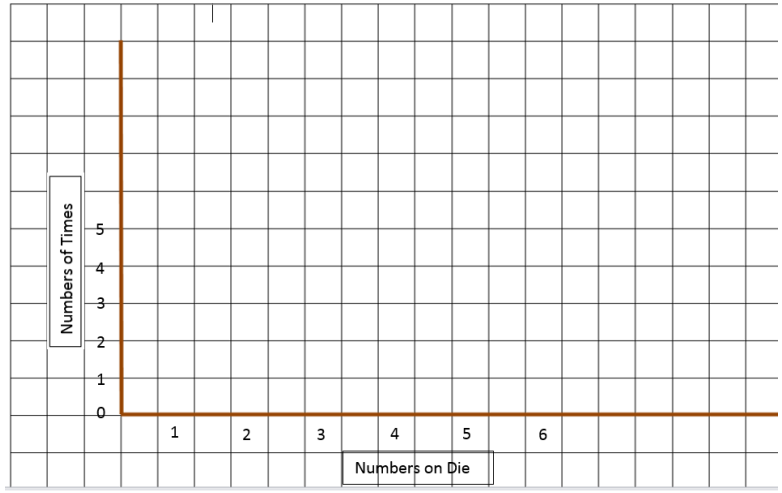


- Let's label the horizontal axis, Numbers on Die

- Let's record the numbers of times the die showed each number on the vertical axis

Record the numbers of times the die showed each number on the vertical axis, and label the vertical axis, Number of Times, for example,

- Let's label the vertical axis, Number of Times

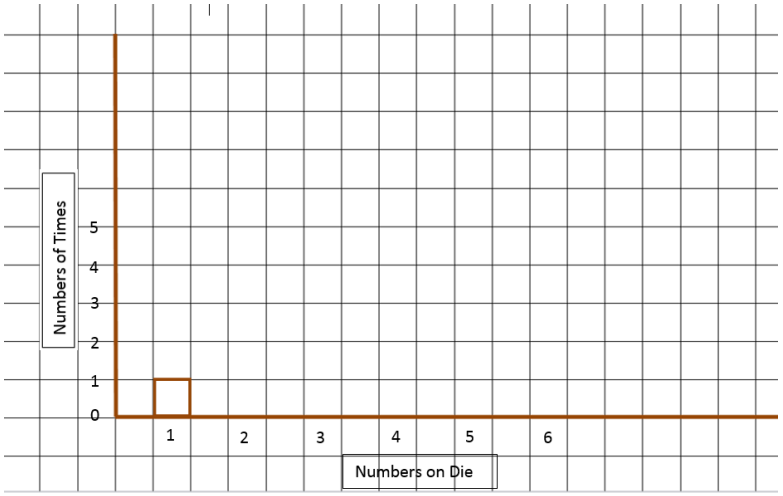


- Let's start recording the data!

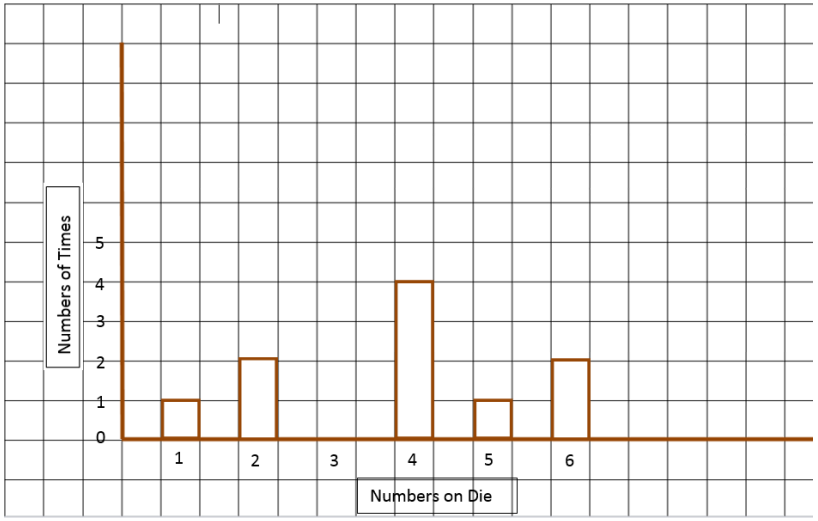
Children record a column with the number of times their die showed Number 1, for

- Record a column with the number of times your die showed Number 1

example,



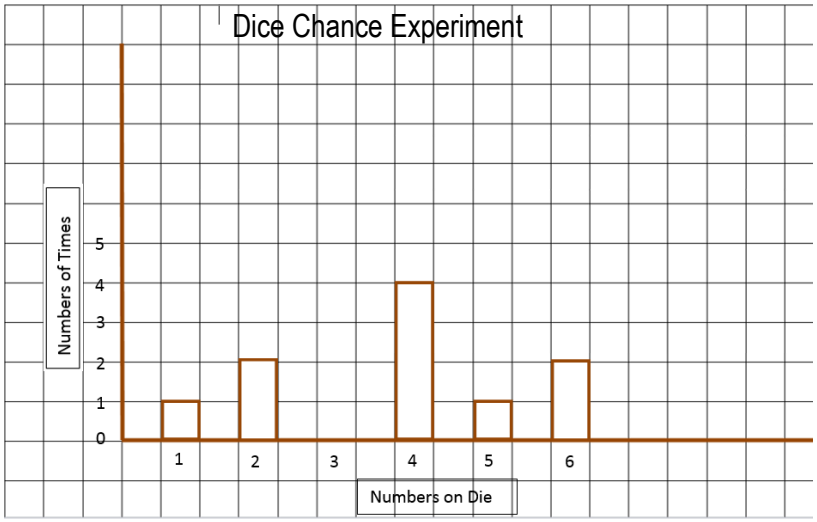
Children continue recording their data in the column graph, for example,



Children give their graph the title 'Dice Chance Experiment ', for example,

- Continue adding the data to your column graph

- What title could we give the graph?
- Is this data from a Dice Chance Experiment?

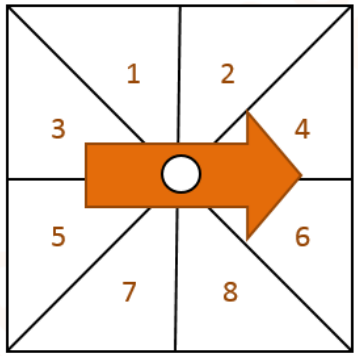


Children predict outcomes, then repeat the experiment in pairs.

- Could we give this graph the title ‘Dice Chance Experiment '?
- If you repeated the experiment, would you get the same results or different results? Why?
- Let's repeat the experiment!
- Let's compare the results of our second experiments with the results from our first experiment.
- Were they exactly the same?
- Why not?
- Is it just up to chance which number the die shows each time?
- Let’s compare our results with another pair of children.
- Compare what number of times your die showed each outcome.

Either display an amendable commercially available spinner, an amendable computer generated spinner (readily downloadable from the Internet) or children make their own spinners, for example,

Children label each section with the numbers 1 to 8, for example,



- Was it the same number for both results?
- Why?

- If you repeated the experiment again, do you think you'd get the same results, or different results?
- Are you likely to get different results because it's up to chance what number is rolled?

- Let's conduct a chance experiment using a spinner.

- Let's look closely at our spinner.
- Are there 8 sections?
- How many sections are there?
- Is each section the same size?

- If we spin the arrow, which number is it most likely to stop at?
- Is it more likely to stop at number 1? Number 2? Number 3?
- Is any number more likely than any other number?
- Does each number have an equal chance that the spinner will stop at their section? Why?
- Is that because each section is the same size?

- Let's conduct a chance experiment!
- In pairs, let's spin the arrow 20 times and record the number that the arrow

Children construct a table listing the numbers 1 to 8 as the row headings, for example,

1
2
3
4
5
6
7
8

Children add a column to the right to record the number of times the arrow lands on that number, for example,

1	
2	
3	
4	
5	
6	
7	
8	

Children spin the arrow.

Children record a tally mark in the column next to the number that the arrow stops at

Children continue spinning the arrow another 19 times.

Children add a column to the right to record the number of times the arrow lands on that number, for example,

1	III	
2	II	
3	I	
4	II	
5	𝍸 I	
6	III	
7	II	
8	I	

stops in each time.

- How could we record the data?
- Could we record in a table?
- What numbers is it possible to land on?
- Let's list those numbers in a table as our row headings

- Let's add a column to the right to record the number of times the arrow stops at that number

- How could we record the number of times the arrow stops at each number?
- Could we use tally marks?

- Let's start the experiment!
- In pairs, spin the arrow 20 times, recording the number the arrow stops at each time using a tally mark in the column next to that number

- Let's compare the results of our investigation
- Join with another pair of children

Children add a column to the right to record the number of times the arrow lands on that number in the second experiment, for example,

Children spin the arrow

Children record a tally mark in the column next to the number that the arrow stops at

Continue spinning the arrow another 19 times

	Experiment 1	Experiment 2
1	III	I
2	II	𝍸
3	I	I
4	II	II
5	𝍸 I	III
6	III	III
7	II	II
8	I	III

Distribute some paper with a 1 centimetr[illegible]

- Compare which number your arrow stopped at the highest number of times.
- Was it the same number for both results? Why?
- Compare which number your arrow stopped at the least times.
- Was it the same number for both results? Why?
- Compare the number of times each number was spun.
- Was it the same number for both results? Why?

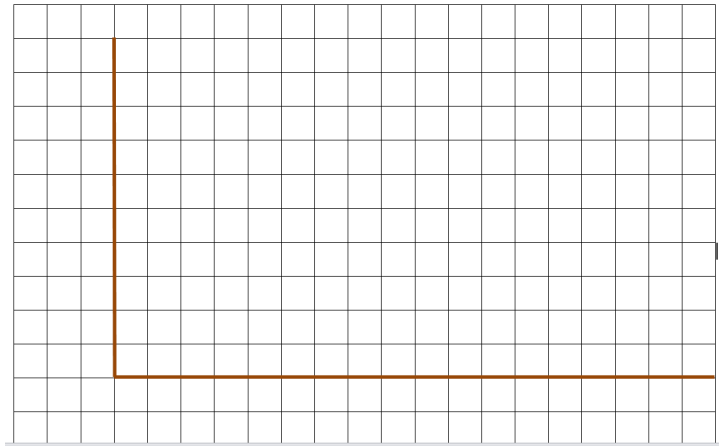
- If you repeated the experiment, do you think you would get the same results or different results?
- Why?
- Let's repeat the experiment
- Let's add another column to the right to record our results from this experiment

- In pairs, spin the arrow another 20 times, recording the number the arrow stops at each time using a tally mark in the column that we just added

- Now we have 2 columns of data
- Could we label the columns?
- Could we label the first column Experiment 1?
- Could we label the second column Experiment 1?

- Did you get the same results when you repeated the experiment?
- Why not?
- How could we record this data in a graph?

Record the vertical and horizontal axes, for example,

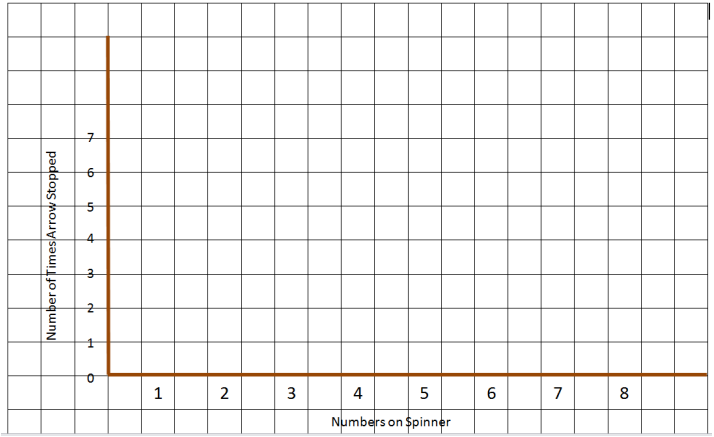


- Let's graph the data from the Experiment 1 first.
- Let's record the vertical and horizontal axes.

Record the numbers that is was possible for the arrow to stop at on the horizontal axis, and label the horizontal axis 'Numbers on Spinner', for example,

- Let's record the numbers that is was possible for the arrow to stop at on the horizontal axis.
- Let's label the horizontal axis, Numbers on Spinner.

Record the numbers of times the arrow stopped on the vertical axis, and label the vertical axis, Number of Times Arrow Stopped, for example,

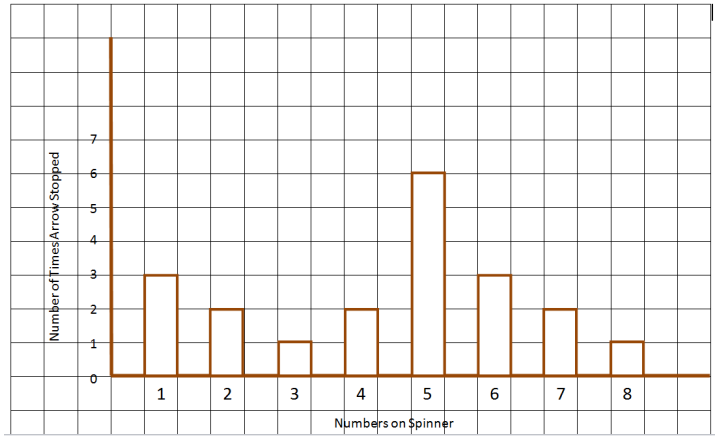


- Let's record the numbers of times the arrow stopped on the vertical axis
- Let's label the vertical axis, Number of Times Arrow Stopped

Children record a column with the number of times their arrow stopped at Number 1 in Experiment 1, for example,

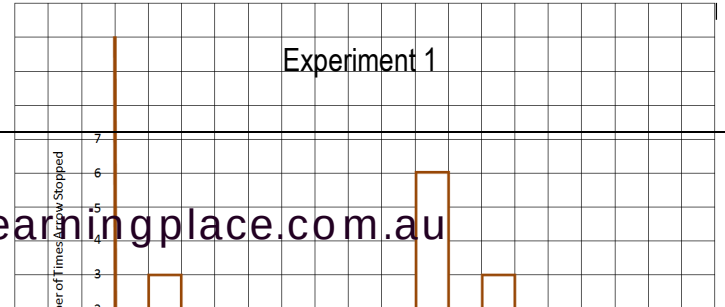
- Let's start recording the data!
- Record a column with the number of times your arrow stopped at Number 1 in Experiment 1

Children continue recording their data in the column graph, for example,



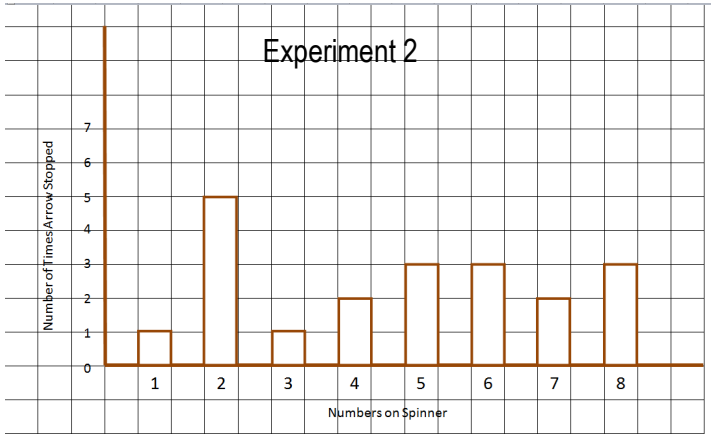
- Continue adding the data to your column graph

Children give their graph the title 'Experiment 1', for example,



- What title could we give the graph?
- Is this data from Experiment 1?

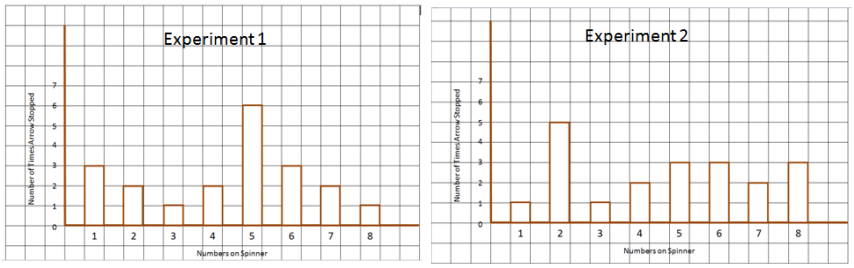
Children construct a second column graph for their Experiment 2's data, for example,



Children place their graphs and tables side-by-side

	Experiment 1	Experiment 2
1	III	I
2	II	IIII
3	I	I
4	II	II
5	IIII I	III
6	III	III
7	II	II
8	I	III

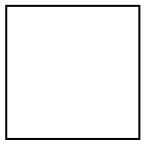
- Could we give this graph the title 'Experiment 1'?
- Let's graph the data from your Experiment 2 now
- How could we describe the data?
- Which number was the arrow most likely to stop at in Experiment 1?



- Which number was the arrow most likely to stop at in Experiment 2?
- Which number was the arrow least likely to stop at in Experiment 1?
- Which number was the arrow least likely to stop at in Experiment 2?
- Are there any numbers that the arrow stopped at the same number of times in both experiments?
- Did the arrow stop on each number the same number of times? Why not?
- If we repeated the experiment again, would we get the same results or different results? Why?

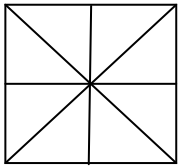
Children make their own spinner: back

Display some square cards, for example,

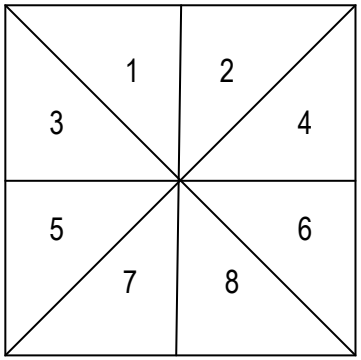


NB: The spinner could be constructed during art lessons. This is one way a spinner may be constructed - there are many others including using a split pin

Draw lines on the square card to divide it into 8ths, for example,

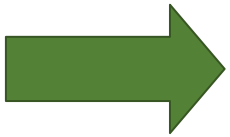


Record numbers in the parts of the spinner, for example,

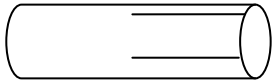


- Let's divide the card into 8ths
- How could we divide the card into 8ths to make a spinner?
- Could we draw lines from opposite vertices through the centre?
- Could we draw lines from the centre of each opposite edge through the centre?
- How could we label each part of the spinner?
- Could we use colours?
- Could we use numbers?
- Could we use symbols?
- Let's use the numbers 1 to 8

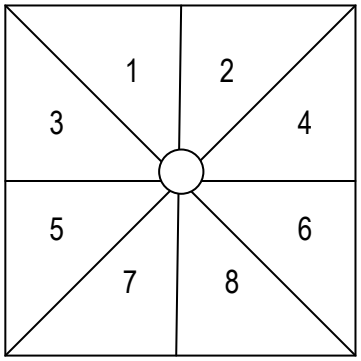
Draw an arrow about two-thirds as long as the card, for example,



Cut a 2 centimetre length of straw and cut slits into one end of the straw to split it into 4 sections, for example,



Make a hole in the centre of the card large enough to fit the straw, for example,

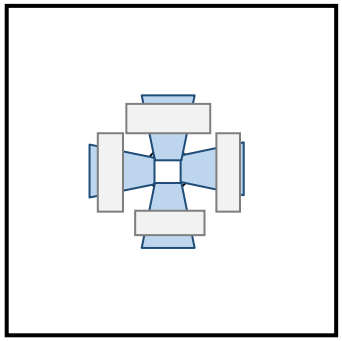


- What could we use as a spinner?
- Could we use an arrow?
- How long could our arrow be?
- Should it be shorter than our card?
- Could the arrow be about two-thirds as long as the paper?
- Let's draw an arrow about two-thirds as long as the paper

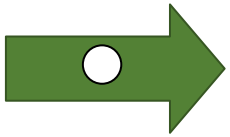
- Now we need to join the arrow to the card so that it will spin
- How could we attach the arrow to the card?
- Could we use a straw to attach the arrow? Let's investigate!
- Let's cut of a 2 centimetre length of straw
- Let's cut slits into one end of the straw to split it into 4 sections

- Now we need a hole in the centre of the card to fit the straw through
- How could we make a hole in the centre of the card?

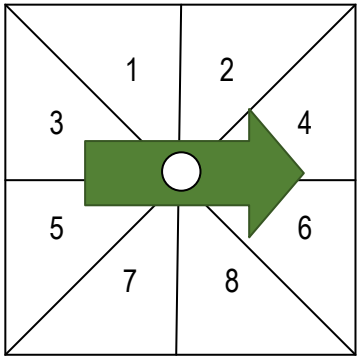
Place the straw through the centre of the card, and tape the split parts at the back, for example,



Make a hole in the arrow a little larger than the straw, for example,



Place the arrow over the straw, and spin, for example,



- Let's place the straw through the centre of the card, and tape the split parts at the back
- Now we need to make a hole in the arrow a little larger than the straw to allow it to spin
- Now let's place the arrow over the straw, and spin!