First Steps in Mathematics
Chance and Data

Diagnostic Tasks – Student Worksheets

Understand Chance
Collect and Process Data
Interpret Data

First Steps in Mathematics Chance and Data

Diagnostic Tasks – Student Worksheets

Introduction

First Steps in Mathematics: Diagnostic tasks - Student worksheets

Task review and planning sessions are a critical component of using First Steps in Mathematics. After completing each First Steps in Mathematics content session, teachers should use some of the diagnostic tasks with their students and then work with a small group of colleagues to review the completed tasks and plan for further learning.

Making Judgments Using Diagnostic Tasks

Task _____

Description of the group

In which Phase (why?)

Key Understanding

Mathematical Focus

Classroom Planner

Week _____ Term _____ Year Level _____ Date _____

Key Understanding	Mathematical Focus	Activities	Focus Questions	Observations/Anecdotes

After the Lesson or Series of Lessons

Teachers

What did you learn about the mathematics?

What did you learn about your students?

What did you learn about your teaching?

What would you do differently next time?

After the Lesson or Series of Lessons

Students

**Have the students learned what was intended for this lesson?
If not, why not?**

How do you know what they have learned?

What else have they learned?

Chance Cards

The Lotto numbers 1, 2, 3, 4, 5, 6 will win on Saturday	You toss a 6-sided die and it **doesn't** land on 2	You toss a normal 6-sided dice and it lands on 8
You toss two coins -one lands on heads, one lands on tails	You will buy a puppy this afternoon	You will see the sun here at midnight tonight
You will walk to school tomorrow	You will eat bacon and eggs for breakfast tomorrow	You toss a 6-sided dice and it lands on 1, 3 or 5
You will receive a book for your next birthday	It will rain in the next week	You will travel to school by bus tomorrow

Sun at midnight: http://www.flickr.com/photos/johnnymyrenghenriksen/
Walk to school: http://www.flickr.com/photos/mobikefed/

You will find a $10 note tomorrow	You will go on a holiday to Bali next year	You will find a dinosaur bone in your garden
You will wash your hair tomorrow morning	You will buy a dress tomorrow	You will eat a sandwich for lunch tomorrow
Friday is always the day after Thursday	Your favourite football team will win its next game	A cat can learn to read
You could count backwards by 2's from 100 in 10 seconds …92,90,88,86…	Your eyes will be the same colour tomorrow	The numbers 7, 9, 12, 14, 17 and 25 will win Lotto on Saturday

You will eat fast-food tomorrow	You will see a live crocodile in the next week	The moon will be red tonight
Your hair will be the same colour tomorrow	You will see a wild bear tomorrow	You will see snow on your next holiday
You will see fireworks on New Year's Eve	Pigs can fly	You can touch your left elbow with your left hand
Your best friends will sleep-over tonight	You will receive a school award this week	You will be allowed to watch television tonight

Pigs can fly: http://farm4.staticflickr.com/3473/3801995837_e116312374.jpg

Chance Cards 1: Student Worksheet

Name _____ Year _____ Date _____

1. Look at the cards. What is the chance of each of these events happening? Write the words that you would use to describe the chance of the events happening.

   _____

   _____

   _____

2. Now sort the cards into two groups. Which events are **possible** to happen and which are **impossible** to happen?

Possible	**Impossible**

3. Take the cards you decided are **possible** to happen and sort these
    into those that are **certain** to happen and **uncertain** to happen.

Certain	Uncertain

4. Now take the **uncertain** event cards and sort these into two groups to show events
    that are **likely** to happen and those that are **unlikely** to happen.

Likely	Unlikely

5. Make a note of any events that had equal chance of happening.

_____

_____

Chance Cards 1: Teacher Recording Sheet

Name _____ Year _____ Date _____

| |
|---|
| 1. What language does the student use to describe the chance of each event happening? |
| 2. Is the student able to sort the cards into possible and impossible? **Y/N**
 Note the language used to justify the grouping. |
| 3. Is the student able to re-sort the possible cards into certain and uncertain? **Y/N**
 Note the language used to justify the grouping. |
| 4. Is the student able to re-sort the uncertain cards into likely and unlikely? **Y/N**
 Note the language used to justify the sorting. |
| 5. Was the student able to accurately identify any events with an equal chance of occurring? **Y/N**
 Note the reasoning. |

Chance Cards 2: Student Worksheet

Numerical Scale

Record where each event belongs on this scale.

Certain NOT to happen →

Certain to happen →

0	0.25	0.5	0.75	1
0%	25%	50%	75%	100%
	¼	½	¾	
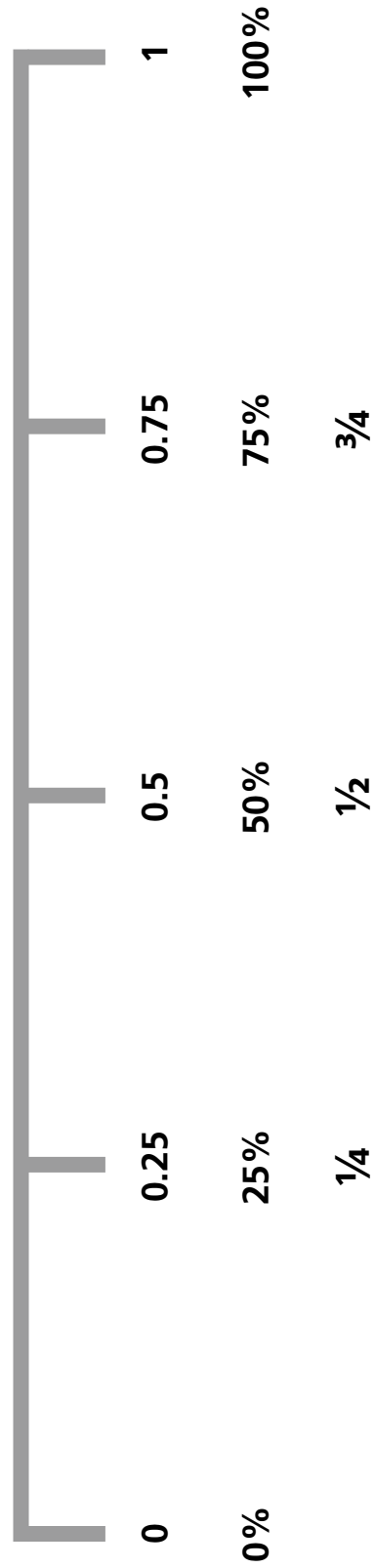
Chance Cards 2: Student Worksheet

Name _____ Year _____ Date _____

1. Once you have sorted the cards into 'certain' and 'uncertain' assign each of the 'certain' cards a probability.

0%	**100%**

2. Now assign a probability to three of your 'uncertain' cards.

   Card 1: _____ probability =

   Card 2: _____ probability =

   Card 3: _____ probability =

3. How did you work these out?

Bubble Gum Machines: Student Worksheet

Name _____ Year _____ Date _____

Look at the bubble gum machines below.

There are red bubble gum balls ⬤ and white bubble gum balls ◯
in the machines. When you press the lever the bubble gum balls get jumbled around, then one pops out.

Which machine/s do you think will give you the **best** chance of getting a red bubble gum ball when you press the lever?

Which machine/s do you think will give you the **worst** chance of getting a red bubble gum ball when you press the lever?
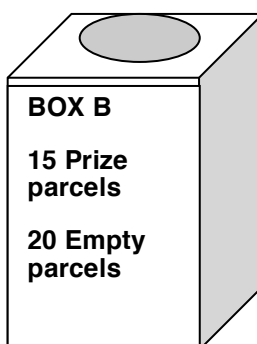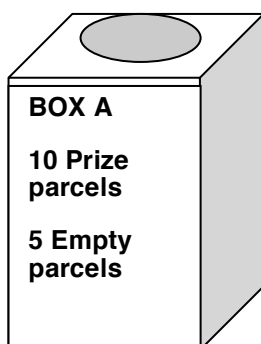
A

B

C
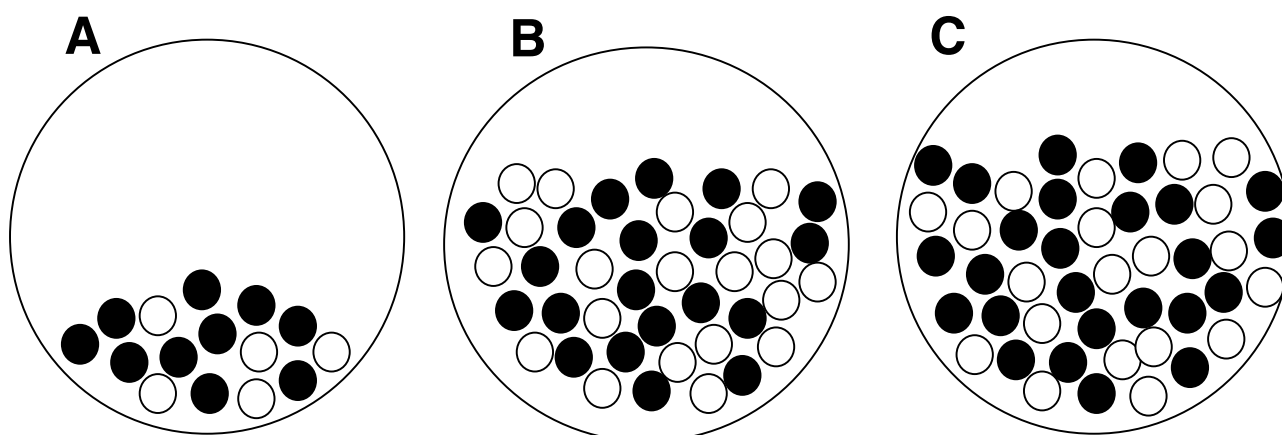
Explain your answers

Lucky Dip: Student Worksheet

Name _____ Year _____ Date _____

There are two lucky dips to choose from, box A or box B.
You have to take a parcel without looking in the box.
Some parcels have a prize in them and some are empty.
All the parcels feel the same.

1.

BOX A

10 Prize parcels

5 Empty parcels

BOX B

15 Prize parcels

20 Empty parcels

Which box will you choose to have the best chance to get a prize?

Explain why

2.

BOX A

12 Prize parcels

18 Empty parcels

BOX B

20 Prize parcels

32 Empty parcels
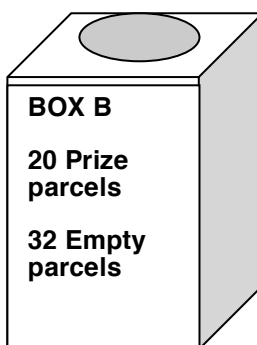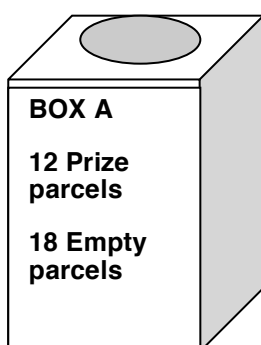
Which box will you choose to have the best chance to get a prize?

Explain why

Lotto Chances: Student Worksheet

Name _____ Year _____ Date _____

Kate and Bree were comparing their Lotto coupons.

Kate's numbers were

Bree's numbers were

1, 2, 3, 4, 5, 6

3, 9, 15, 16, 22, 40

Bree said,
'That's really dumb, 1, 2, 3, 4, 5, 6 will never win!'

Kate said,
'No more dumb than 3, 9, 15, 16, 22, 40. My numbers have exactly the same chance as yours to win!'

Who do you think has more chance of winning?

Kate _____   Bree _____ They both have the same chance _____

Explain how you decided

Coloured Dice: Student Worksheet

R	R	B	B	Y	G
					6
					12

Throw the die, use a matching coloured sticky spot or colour with a marker to record the result in the table provided.

After twelve throws, draw a line under the results.

Cut out the grid and combine your data with others to compare what happens with a large number of trials.

✂

Sixes: Student Worksheet 1

Name _____ Year _____ Date _____

The chance of getting six is 'one in six' (about 16.5%). What does this really mean?

Do you expect to get a six in the first six throws? Yes _____   No _____
Why?

Do you expect to get more than one six in the first six throws? Yes _____   No _____
Why?

Use numbers to predict:

About how many sixes would you expect to get in eighteen throws? _____
Why?

About how many sixes would you expect to get in sixty throws? _____
Why?

Throw the die and record the total number of sixes after six, eighteen, then sixty throws.

Combine the totals at your table and work out the percentage of throws that resulted in six.

Record the results below:

Number of throws	**Number of sixes thrown**	**Percentage of throws that were six**
6 throws		
18 throws		
60 throws		
_____ throws		

Compare to other groups' results.

How can you explain that there was less percentage variation between groups for the larger numbers of throws?

Sixes: Student Worksheet 2

Name _____ Year _____ Date _____

Throw the die. If the result is six, cross the first six. If it is one to five, write the number in the blank spaces in turn. Keep throwing the die, crossing the next six or filling in the blanks, depending on your result.

Planning for Collecting and Organising Data

Hypothesis/Prediction: What do you think?

	Sample Learning Activities
What question will you ask? (KU1)	
How will you collect your data? (KU2) • What would you count or measure? • Who could you ask? • What would you observe? • What existing data would you use?	
How will you organise your data? (KU3)	
What sample type and size will you use? (KU5)	
How will you make sure your data collection is valid and reliable? (KU4)	

Sports Graph: Student Worksheet

Name _____ Year _____ Date _____

Ryan wanted to know which sports the children in his Year 6 class preferred. He asked each of them to tell him which was their favourite sport.
Try to draw a graph of the information to show the sports the children liked best.

Olivia	Netball		Robbie	Football
Ethan	Basketball		Sarah	Netball
Riley	Swimming		Jessica	Hockey
Max	Swimming		Rory	Hockey
Dylan	Football		Xu How	Swimming
Alban	Basketball		Thomas	Hockey
Jamie	Basketball		Ruby	Netball
Jamilah	Hockey		Daniel	Hockey
Ayesha	Hockey		Jacob	Football
Joseph	Football		Jack	Football
Kaitlin	Netball		Areesh	Soccer
Tana	Hockey		Lachlan	Football
Sam	Football		Cooper	Football

Graph of favourite sports in Year 6

Sports Graph: Teacher Recording Sheet

Name _____ Year _____ Date _____

How does the student group the raw data?

Does the student:
Record on one axis?

Record on two axes?

Develop a scale?

Use the scale?

Understand that the scale relates to the length of the bars?

Group data on the horizontal axis?

Use indirect measure strategies (e.g. uses percentages to create a pie graph).
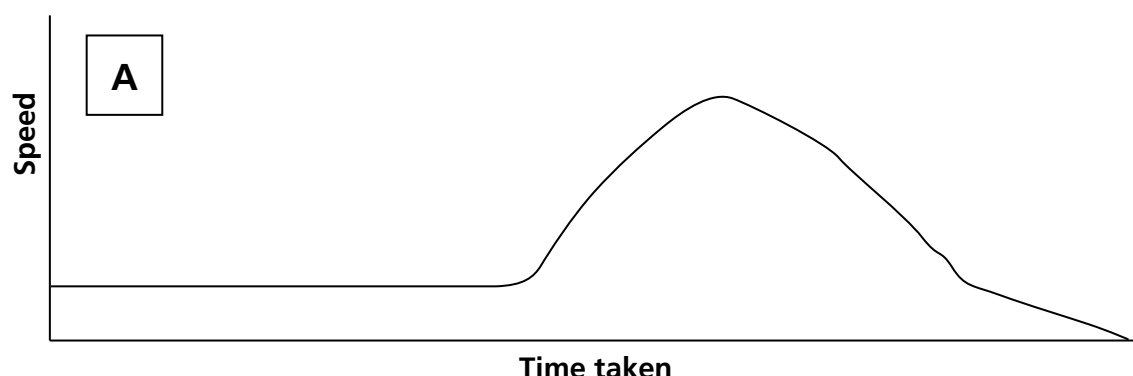
Speed Graphs: Student Worksheet

Name _____ Year _____ Date _____

Look at the story about Christie's bike ride in the boxes below.
Which of the graphs do you think best matches her speed as she went for a ride on her bike?

A _____   **B** _____   **Neither** _____

Explain why you decided.

Now show what part of the story, in the boxes below, matches which bits of the graph. (You can use arrows or numbers to show it.)

A

Speed

Time taken

1	2	3	4	5	6
Christie started her bike ride.	She rode along a flat road at about the same speed for a while.	Then she came to a hill.	She got slower as she climbed the hill.	When she got over the top, she sped up as she rode down the other side.	She got so fast she put on her brakes and slowed right down until she stopped.

B

Speed

Time taken
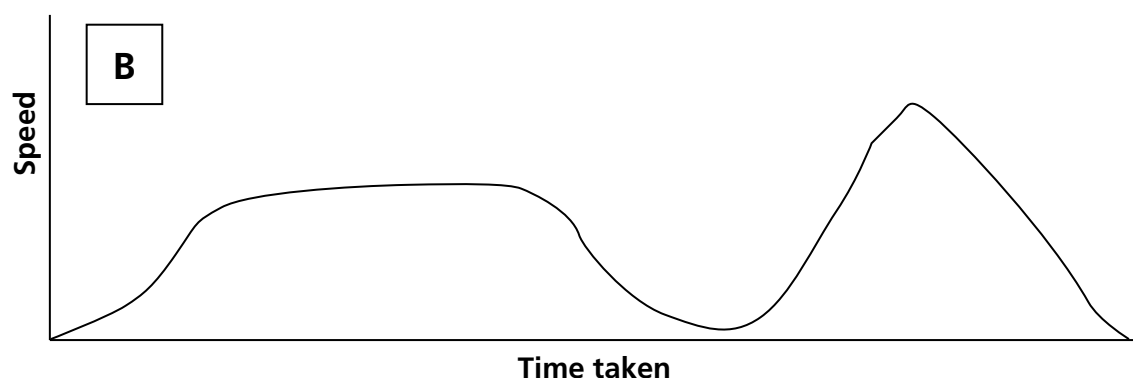
Pictograph: Student Worksheet

Name _____ Year _____ Date _____

Pictograph

This is Andrew's graph of the way his class travels to school.

Graph of the way our class gets to school.
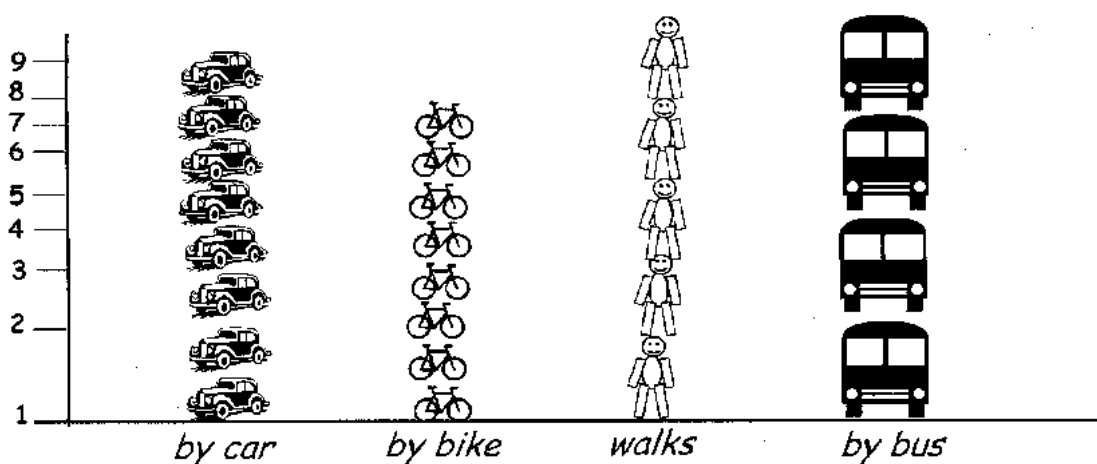
How do you think he got his information?

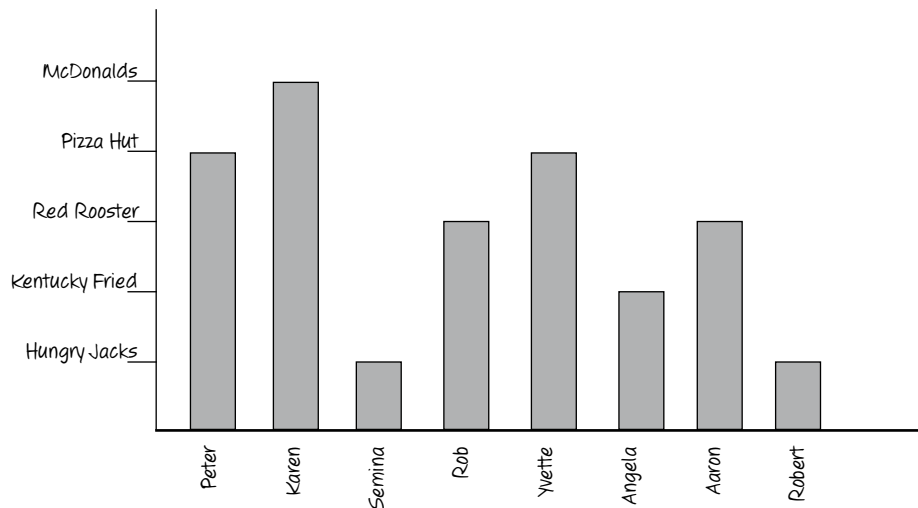**Explain anything you think might be wrong with his graph.**

Food Graph: Student Worksheet

Name _____ Year _____ Date _____

Food Graph

This is Yvette's graph of her group's favourite fast foods.

Graph of our group's favourite fast foods.

How do you think she got her information?

Explain anything you think might be wrong with her graph.

Whole School Curriculum Planner: Chance and Data Overview

Date _____

Understand Chance

	B	M	L
1. Some things we are sure will or will not happen and other things we are unsure about.			
2. There are special words and phrases we use to describe how likely we think things are to happen.			
3. We can compare and order things by whether they are more or less likely to happen.			
4. We say things have an equal chance of happening when we think they will happen equally often in the long run.			
5. We can use numbers to describe how likely something is to happen.			
6. Sometimes we list and compare all the possible things that could happen to predict how likely something is to happen			
7. Sometimes we use data about how often an event has happened to predict how likely it is to happen in the future.			

Collect and Process Data (Part A) – Collect and Organise Data

	B	M	L
1. We can answer some questions (and test some predictions) by using data.			
2. We can produce data by: counting or measuring things, asking groups of people, watching what happens, or re-working existing data.			
3. Organising data in different ways may tell us different things.			
4. We should make our data as accurate and consistent as possible.			
5. Sometimes we collect data from a subset of a group to find out things about the whole group. There are benefits and risks in this.			

Interpret Data

	B	M	L
1. Graphs, tables and diagrams display data about the real world, although they are not pictures of the real world. We need to learn how to read them.			
2. When we analyse and interpret data we are deciding what it says and what it means. There is a difference between the data itself and what we think it means			
3. We need to evaluate the data we are using in order to be confident about the conclusions we have drawn.			

Collect and Process Data (Part B) – Summarise and Represent Data

	B	M	L
1. We can display data visually; some graphs and plots show how many or how much is in each category or group.			
2. We can display data visually; some graphs and plots show how one quantity varies over time.			
3. We can display data visually; some graphs and plots show how two quantities are related.			
4. We use tables and diagrams to organise and summarise data in a systematic way.			
5. How we display our data depends on the kind of data we have and our purpose.			
6. We can use words and numbers to summarise features of a set of data.			

Classroom Overview: Chance and Data

Class _____ Date _____

Understand Chance	T1	T2	T3	T4	Collect and Process Data (A)	T1	T2	T3	T4	Collect and Process Data (B)	T1	T2	T3	T4
1. Some things we are sure will or will not happen and other things we are unsure about.					1. We can answer some questions (and test some predictions) by using data.					1. We can display data visually; some graphs and plots show how many or how much is in each category or group.				
2. There are special words and phrases we use to describe how likely we think things are to happen.					2. We can produce data by: counting or measuring things, asking groups of people, watching what happens, or re-working existing data.					2. We can display data visually; some graphs and plots show how one quantity varies over time.				
3. We can compare and order things by whether they are more or less likely to happen.					3. Organising data in different ways may tell us different things.					3. We can display data visually; some graphs and plots show how two quantities are related.				
4. We say things have an equal chance of happening when we think they will happen equally often in the long run.					4. We should make our data as accurate and consistent as possible.					4. We use tables and diagrams to organise and summarise data in a systematic way.				
5. We can use numbers to describe how likely something is to happen.					5. Sometimes we collect data from a subset of a group to find out things about the whole group. There are benefits and risks in this.					5. How we display our data depends on the kind of data we have and our purpose.				
6. Sometimes we list and compare all the possible things that could happen to predict how likely something is to happen					**Interpret Data**					6. We can use words and numbers to summarise features of a set of data.				
7. Sometimes we use data about how often an event has happened to predict how likely it is to happen in the future.					1. Graphs, tables and diagrams display data about the real world, although they are not pictures of the real world. We need to learn how to read them.									
					2. When we analyse and interpret data we are deciding what it says and what it means. There is a difference between the data itself and what we think it means.									
					3. We need to evaluate the data we are using in order to be confident about the conclusions we have drawn.									

Planning Outline: Understand Chance

Class _____ Date _____

Key Understandings	T1	T2	T3	T4
1. Some things we are sure will or will not happen and other things we are unsure about.				
2. There are special words and phrases we use to describe how likely we think things are to happen.				
3. We can compare and order things by whether they are more or less likely to happen.				
4. We say things have an equal chance of happening when we think they will happen equally often in the long run.				
5. We can use numbers to describe how likely something is to happen.				
6. Sometimes we list and compare all the possible things that could happen to predict how likely something is to happen.				
7. Sometimes we use data about how often an event has happened to predict how likely it is to happen in the future.				

Planning Outline: Collect and Process Data (A)

Class _____ Date _____

Key Understandings	T1	T2	T3	T4
1. We can answer some questions (and test some predictions) by using data.				
2. We can produce data by: counting or measuring things, asking groups of people, watching what happens, or re-working existing data.				
3. Organising data in different ways may tell us different things.				
4. We should make our data as accurate and consistent as possible.				
5. Sometimes we collect data from a subset of a group to find out things about the whole group. There are benefits and risks in this.				

Planning Outline: Collect and Process Data (B)

Key Understandings	T1	T2	T3	T4
1. We can display data visually; some graphs and plots show how many or how much is in each category or group.				
2. We can display data visually; some graphs and plots show how one quantity varies over time.				
3. We can display data visually; some graphs and plots show how two quantities are related.				
4. We use tables and diagrams to organise and summarise data in a systematic way.				
5. How we display our data depends on the kind of data we have and our purpose				
6. We can use words and numbers to summarise features of a set of data.				

Planning Outline: Interpret Data

Key Understandings	T1	T2	T3	T4
1. Graphs, tables and diagrams display data about the real world, although they are not pictures of the real world. We need to learn how to read them.				
2. When we analyse and interpret data we are deciding what it says and what it means. There is a difference between the data itself and what we think it means.				
3. We need to evaluate the data we are using in order to be confident about the conclusions we have drawn.				

Classroom Planner

Week _____ Term _____ Year _____ Date _____

Key Understanding	Mathematical Focus	Activities	Focus Questions	Organisation/observations