Contents – click on the link below

How to use this work program

Accessing the online resources

To access the online resources, please go to: https://www.backtofrontmaths.com.au/b2fmathshome

Running the program each week

Each week is designed with five maths lessons so that you can do it each day. Different days have different types of lessons to make sure that students experience the kind of thinking that they need to continue growing in maths. The types of lessons include:

- **At-home investigation:** This is a hands-on task where students explore a new idea before they are taught that skill. They need to come up with an idea to try to solve the problem, try out their idea, decide if it worked or not, try again if needed, and explain what they did.
  If your child has time with your teacher with a webcam, the teacher will generally be doing this lesson with your child. This is the lesson that will require the heaviest input from you to help your child think through an idea and generally requires the use of some hands-on materials that are listed in the information page.
- **Connecting lesson:** This type of lesson has questions that lead students to develop their ideas and learn a new skill. It should be fairly easy for a student to do, but you will need to be available to read the question to your child as needed, encourage them to think further, and make sure that they complete the work. Most of these lessons will include 10 minutes of practising number operations or concepts through activities or games.
- **Interleaved practise lesson:** This type of lesson provides 8-10 questions from different areas of maths so that students practise remembering what they have previously been taught. Some of the questions may not be easy for your child, so feel free to help whenever you see them struggling.
- **Number practice:** This lesson contains games and number tasks to do regularly with your child. Number is the most important concept to establish in Foundation, so we will be using similar activities each week to help your child develop a very firm understanding of "how many", to be able to picture that amount in their head, and to be able to add and subtract small amounts very flexibly. **These sessions will not focus heavily on counting, as counting is far less important than making amounts, drawing those amounts and recognising that the amount is still the same when the objects move.**

Getting help

The website above will have answers to frequently asked questions as well as videos to help you successfully teach your child at home. If you have further questions or need support, please contact your child's teacher directly using the contact details that they have provided to you. If they can't answer your questions, they will contact the B2FMaths@Home team directly to get an answer within 3 days.

What you need to know this week

Week overview
This week we are teaching the concept of chance and linking it with what we learned last week about fractions. We want students to be able to describe outcomes of events and consider how likely these are to occur, and also create a number line to show probability as a fraction between impossible (no chance, 0%) and certain (100% chance).

For your information: When students are learning about chance or probability, they need to understand that chance is linked heavily with fractions. That means that all the ideas we explored last week with fractions still apply. Probability is always a fraction between 0 and 1.

We are hoping that students will:
- Classify outcomes of events according to how likely they are to occur.
- Conduct simple experiments to gather data (e.g. flipping a coin, tossing dice, drawing out a coloured ball from a bag).
- List the possible outcomes of an experiment (e.g. the coin could only land on H or T).
- Explain why the results vary in experiments (e.g. why a coin doesn't just go H, T, H, T, H, T…)
- Create a number line between 0 and 1 and use this to represent fractions and decimals.
- Change fractions into decimals using the idea "of a dollar". For example, what is half "of a dollar"? 50c, which written in dollars is 0.50. Using the same idea, we can convert to percentages: 50c = 50% as both use "cent" or "hundredth"

Important terms to use:
- Impossible: there is no chance that this event will ever occur
- Certain: there is 100% chance that this event will occur (NB. Note the saying that the only things to be certain of in life are death and taxes. This points out that very few events are considered "certain". An example would be drawing out a ball that is red from a bag that only contains red balls.)
- Likely: over 50% chance of occurring, but not certain
- Unlikely: less than 50% chance of occurring, but not impossible
- Outcomes: the possible results or things that might occur, for example the results of an experiment
- Sample space: a list of all the possible outcomes of an experiment
- Variation: how the results can change each time you conduct a trial
- Independent events: the results of this experiment are not changed by other factors (e.g. flipping a coin)
- Dependent events: sometimes outcomes are reliant on or changed by previous events (e.g. if you draw out a coloured ball from a bag of red and green balls and don't put it back, the chance of red or green next time depends on what you drew out the first time)
- Observed frequency: what actually happens when you conduct a number of trials
- Expected frequency: what you would expect to happen based on the fraction of possible outcomes (e.g. a coin has an expected frequency of ½ for heads and ½ for tails, but if you really flip it a bunch of times the observed frequency might not work out to that)

Monday: At-Home Investigation

Today your child will be working on making a number line to show how big fractions are, and where they are positioned between 0 and 1. This is a very important task and should take a considerable amount of thought. Make sure that your child does the thinking, rather than you simply telling them the answers. Ideally, you would make a very large number line stretching down the length of your hallway and ask your child to fold each fraction from paper so they can compare them.

Helpful materials:
- Strips of paper or string that can be folded to show fractions of a length (e.g. fold the string in half and half again to find quarters)
- Pieces of paper all the same size that can be folded and coloured to make fractions so that they can easily be compared.

Steps:
1. Make sure you have read "What you need to know this week" so that you know what to emphasise with your child and are familiar with the terminology.
2. For the second question, your child may not yet understand how to convert fractions to decimal numbers. **Tomorrow's lesson will help**, so do that one first then try this question again if you have time.
3. Help your child think about what worked and what didn't, then come up with a new plan if needed. Let them know that they can start with any of the fractions that they know rather than following the order supplied. You may find it easier to draw lines in landscape mode on a piece of paper as that way they are slightly longer.
4. Discuss what your child found out with them. Keep in mind the ideas from the "What you need to know this week" section so that you can ask questions that are appropriate to the issues identified.
5. The last question extends the line from 0-2. This should be relatively simple for students at this level, however contact your child's teacher if you get stuck.
6. At the end: consider writing a comment to your child's teacher to say what went well or what you are concerned about. Fractions is a particularly difficult concept, so contact your school if you have concerns.
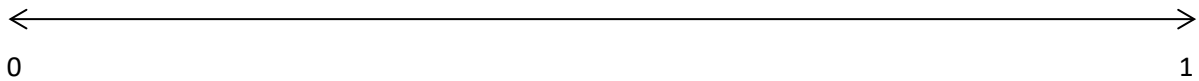
Ordering Fractions

Find a line that stretches across your room. Label one end of the line 0 and the other end 1. Place the following fractions onto the line in their correct position:

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{3}{4}$ $\frac{1}{8}$ $\frac{3}{8}$ $\frac{1}{10}$ $\frac{2}{10}$ $\frac{5}{10}$ $\frac{8}{10}$ $\frac{1}{5}$ $\frac{2}{5}$ $\frac{3}{5}$ $\frac{4}{5}$

Draw what you did here. Write each of the fractions on the lines in their correct position.
You might need to try a few times, so more lines are provided. Use more paper if you need it.
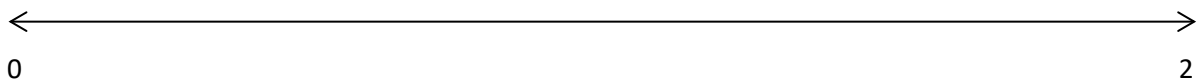
0   1

0   1
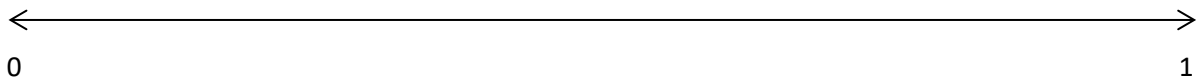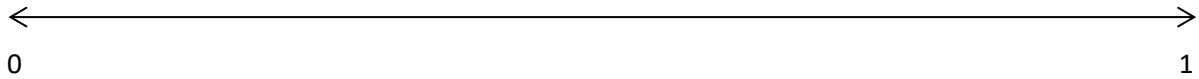
If you know how to convert to decimals, try writing the decimal fractions for the first 7 fractions above on this line.

0   1

Now let's try including some fractions that are greater than 1. Order the following fractions on the line below. Try as many times as you need.

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

0   2

0   2

Tuesday: Connecting lesson

In this lesson your child will be reviewing how to **write fractions as decimal numbers**. Hopefully, this is something that they already understand, however if they don't then the questions should lead them through the thinking to connect fractions to decimals. The idea is to build understanding of a simple connection so that they can work out later to divide and retain the understanding for later years. The basic idea is explained for you below for each question along with the answers.

Question 1

½ of a dollar is 50c.
- We write that in dollars as $0.50 or $0.5
- We write ½ as a decimal as 0.5 (you could also write 0.50)

As our measurement system uses tenths, hundredths and thousandths we can find many other examples. Some include:
- ½ a kilo of mince is 500g, which is 0.5kg
- ½ a metre of fabric is 50cm which is 0.5m
- ½ a litre is 500mL or 0.5L

No matter what the example, ½ is always 0.5.

Question 2

The same idea works for other fractions too.
- ¼ of a dollar is 25c or 0.25, ¼ of a metre is 25cm or 0.25, ¼ of a kg is 250g or 0.25
- ¾ of a dollar is 3 lots of 25c, which is 75c or 0.75
- $^2/_4$ of a dollar is the same as ½ of a dollar

Question 3

Tenths are much simpler as they are already in the same base as decimals (called base 10: because 10 ones = 1 ten, 10 tens = 1 hundred etc.)
- $^1/_{10}$ of a dollar is 10c, which is 0.10 or 0.1
- 0.1 is named one tenth. It has the same name as $^1/_{10}$ because it is the same amount. They are equal.
- $^2/_{10}$ of a dollar is 0.2 or 0.20

Table:
- 5/10 = 0.5
- 7/10 = 0.7
- 1/5 = 20c = 0.2
- 2/5 = 0.4
- 3/5 = 0.6
- 4/5 = 0.8
- 1/3 won't make a whole number of cents. 33c will do, but there is still 1c left. The decimal would be 0.33333…. keeping going forever. We write this usually with only one three and a dot above it.

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Fractions of a dollar as decimals

A lot of the time we tend to assume that fractions are difficult. Understanding a few connections tends to make fractions and decimals much easier. Today we are going to use what you already know about money to help us to connect fractions and decimal numbers. Work through the questions below to help.

Half as a decimal

1. I could buy two lollies for a dollar. This means that each lolly is worth half a dollar ($^1/_2$).

   - How many cents is half a dollar? Circle the coin/s above in black.

   - How would you write 'half a dollar' in dollars? $_____
     If you leave off the $ sign that is how you write half as a decimal.
     Write one half as a decimal number.

   - How come you would not write half a dollar as 1.2 even though it has a 1 and a 2?
     What would $1.2 mean?
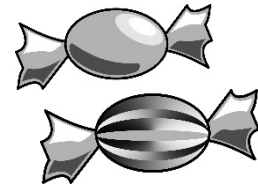
One quarter as a decimal

2. This time I could buy four lollies for a dollar. This means that each lolly is worth one quarter of a dollar ($^1/_4$).

   - How many cents is $^1/_4$ of a dollar? Circle the coin/s at the top of the page in red.

   - How would you write '$^1/_4$ of a dollar' in dollars? $_____
     If you leave off the $ sign that is how you write $^1/_4$ as a decimal.
     Write one quarter as a decimal number.

   - How come you would not write $^1/_4$ of a dollar as 1.4 even though it has a 1 and a 4?
     What would $1.4 mean?

   - What would $^3/_4$ of a dollar be? So how would we write $^3/_4$ as a decimal?

   - What would $^2/_4$ of a dollar be? So how would we write $^2/_4$ as a decimal? How is this fraction related to our first question?

One tenth as a decimal

3. This time I could buy ten lollies for a dollar. This means that each lolly is worth one tenth of a dollar ($^1/_{10}$).

    - How many cents is $^1/_{10}$ of a dollar? Circle the coin/s above in black.

    - How would you write $^1/_{10}$ of a dollar in dollars? $_____
      If you leave off the $ sign that is how you write $^1/_{10}$ as a decimal.
      Write one tenth as a decimal number.

    - 2.1 is called, "two and one tenth", 0.7 is called "seven tenths". Use this information to help you write the name for the decimal number from your last answer.
      What connection can you find to the name for $^1/_{10}$?

Apply what you know

Use the idea "of a dollar" to help you write each of the following fractions as decimals

Fraction	How much is this out of a dollar?	Decimal
$\frac{1}{10}$	10c or $0.10 or $0.1	0.1
$\frac{2}{10}$		
$\frac{5}{10}$		
$\frac{7}{10}$		
$\frac{1}{5}$		
$\frac{2}{5}$		
$\frac{3}{5}$		
$\frac{4}{5}$		

Optional challenge question if you want something trickier:

$\frac{1}{3}$		

Wednesday: Connecting lesson

This lesson allows your child to conduct some simple chance experiments and collect data. They will also describe the possible outcomes of an experiment as the "sample space". You will need to know the terms:

- **Observed frequency**: what actually happens when you conduct a number of trials of an experiment – the real outcomes of the events
- **Expected frequency or expected probability:** what you would expect to happen based on the fraction of possible outcomes (e.g. a coin has an expected frequency of ½ for heads and ½ for tails, but if you really flip it a bunch of times the *observed* frequency might not fit what you would *expect*)

You will need:
- A coin to toss
- Dice

For each experiment, ask your child to first make a prediction about what they think will happen. Then carry out the experiment and record what actually happens. Once children return to school, they will combine the data for their whole class and look at the variation in results.

If you do not have real dice or coins, you can find an online version here:
https://www.random.org/dice/

I2. Probability as a fraction

TR p127

> In this activity you will learn to express the likelihood of an outcome as a fraction rather than just using words.

1. If I toss a coin 100 times, about how many times would you expect the coin to land as tails? Explain your answer:

2. The probability of the coin landing as tails is ½.   How is this related to the fraction that you found in the question above?

Working out what the numbers in the fraction refer to:
1. Which of the numbers in the fraction refers to the total number of possible outcomes from tossing a coin?

2. Which of the numbers in the fraction refers to the number of "tails" on a coin?

This pattern is the same for every example of probability where the outcomes are equally likely!

Have a go writing these possibilities as fractions:

1. In a bag I have 5 lollies. Two of them are red, one is blue, one is green, one is yellow.
    a. The likelihood of drawing out a blue one is:

    b. The likelihood of drawing out a green one is:

    c. The likelihood of drawing out a yellow one is:

    d. The likelihood of drawing out a red one is:

2. A die has 6 sides with the numbers 1-6:
    a. The likelihood of rolling any one of the numbers is:

Now order each of the events from the questions above from the least likely to the most likely using the line beneath. Explain how you have made your decisions.

Never going
to happen

Certainly going
to happen

0   1

Backwards Question:
If another red ball was added to the bag, how would this change your answers?

I3. Conduct experiments to collect data

⬚ You are going to conduct experiments to collect data (observed frequency)

Instructions:
1. Decide on how to conduct an experiment so that you have good results to analyse. Write a sentence to explain your experiment in the space indicated.
2. Predict what you think is likely to happen, and express this as a fraction if possible.
3. List the sample space in the left column of the tables below.
4. Tally the number of times each outcome actually occurs (observed frequency).
5. Comment on the accuracy of your prediction.

Experiment 1: Drawing out a red counter from a bag containing 10 red and 10 blue counters

My prediction (expected probability):

Sample Space:	Observed Frequency: Tally of number of outcomes from _____ trials:

How close were my predictions (compare expected probability to observed frequency):

Experiment 2: Rolling a standard die

My prediction:

Sample Space:	Number of outcomes from _____ trials:

How close were my predictions? Compare the expected probability to observed frequency:

Thursday: Interleaved Practice Questions

Why we are using mixed up questions:
In this lesson your child will be reviewing a range of skills that they have learned previously. Each question is unrelated to the previous question, because we want your child to have to *think hard* about what to do. Mixing up questions like this, rather than just practising related questions, has been shown in research to improve student retention of concepts by 60% over a 4 month period.

What to expect:
Your child will probably have forgotten how to complete quite a few of the questions. If needed, change the numbers in each question to make them easier because this will still require your child to think hard and remember a process. If they still can't work it out, feel free to show them, but try using different numbers rather than the exact same question. There are answers to each question on the website in case you get stuck.

Interleaved practise

Year 6, week 8

Number:

1. The maximum temperature during the day reached 12^0. Overnight, it dropped 18^0. What was the lowest temperature? Show it on the thermometer below.

```
  40
  30
  20
  10
   0
 -10
```
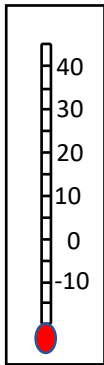
2. Biscuits are packed in trays of 6 for sale. The baker has made 500 biscuits. How many trays of biscuits will she fill?

3. If each tray of biscuits is sold for $12.50, what will the total sales amount to?

4. Decide whether these answers are true or false. Write T or F beside them.

   4 x 3 + 7 = 40   14 + 23 – 17 = 14 + 6   36 ÷ (11 - 5) = 6   21 + 7 x 2 = 56

5. How much is 25% of these amounts?
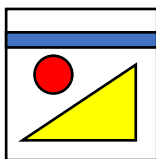
   $130   2400mL $38.00
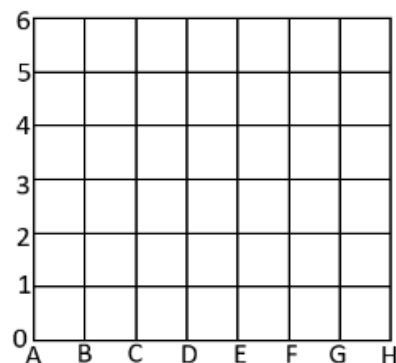
Measurement/Geometry:

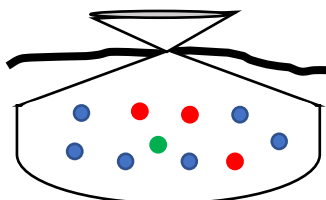6. Use the shapes on the first tile to create a new tile using flips, slides and turns. Describe what you did.

7. Draw the shape that has vertices located at the following coordinates: C5, G5, F2, B2 What shape have you made?

8. Use the grid from question 7 to draw a triangle. Write the coordinates for each of the vertices.

Chance/Data:

9. This bag has counters in it. Write one of the following words to describe the chance of drawing each colour: **impossible, certain, likely, unlikely**.

   blue   red   orange   green

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Friday: Connecting lesson

In this lesson your child will connect what they have been learning about chance with the learning from earlier this week and last week on fractions. They will use fractions to express the chance of an outcome occurring and will then order those events on a number line, just like you ordered fractions along a number line on Monday.

Friday: Connecting lesson

14. Probability as a measure between 0 and 1

> 📋 In this activity you will learn what is meant by expected probability.

1. If I toss a coin a number of times, what fraction of the times would you expect the coin to land as tails? Write it as a fraction, decimal and percent:

2. The probability of the coin landing as tails is 0.5. How is this related to the fraction that you found in the question above?

Below are some other examples of expected probability. Examine them to find the patterns and try to further your understanding of probability. Plot the letters corresponding to the statements on the line beneath and think about the fractions involved.

A.	The sun will always rise tomorrow. The probability of the sun rising tomorrow is 1.
B.	People will never stop needing oxygen to breathe. The probability of people not needing oxygen to breathe is 0.
C.	There are two possible outcomes of a situation that are equally likely to occur. The probability of a specific one of them occurring is 0.5 (50%).
D.	There are three possible outcomes of a situation that are equally likely to occur. The probability of a specific one of them occurring is 0.3333 recurring (33%).
E.	There are four possible outcomes of a situation that are equally likely to occur. The probability of a specific one of them occurring is 0.25 (25%).
F.	In a bag I have 5 lollies. Two of them are red, one is blue, one is green, one is yellow. The probability of a red lolly being drawn out is 0.4 (40%). The probability of a blue lolly is 0.2. The probability of a green lolly is 0.2. The probability of a yellow lolly is 0.2. (20% each)

Never going
to happen

Certainly going
to happen

⟵————————————————————————————⟶

0   1
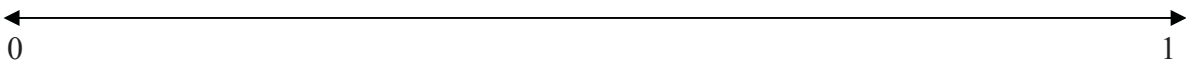
How do you think expected probability is calculated?

How do you think expected probability is related to fractions?

BACKWARDS QUESTION:
If the expected probability of something was 0.75 what would this mean?

Complete the table below to help you work out how to calculate expected probability.

Use your calculator to work out what to do with the numbers to calculate the probability:

Situation: I draw out one ball from a bag. In the bag there are…	Number of red balls	Total number of balls	Expected probability of red ball	**Calculator:** How did I get the expected probability from the numbers in columns 2 and 3?
2 red balls, 2 blue balls, 1 green ball, 1 purple ball	2	6	0.3333333 33%	
1 red ball, 4 purple balls, 5 green balls	1	10	0.1 10%	
3 green balls, 2 red balls	2	5	0.4	
5 red balls, 3 green balls	5	8	0.625	

What pattern have you found?

Use it to calculate the probabilities for the following situations. Check with your teacher.

Situation: I draw out one ball from a bag. In the bag there are…	Number of red balls	Total number of balls	Expected probability of red ball	**Calculator:** How did I get the expected probability from the numbers in columns 2 and 3?
3 red balls, 2 blue balls, 5 green balls	3	10		
2 green balls, 1 red ball, 1 black ball				
5 red balls, 1 blue ball				
2 red balls, 2 green balls, 3 purple balls				
1 red ball, 8 black balls, 4 purple balls, 2 green balls				

How do I think that I would calculate probability? Would it be ok to use percentages too?

Backwards Question:

Which of the possibilities above would be the highest expected probability? What colour is it? What is its probability?

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