Work Program for B2FMaths@Home Week 7 Year 3

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 fractions (especially: $^1/_2$, $^1/_3$, $^1/_4$, $^1/_5$, $^1/_8$ and multiples of any of these such as $^2/_3$, $^4/_5$, $^3/_8$…). We will be linking to what we learned last week about capacity to think about "half a glass". We will also look at fractions of shapes (2D), fractions of lengths, fractions of a window being covered, and fractions of a collection or group.

For your information: When students are learning about fractions in later years, they need to understand that:

- Fractions and division are different expressions of the same concept: 3 ÷ 4 = ¾
- Fractions, decimals and percentages are all different ways of expressing the same amount. We can use the context "of a dollar" to help with conversions. For example, what is half of a dollar? 50c. The number of cents is the same as that fraction converted to a percent, ½ = 50%. If we write the amount in dollars, we are converting it to a decimal, ½ = 0.50 or 0.5
- In real life, we use fractions as numbers far more often than fractions of pizzas and cakes. For example, we express probability as a fraction, decimal or percentage (e.g. a 5% chance of rain), we use fractions in equations for measurement, we use fractions in budgeting. We will be using probability next week as a natural extension of what we learn about fractions this week.

Students at this age need to work out:

- Fractions need to be "fair". If the pieces are to be given the same name, then the **size** of each piece needs to be the same. That includes fractions of a group of objects (e.g. half of 6 shells is 3 shells).
- We can have fractions of different types of wholes. We can have "half full" glasses, halves of string or ribbon, halves of amounts (e.g. half of $4 is $2) and also halves of shapes (e.g. rectangles, circles).
- Fraction names are related to the **size** of the pieces compared to the whole, not about how many pieces there are. If we cut a cake into 4 different sized pieces, they would not be quarters. Likewise, we could cut the cake into 1 half and 2 quarters, making 3 pieces altogether. They would not be called thirds.
- We can have different sized pieces in the same whole as long as we name them according to their size (e.g. one half, one quarter and two eighths cut into the same circle).
- Fractions can be compared to each other to work out which is bigger and to order them.
- The "whole" needs to be the same when comparing fractions. You can't compare fractions if one is from a small pizza and one is from a family-sized pizza!
- Fraction names are related to ordinal numbers (e.g. position in a race: third, fourth, fifth…)
- When using a fraction symbol, e.g. ½, the bottom number refers to how many parts there are in the whole (2 parts), and the top tells us how many we are talking about right now (1 out of the 2 parts is ½). When they return to school, children will refer to the bottom number as the denominator and the top number as the numerator. You don't need to use or remember those terms right now though.

You will need the following objects:

- Lots of scrap paper for Monday (at least 12 pieces)

Teacher Overview

Students will be considering halves, quarters, eighths, thirds, fifths, fraction symbols, unit fractions, simple fractions and the idea of sharing fairly. Ideally, we would use the following sequence of thinking to develop fractions from Year 1 Year 3. For all year levels, we need to make sure that we include all of the following models or representations: **shapes (2D), objects (3D), collections or groups and lines**. For older children we also consider fractions of numbers, and fractions as numbers themselves.

1. Understand and describe a "whole" and a "part".
2. Make halves and consider what is a half and what is not a half. Understand that halves must be fair. This includes understanding sharing a collection fairly (e.g. half of 8 lollies).
3. Understand that joining together halves makes the whole again.
4. Understand that we could cut a shape into more than two pieces, but still divide the pieces fairly between 2 people so that each person gets half E.g. cut in 4 pieces, each person gets 2.
5. Understand that the concept of the size of parts being fair applies to other fractions as well, not just halves. Fractions are named for the size of the part, not the number of parts.
6. Fraction names are related to ordinal numbers: third, fourth, fifth etc.
7. One fourth has a special name: one quarter. Quarters are fourths, not other fractions.
8. Understand that fractions and division are related to each other.
9. Use the symbol (vinculum) for fractions. Understand that the denominator represents the number of parts altogether in the whole and the numerator represents how many of the parts we are specifically talking about.
10. We can compare the size of fractions. The larger the number of pieces that a whole is divided into, the smaller the size of each piece. That means that eighths are smaller than thirds.
11. Sometimes fractions can be the same size as each other even if they have different denominators (number of parts altogether). E.g. 3/6 is the same quantity/size as 2/4.

What to emphasise

If you have time online with a webcam
Fractions are hard to teach at the best of times. Focus on developing an understanding of fair or equal sized parts and comparing the size of fractions to each other. Don't worry too much about using terms such as vinculum, numerator or denominator as you can introduce those once we are back at school. Focus on developing the concept of "fair" and the size of portions.

Tracking student achievement

This week we are focusing on the Australian Curriculum Content Descriptor **ACMNA058:** Model and represent unit fractions including ½, ¼, 1/3, 1/5 and their multiplies to a complete whole.
In Year 2, students also used eighths so we need to use those as well. They also specifically looked at shapes and collections, not just pizzas, so we need to include at least those models.

The Achievement Standard is **N3C**: Model and represent unit fractions.
As thirds and fifths are specifically mentioned along with the halves, quarters and eighths from year 2, we need to at least include these at the C standard. To receive an A or B the student should also be able to model and represent non-unit fractions (5/6, 3/5…) and do some comparison of sizes.

Monday: At-Home Investigation

Today we are revising what we know about halves, quarters and eighths, and using this knowledge to help introduce thirds and fifths. Your child will be folding paper to make and colour each fraction, then comparing the size of some of the fractions.

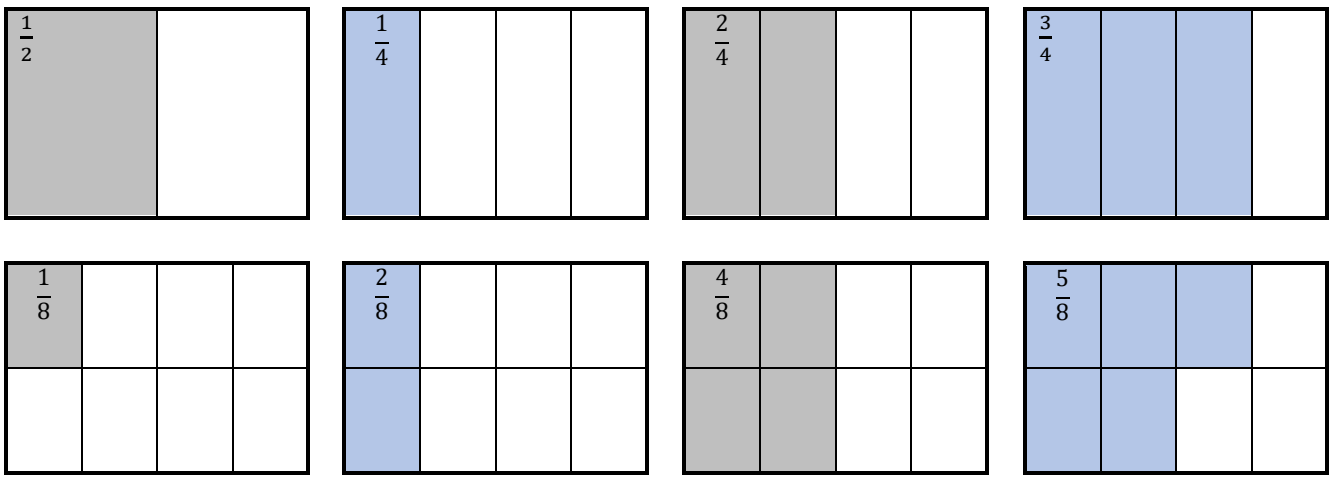
You will need:

- At least 12 pieces of paper. Please note: you can use scrap paper as long as each piece is the same size. If you don't have enough paper, cut 3 pieces of A4 paper into four and use those instead.

Steps:

1. Make sure you have read "What you need to know this week" so that you know what to emphasise with your child.
2. Read the sheet to your child. Ask for their ideas on how to fold each fraction. Focus on using the terms "fair", "the same amount", or "the same size". One example of answers is shown below.
3. For the questions on comparison and on making thirds and fifths, make sure that you try out their ideas first before you try to help them come up with a better plan. This is important because then they will know *why* their idea didn't work.
4. Help your child think about what worked and what didn't, then come up with a new plan if needed. For example, thirds should all be the same as each other. One half and two quarters is not thirds.
5. Encourage your child to draw or write answers to the questions on the page. It is important to make a record of this page, whether as a photograph showing their folded fractions or by keeping the page with the drawings.
6. 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.
7. At the end: consider writing a comment on the page to say what went well or what you are concerned about. Fractions can be hard to understand for children, so please contact your teacher for help as needed.

Example answers:



At-Home Investigation

Revising fractions:

Last year you will have learned about halves, quarters and eighths. Today we are going to fold paper to make each of these fractions. Use rectangular paper and fold, then colour the following fractions. Draw the lines in with a pen, then take a photo of what you have made to send to your teacher.
If you can't send in a photo, you could use the boxes beneath to draw the fractions and label what you have made.

- One half $\frac{1}{2}$
- One quarter, two quarters, three quarters $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$
- One eighth, two eighths, four eighths, five eighths $\frac{1}{8}$ $\frac{2}{8}$ $\frac{4}{8}$ $\frac{5}{8}$

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

Compare the size:

Now that you have made each fraction, answer the following questions.

1. Which is the largest?

2. Which is the smallest?

3. Which fractions are the same size as each other?

Introducing thirds and fifths:

Think it through: When you folded eighths, how many pieces did you have to fold it into? Use this information to try and work out how you would fold thirds and fifths. Draw what you did below as accurately as you can. **Is three fifths bigger than three quarters?**

Teacher Overview

This is a ***Problem Solving and Reasoning*** task.

The emphasis is on *designing* an investigation, *developing* a plan, *testing* it out, *verifying* that the plan worked, changing it as needed and *communicating* the procedure. There is also an emphasis on *generalising* an appropriate process that can be replicated for sharing any amount fairly.

If you are at school: Focus on making fractions using each of the models (lines, volumes…), rather than just using shapes. Make sure that you discuss what is half and what is not half (same for quarters and eighths). Make sure that students understand that a quarter is a fourth, or half of a half, not just a "bit". Focus on applying the thinking "eighths have 8 pieces" to work out thirds have 3 pieces etc. This will be a big focus for the rest of the week.

Please note: Watch out for using the word "even" to mean "equally sized" when describing fractions. This tends to lead to students thinking that only fractions with even numbers for denominators can be evenly sized. Instead, try using any of the following terms or phrases: equal, fair, same-size, equivalent, same amount.

Watch out for:

- Any three pieces are thirds – no need to be equally sized or shared fairly
- Only understanding fractions of shapes
- Any number of pieces are "quarters" (e.g. thirds are three quarters…)
- All fractions start when we fold in half (this won't work for thirds, fifths…)

Good questions to prompt thinking:

- Is it fair? What would fair look like? Fractions have to be fair to have the same name.
- How can we compare the size of the fractions? Which is biggest/smallest? Which are the same size even though they have different names?

Students requiring support:

- Use physical manipulatives
- Make sure that you do not limit the thinking to squares and circles – shapes AND collections are required to meet the C standard

Extension:

- Provide "one third" and ask "what would the whole look like?" Repeat for simple fractions that are not unit-fractions.
- Find thirds and fifths of collections (e.g. 30)
- Link with time: "half an hour", being 5 and a half years old
- Link with measurement: "quarter of a metre", "half a litre"
- Link with chance: one quarter of the time the card drawn will be a heart, half the time it will be black
- Link with money: half a dollar is 50c
- Link with a number line: half way between 0 and 100 is 50, one quarter of the way is 25

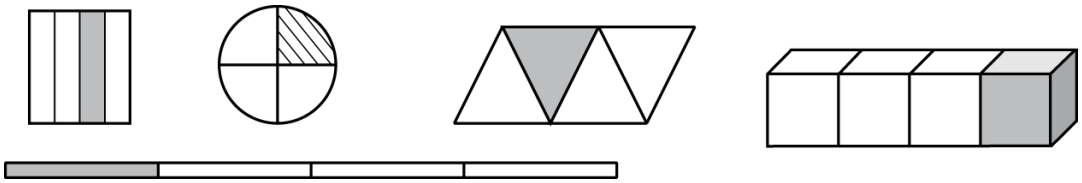
Tuesday: Connecting lesson

Worksheet task:
The two worksheets for today show pictures that are one quarter and that are not one quarter and also use the symbol for one quarter. This should be an easier task than yesterday, but please make sure to talk to your child to reinforce the idea of fractions being equal in size. For your reference: quarters are fourths not other fractions. They need to be a fair amount, so each quarter needs to be the same size. You can have quarters of groups (e.g. one quarter of 8 is 2), shapes, lines and objects as well as quarters of masses, time, money etc.

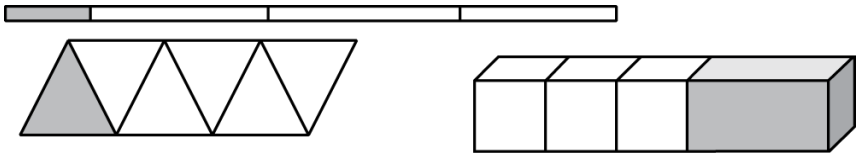
One quarter of shapes and collections

Today you will learn about the fraction 'one quarter'. You will learn why some pictures show one quarter and others don't, and what the symbol is for one quarter.

These pictures all show one quarter:



These pictures <u>do not</u> show one quarter:



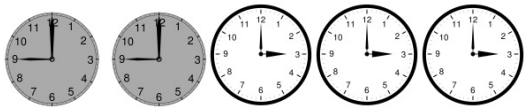
What is the difference between the pictures that show one quarter and those that do not show one quarter?

This collection shows one quarter:

One quarter of the shoes are boots

The collections do not show one quarter:

This is not one quarter of the stars



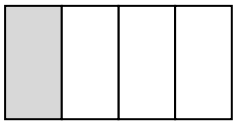
This is not one quarter of the clocks

What is the difference between the collections that show one quarter and the collections that don't?

Symbol for one quarter

In this lesson you will learn about the symbol for one quarter. It is shown below next to the picture of one quarter.

Use the picture below to work out what the one means and what the four means for the symbol of one quarter. Fill in the boxes.



$\frac{1}{4}$

The 1 means:

The 4 means:

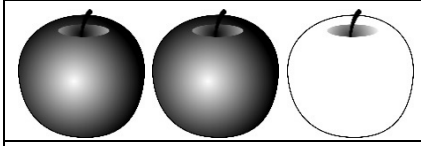
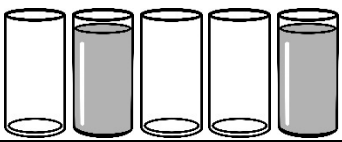
How is the symbol for one quarter similar to the symbol for one half? Why do you think it is similar?

How is the symbol for one quarter different from the symbol for one half? Why is it different?

Use what you have learned to join up the following statements:

The top number	says how many equal pieces there are altogether.
The bottom number	says how many pieces are shaded or indicated.

Generalising Question: Fill in the blanks for the following fractions, words and symbols

Picture	Words	Symbols
	*One third* of the apples are peeled	$\frac{1}{3}$
	Two thirds of the stickers are stars	
		$\frac{1}{5}$
		

Teacher Overview

This is a ***Reasoning and Understanding*** task. It asks students to identify what is a quarter and also what it is not, for both shapes and collections (prove true or false). Sometimes in junior primary we tend to forget to look at non-representations. It also introduces the symbol for one quarter and uses deductive reasoning to unpack what each number represents. Using the same logic, children are introduced gently to the idea of thirds and fifths for a second time.

You may also want to review concepts of arrays, shapes, length, time and capacity that students were working on in previous weeks to build retention.

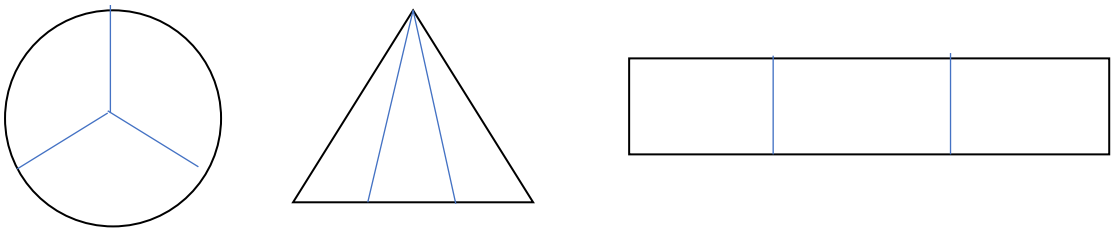
Wednesday: Connecting lesson

In this lesson we will introduce the concept naming fractions and link it with positions in a race (ordinal numbers). After first and second places, fractions follow the same naming patterns as ordinal numbers: third, fourth, fifth… This simple connection should help your child to understand the number of parts needed for each fraction. The tricky part will be understanding that each part needs to be "fair" – just like it isn't fair to have a bigger half, it also isn't fair to have a bigger third or a bigger fifth.

When children are working on the second page they may have trouble dividing the shapes fairly. Just do what you can. If you get stuck, examine the table on the second worksheet from yesterday and let your child's teacher know that you have had trouble. They can review this concept once we return to school.

Here is an example

Draw thirds:



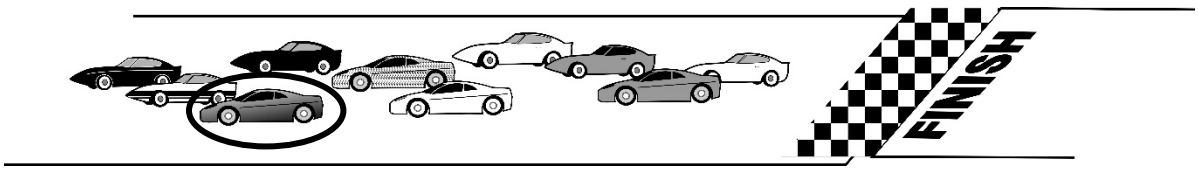
For the triangle: splitting the base into equal lengths will really make that fraction. An explanation is provided below, however as this involves year 8 level algebra and measurement formulas you really don't need to show it to your children 😊

For those of you who are interested:
The area of a triangle is ½ x base x height. As each smaller triangle has the same height, as long as you divide the base to make 3 equal lengths then you are keeping that dimension the same as well.

Fraction names are like racing

Fractions are named similarly to places in a race. Use this information to help you answer the questions below:

The cars below are having a race. Car number one crossed the finish line in first place.
Car number two came in second place.
What place did car number three come in? _____



This is the **same word** as that used for when one whole is broken into three fair parts.

What would one of these parts be called? _____

Divide the whole rectangle below into three fair parts. Write the name of each part on your picture.

What place would car number five come in? _____

This is the same word as that used for when one whole is broken into five fair parts.

What would one of these parts be called? _____

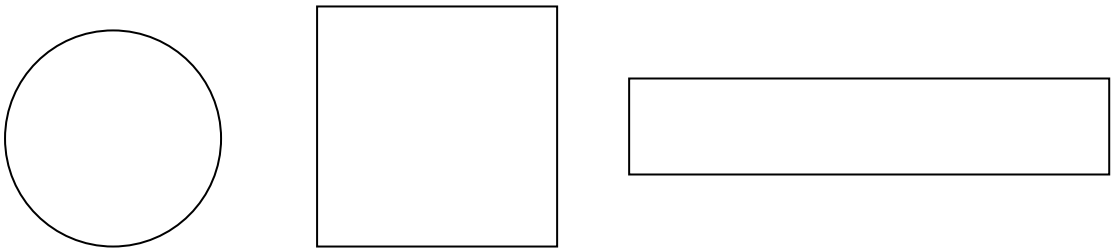
Divide the rectangle below into five fair parts. Write the name of each part on the picture

If a shape was broken into 7 pieces, what do you think each would be called? _____

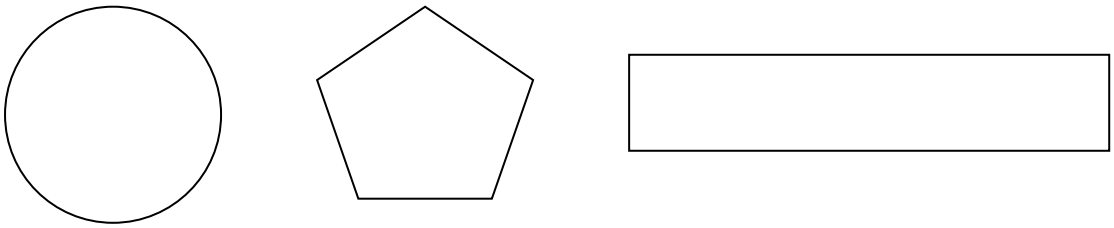
Explain why and draw a picture to show what it would look like:

Draw the following fractions onto the shapes below:

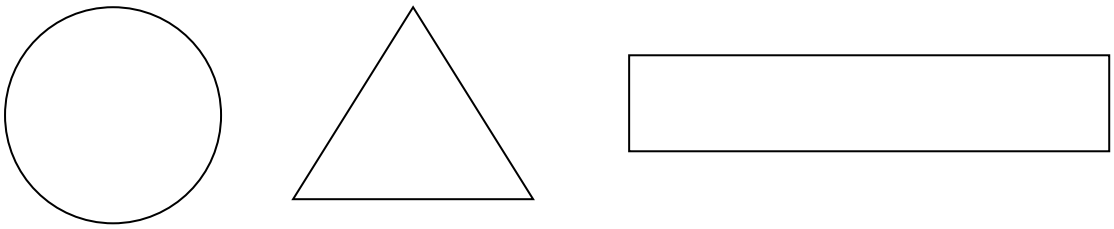
Draw halves:



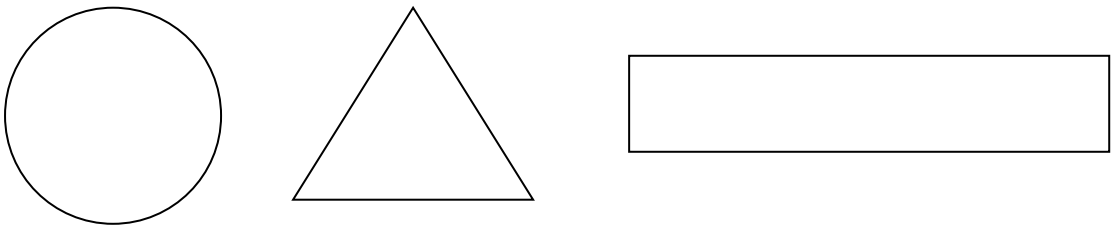
Draw fifths:



Draw thirds:



Draw fourths:



Why are the fifths smaller than the thirds?

Extension:
Colour in two parts out of each shape. Guess what the name and symbol for each of your fractions is and write it in the space below:

Teacher Overview

This is a ***Reasoning and Understanding*** lesson. It gives students an opportunity to reflect on what they know about naming fractions and use deductive reasoning to make connections to any simple fractions. This is part of the Achievement Standard for a C. That means that this sheet gives students a chance to demonstrate the C standard from the Achievement Standard, however we are only looking at area of shapes rather than other models. You will need to review this concept when we return to school.

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 practice

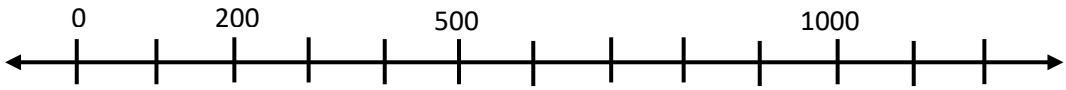
Number:

1. 5 x __ = 30 Show how you worked it out.

2. Circle the numbers that are even and explain why they are even?

   25 62 80 31 44 92 87

3. Show where these numbers would go on the number line: **250** **675** **920**

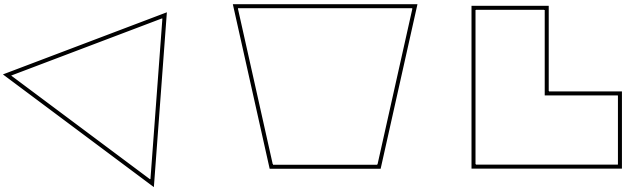


4. Colour in 3 quarters of each of these rectangles.

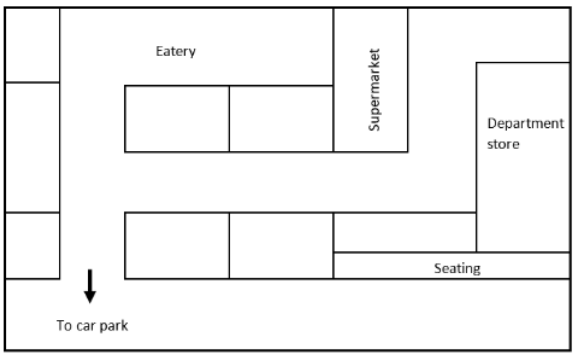
5. What change would I get from $20.00 if I spent $14.30.
   Work out the answer and then draw the money.

Measurement/Geometry:

6. Are these shapes symmetrical? Explain your answers.



7. Add the following to the shopping centre plan and label them:
   - A bus stop in front of the seating
   - A post office close to the exit
   - A sandwich bar in a suitable position
   - A butcher opposite the supermarket



8. What time is it? Draw the clock to show.

Chance/Data:

I am going to use this spinner to play a colour game.
List all of the possible results of my spins.
Which colour am I least likely to spin?

Teacher Overview

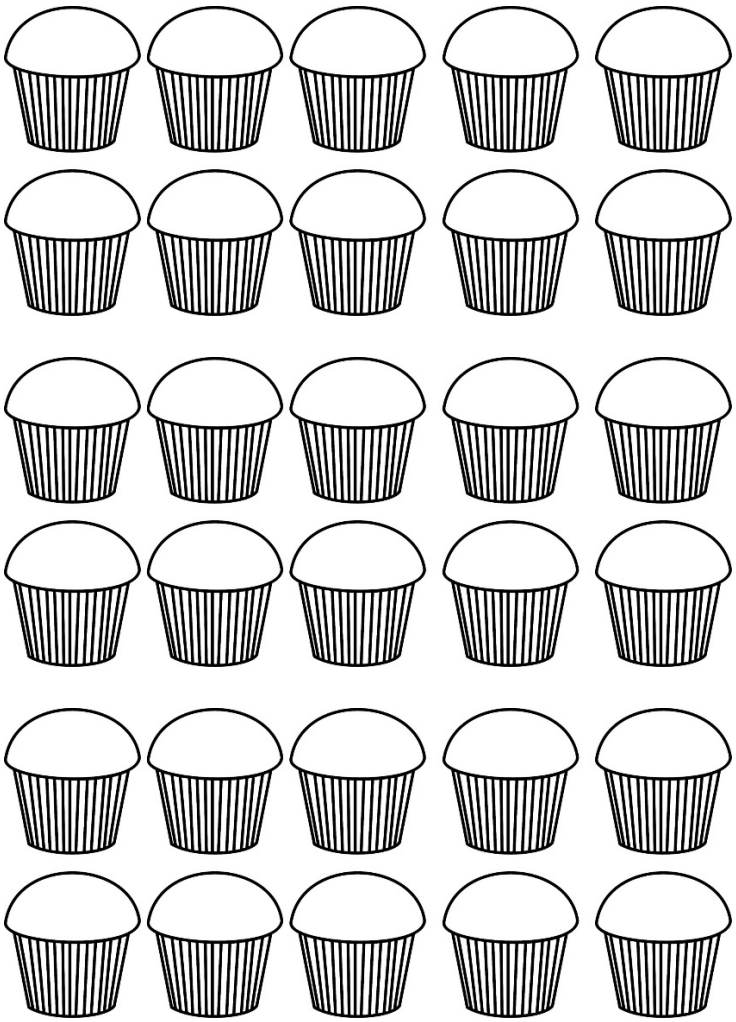
The questions on this worksheet are drawn from the “C standard” of the Achievement Standard. See your tracking sheet for more detail. Each week the interleaved questions will get a little harder, and more concepts will be reviewed throughout the program as we teach that concept. We have included answers to these questions on B2FMaths@Home so that parents can find them if needed.

Support for struggling students:
You might like to reduce the numbers in the questions. You might also give the student the answer, then ask them to work out how the answer was obtained.

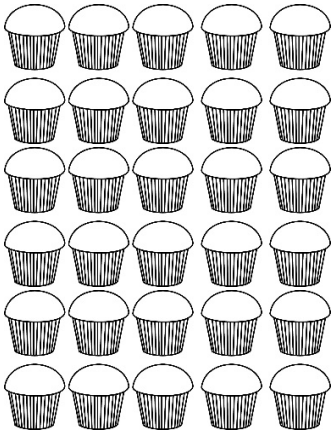
Friday: Connecting and Generalising Lesson

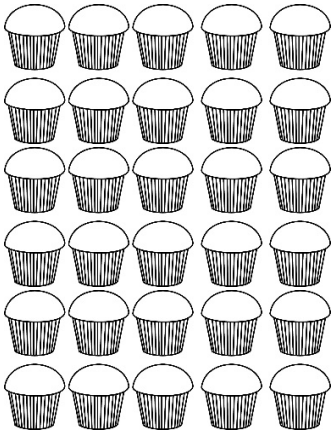
Fractions are not just shapes

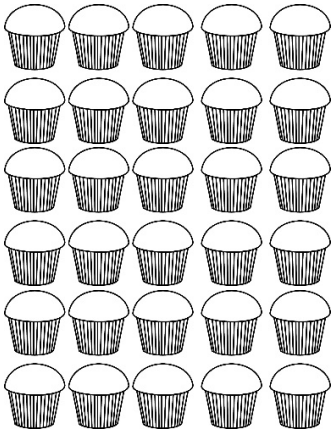
The following picture shows 30 cupcakes. Your job is to work out what fractions you could make with the cupcakes without having to cut any of them into pieces. Making thirtieths doesn't count for this question. Use the following page to circle each different fraction that you find and explain what it is. You need to find at least 4 fractions, but there are 6 possible ones to find without cutting the cakes.

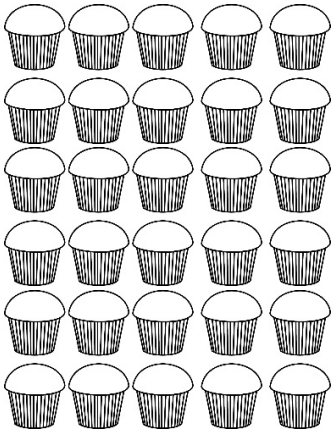


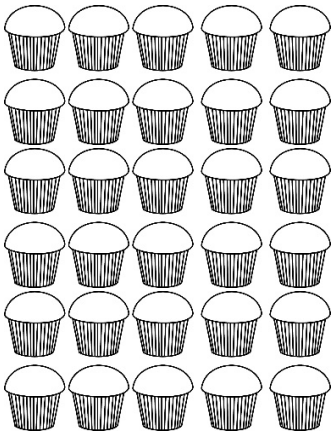
Circle the fractions you find and write the fractions in symbols or numbers (e.g. ½)

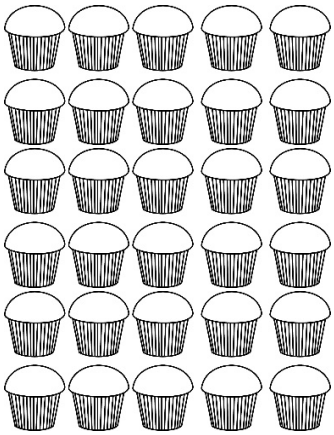












Teacher Overview

This is a ***Problem Solving and Reasoning*** lesson. It is designed to apply students' understanding to create fractions of groups. This will be a particularly tricky concept from many children so it should make a fun experiment for families at home and provoke good discussion. Feel free to suggest cutting the original group of 30 up then rearranging them into equal groups/rows.

Fractions of 30 that could be made:

- Halves (2 groups of 15)
- Thirds (3 groups of 10)
- Fifths (5 groups of 6)
- Sixths (6 groups of 5)
- Tenths (10 groups of 3)
- Fifteenths (15 groups of 2)

While children could do something like show 3/5 (18 out of 30), the aim of this task is to consider what different numbers of parts they could show. The number 30 has been deliberately chosen to steer children towards thirds, fifths and tenths rather than using base-two fractions (halves, quarters, eighths). This gives you a good opportunity to demonstrate the Achievement Standard again.