# Stage 3 Maths Program
## Term 2 Week 8

**NSW K-10 Mathematics Syllabus Outcomes**

### Fractions and Decimals (relate to Addition and Subtraction) (1)

**MA3-7NA - Compares, orders and calculates with fractions, decimals and percentages**

- Model and represent strategies to add and subtract fractions with the same denominator
- Write fractions in their 'simplest form'
- Add and subtract fractions, included mixed numerals, with the same or related denominators

### Mass (1) (relate to Fractions and Decimals)

***MA3-12MG - Selects and uses the appropriate unit and device to measure the masses of objects, and converts between units of mass***

- Recognise the need for tonnes to measure mass
- Record masses using the abbreviations t, kg and g
- Select and use appropriate instruments and units to measure mass
- Distinguish between 'gross mass' and 'net mass'
- Solve problems involving mass

**Working Mathematically**

- MA3-1WM - Describes and represents mathematical situations in a variety of ways using mathematical terminology and some conventions
- MA3-2WM - Selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations
- MA3-3WM - Gives a valid reason for supporting one possible solution over another

**Learning Goal - Fractions and Decimals (refer to outcome)**

**Success Criteria - (refer to indicators)**

**TIB**

**Learning Goal - Mass (refer to outcome)**

**Success Criteria -Mass (refer to indicators)**

**TIB**

# Mathematics Weekly Plan

**Term –** 1 2 3 4 **Week –** 1 2 3 4 5 6 7 8 9 10 11 **Strands** – Fractions and Decimals (1)/ Mass (1)

| | | Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|---|---|
| **Key Ideas:** | | **Fractions and Decimals** | | | **Mass** | |
| **Warm Up** | **Additional warm up activities: TEN:** Using your PLAN Data, students will work on TEN based activities for 10 minutes. Activities are differentiated based on group needs (view PLAN Data/Clusters). | **Mark Pre-test as a whole class and provide immediate feedback.** | **TEN/ Ninja Numeracy/ Quick Revision Mentals** | **TEN/ Five Minute Frenzy/ Quick Revision Mentals** | **TEN/ Five Minute Frenzy/ Quick Revision Mentals** | **Mark Post-test as a whole class and provide immediate feedback.** |
| **Problem of the Day** | | **Pre-Test:** Fractions & Decimals and Mass. | *Planet X is 11/12 of a light-year away from Earth. Planet Y is 1/12 of a light-year away from Earth. How much farther away is Planet X?*<br>*Planet X is 10/12 of a light-year farther away than Planet Y.* | *When Susan looked at her mobile phone bill for the month, she saw that she had spent 3/5 of her minutes talking to her mother and 1/5 of her minutes talking to her best friend. What fraction of the minutes did Susan spend talking to either her mum or her best friend?*<br>*Susan spent 4/5 of the minutes talking to either her mum or her best friend.* | *There are 64 passengers on a bus. If the average weight of a passenger is 60 kilograms, what is the total weight of the passengers in tonnes?*<br>*3.84t* | **Post-Test:** Fractions & Decimals and Mass. |

**Explicit Teaching**

## Main Focus + Language

**Access prior knowledge: Adding** and **subtracting 'Like' fractions**.
Revise the rules with the students;
*What do you remember about fractions?*
*What are some of the rules to add and subtract fractions?*
*Get feedback from the class (thumbs) who requires more help?*
**General rules:** if the denominators are the same, you simply add or subtract the two numbers at the top *(the numerators; the top number says how many slices we **have**)*. You MUST NOT add the denominators *(The bottom number says how many equal slices the whole was **cut into**)*. To **ADD** fractions with like or the same denominator, simply add the numerators then copy the common denominator. Always reduce your final answer to its lowest term *(simplest form)*.
Similarly, to **SUBTRACT** fractions with like or the same denominator, just subtract the numerators then copy the common denominator. Always reduce your final answer to its lowest term *(simplest form)*.

Explicitly review how to add and subtract 'like fractions':
**Example 1**: $\frac{3}{7}+\frac{2}{7}$.

**Explain:** the denominators of the two fractions are both 7. By having the same denominators, we can easily add these fractions by adding their numerators and copying the common denominator which is 7.

$$\frac{3}{7}+\frac{2}{7}=\frac{3+2}{7}$$
$$=\frac{5}{7}$$

*This is the simplest form this fraction can be as nothing can equally go in to 5 or 7. 5/7 is the answer.*
**Additional examples (adding like fractions):**
*Students can complete these in their books or on whiteboards. Work with students who may need additional support. Fractions should be simplified if possible.*
3/12 + 6/12
4/8 + 3/8
2/5 + 2/5
26/45 + 16/45
13/50 + 32/50
15/25 + 7/25
31/84 + 29/84

**Example 2:** Subtracting fractions
$\frac{10}{27}-\frac{4}{27}$

The two fractions have the same denominators which mean we should be able to easily subtract their numerators.

$$\frac{10}{27}-\frac{4}{27}=\frac{10-4}{27}$$
$$=\frac{6}{27}$$

**Model:** *The answer to this fraction problem can still be further simplified using a common divisor. To find a common divisor we need to use our multiplication knowledge to determine what number can go equally into 6 and 27. The answer is 3. So, divide the numerator and denominator by 3 to reduce the fraction to its simplest form.*

**Access prior knowledge: *What Is Simplest Form of a fraction?***
When you hear people talk about writing fractions in **simplest form**, it means that you are finding the smallest, easiest way to represent a fraction. When you are asked to simplify a fraction that is the same as writing it in simplest form.
A **fraction** is a part of a whole. It is represented by two numbers: one on top of the other with a line in between. The top number, or the **numerator**, represents how many pieces of the whole we are referring to, and the bottom number, or the **denominator**, represents how many pieces the whole has been broken into.
When asked to fins the simplest form of a fraction there are two rules we must follow:
**1.** Ask if the numerator and the denominator can be divided by the same number, which is called a common factor.
**2.** See if at least one number in the fraction a prime number is. A prime number is a number that is 1 or greater and cannot be divided nu any number other than 1 and itself. Therefore, it might not be able to be simplified.
**Hint:** Try to **exactly divide** (only whole number answers) both the top and bottom of the fraction by 2, 3, 5, 7... etc, until we can't go any further.

**Explicit modelling:**
**Example 1:** Simplify the fraction 24/108
As 24 and 108 are both even numbers, I know that they can be simplified by dividing by 2:

$$\frac{24}{108}\ \overset{\div 2}{=}\ \frac{12}{54}$$

Again, looking at the 12 and 54, they both end in an even number. Again, I can repeat this process to make it smaller (divide by 2).

$$\frac{12}{54}\ \overset{\div 2}{=}\ \frac{6}{27}$$

Now our fraction is simplified to 6/27. Ask students whether that these numbers can be divided by the same. Return to the hint note above. Go through the whole numbers until you can't go any further e.g. can we divide these numbers by 1? Yes, however our fraction will be the same, we want to make it smaller. Can we divide the numbers by 2? We can only divide 6 by 2 but not 27 as it is an odd number. Can we divide the numbers by 3? Yes. 6 can be equally divided by 3 and 27 can equally be divided by 3.

$$\frac{6}{27}\ \overset{\div 3}{=}\ \frac{2}{9}$$

That is as far as we can go. The fraction simplifies to **2/9**

**Example 2:** Simplify the fraction 10/35
Dividing by 2 doesn't work because 35 can't be exactly divided by 2 (35/2 = 17½)
Likewise, we can't divide exactly by 3 (10/3 = 3 1/3 and also 35/3=11 2/3)
No need to check 4 (we checked 2 already, and 4 is just 2×2).

**Improper to Mixed Numeral:**
**What is an Improper Fraction?** Access student's prior knowledge and ask them to provide answers to the question.
An improper fraction is any fraction where the numerator is greater than the denominator.
Examples of improper fractions are 16/3, 81/9, 52/37.
**How to Convert an Improper Fraction to a Mixed Number**
1. Divide the numerator by the denominator
2. Write down the whole number result
3. Use the remainder as the new numerator over the denominator. This is the fraction part of the mixed number.

**Explicit modelling:**
**Example 1:** Convert the improper fraction 16/3 to a mixed number.
1. The denominator will remain the same (3).
2. Divide the numerator 16 by the denominator 3: 16 ÷ 3 = 5 with remainder of 1.
3. The whole number now becomes 5.
4. The remainder is 1. This 1 will become the new numerator and 3 stays as the denominator, the fraction part of the mixed number is 1/3.
5. The mixed number altogether now is 5 1/3. So, 16/3 = 5 1/3.

**Example 2:** Convert the improper fraction 45/10 to a mixed number.
1. Simplify the fraction first to its simplest form. The only number that can equally go into 45 and 10 is 5. 45 ÷ = 9 and 10 ÷ 5 =2.
So, our new fraction will become 9/2 which will be much easier to turn into a mixed numeral.
2. The denominator stays the same (2).
3. Divide the numerator 9 by the denominator 2: 9 ÷ 2 = 4 with remainder of 2.
4. The whole number now becomes 4.
5. The remainder is 1. The 1 will become the new numerator and 2 stays as the denominator, the fraction part of the mixed number is 1/2.
6. The mixed number altogether now is 4 1/2. So, 45/10 = 4 1/2.

**Mixed Numeral to Improper Fraction:**
**What is a Mixed Numeral?** Access student's prior knowledge and ask them to provide answers to the question. An Improper Fraction has a top number (numerator) larger than (*or equal to*) the bottom number (denominator).

**How to convert a Mixed Numeral to an Improper Fraction:**
**Explicit Modelling**
Multiply the whole number part by the fractions denominator.
Add that to the numerator.
Then write the results on top of the denominator.
**Example 1:**
Convert 3 2/5 to an improper fraction.
1. First, multiply the whole number by the denominator: 3 x 5 = 15
2. Add that to the numerator:
15 + 2 = 17.
3. The denominator will stay the same = 5.
4. Then write that results above the denominator = 17/5 – *that is now the improper fraction.*

**Example 2:**
Convert 2 1/9 to an improper fraction.
1. First, multiply the whole number by the denominator: 2 x 9 =18.
2. Add that to the numerator:
18 + 1 = 19
The denominator will stay the same = 9.
3. Then write that result above the denominator = 19/9 – *that is now the improper fraction.*

**Mass:** What is Mass? **Mass** is the amount of matter in an object. Mass is measured in grams, kilograms and, tonnes *(Metric units of measurements)*.
Explain each measurement and provide/ask for an example of each measurement:
**Grams:** are the smallest, Tonnes are the biggest. Let's take a few minutes and explore how heavy each of these are. A paper clip weights about 1 g Grams are often written as g (for short), so 1 g = 1 gram.
**Kilograms:** are great for measuring things that can be lifted by people. Kilograms are often written as kg. Once we have 1 000 g, we have 1 kg. 1 kg = 1 000 g.
**Tonnes:** are used to measure things that are very heavy. Things like cars, trucks and large cargo boxes are weighed using the tonne. Tonnes are often written as t) for short). Once we have 1 000 kg we will have 1 tonne. 1 t = 1000 kg.
Students must note the following conversions:
**1 kilogram = 1,000 grams**
**1 tonne = 1,000 kilograms**

Using scales and a variety of objects within the classroom (or various items brought in for measuring), model how to estimate the weight of the object before calculating the exact weight.

Ask students if the items will be measured in tonnes? Why/why not? Ask students why the might think that measuring in tonnes is important? *Tonnes is only used to measure things that are tremendously heavy. It is extremely important, particularly in the fields of building, engineering and transport. Measuring in tonnes is useful for calculating load limits on roads and bridges. Vehicle design and handling, aircraft safety and shipping purposes also rely on measurement in tonnes.*

Using scales e.g. kitchen scales, measure items found within the classroom e.g. a dictionary. A thick dictionary may be estimated around 1kg. On the board, model how to set up a measuring table for the students to copy into their work books and select various items from around the room or bring in various items that the students can investigate the mass of:

| Object | Estimate | Mass |
|---|---|---|
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If possible, provide students with a 500g, 100g and 1g weights to get the feel of each measurement so that their estimations are fairly reasonable. Note: *Checking if an answer is **reasonable** means we check to see whether an answer is a good approximation or **estimate** to the question. This is really important because it allows us to check whether our calculations make sense.*

Revise measuring and weighing objects using scales. Explicitly model and distinguish the **differences** between **'gross mass'** and **'net mass': Gross mass:** The total weight, including the contents and the packaging. **Net mass:** The total weight, not including the packaging.

Explicitly model how to measure the gross and net mass of various packaged items. Model the activity to the students. Create a container/bag of jellybeans e.g. 65g (e.g. *65g is gross mass =mass of container + mass of contents*).
Measure the entire contents which would equal 65g. Now, take out the jellybeans and measure the **net mass** and record. For example; if the jellybeans on their own weighed a net mass of 60g, then the container should weigh a net mass of 5g. Calculate the mass of the container the jellybeans were in to see if this statement is true. Create a word problem for the experiment:
**Example:** *The jellybean bag weighs 65g. If the 15 jellybeans weighed 60g, how much did the container weigh? 5g*
Model additional examples using different items.

**Additional Activities to model (Note:** *this does not need to all be taught in one lesson. These could be used with differentiated/extension groups or as an additional activity while students measure using weights or as a fast finisher activity):*
Explicitly model how to solve problems involving mass. Model problems that contain/don't contain decimals Students should use the strategies previously learned to help solve word problems:
**Hint:** *When multiplying with decimals, multiply normally, ignoring the decimal point. Then put the decimal point in the answer - it will have as many decimal places as the two original numbers combined.*

Examples of word problems to explicitly model. As students begin to understand, display the problems on the board for the students to attempt on their own:
*If a pencil weighs 10g, how much would five pencils weigh? This is a multiplication problem.*
**Answer:** *50g*
*If a sandwich roll weighs 500g, how much would two sandwich rolls weigh? This is an addition problem.*
**Answer:** *1000g=1kg*
*A 5t truck can carry a load of 5t. How many 5t trucks are needed to deliver 65t of steel to a building site?*
**Answer:** *13 5t trucks*

*How many tonnes of sand can be transported if a 9t truck makes 8 trips?*

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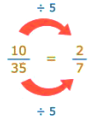
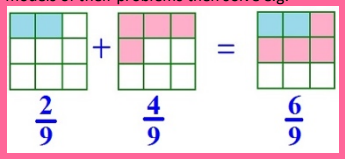
|---|---|---|---|---|---|---|
| | | $\frac{10}{27}-\frac{4}{27}=\frac{10-4}{27}$<br>$=\frac{6}{27}$<br>$=\frac{6\div 3}{27\div 3}$<br>$=\frac{2}{9}$<br>*2/9 is the simplest form this fraction problem can be simplified to.*<br><br>***NOTE:** Explicit modelling of simplifying will be viewed in tomorrow's session so depending on your class, you may want to only focus on adding and subtracting like fractions.*<br><br>**Additional examples (subtracting like fractions):**<br>*Students can complete these in their books or on whiteboards. Work with students who may need additional support. Fractions should be simplified if possible.*<br>7/11 – 4/11<br>12/25 – 8/25<br>17/30 – 15/30<br>14/15 – 9/15<br>6/9 – 5/9 | But 5 does work! It goes evenly into both numbers. Explain to the students that this is the process of elimination with whole numbers as you want to be able to make the smallest fraction possible.<br>  <br><br>That is as far as we can go. The fraction simplifies to **2/7.**<br><br>**Additional examples:** Encourage students to come and work out the following examples on the board using the previous taught strategies. Students may work these out in their books or on whiteboards. Offer support to students who may need it.<br><br>74/10<br>35/5<br>31/5<br>19/5<br>35/8<br>45/6<br>26/7 | **Additional examples:**<br>23/3<br>34/5<br>52/8<br>15/6<br>14/4<br>65/10 | Once you have modelled a few items, invite a student to estimate and measure an item.<br><br>**Example items to measure:**<br><br>• Paper clips<br>• Pencil cases<br>• Books<br>• Glue sticks<br>• Water bottles<br>• Lunchboxes<br>• Weights-unidentified<br>• Pin containers | **Answer:** *72t*<br>*Adam weighs 37.5kg, Jack weighs 34.56kg, and Laura weighs 35.65kg. What is their combined weight? This is an addition problem.*<br>**Answer:** *107.71kg*<br>*The mass of a jar of sweets is 1.4 kg. What is the total mass of 7 such jars of sweets? This is a multiplication problem.*<br>**Answer:** *9.8kg*<br>*The watermelon bought by Peter is 3 times as heavy as the papaya bought by Paul. If the watermelon bought by Peter has a mass of 4.2 kg, what is the mass of the papaya? This is a division problem.*<br>**Answer:** *1.4kg* |
| **Group Activities** | **Revision Group - Names** | Work with these students to solve a variety of like fractions that need to be added or subtracted. Create these as task cards or use dice or decks of cards to create.<br>If students need to, encourage them to draw models of their problems then solve e.g.<br>  <br> | Simplifying fractions game: Play the following bingo game with this group following the link below. Once students have a better understanding how to simplify fractions, create more challenging ones for them using decks of cards or already made fraction cards:<br>https://youvegotthismath.com/2017/10/09/simplifying-fractions-game/ | Work with this group and solve improper fractions to mixed numerals and vice versa. Use whiteboards during this session as well as math books.<br>Use the following links to model examples with the students:<br>http://www.k5learning.com/worksheets/math/grade-5-mixed-numbers-to-improper-fractions-a.pdfc<br>http://www.k5learning.com/worksheets/math/grade-5-improper-fractions-to-mixed-numbers-b.pdf | **5/6M Town Groups Based on Continuum Clusters** | Students get into mixed groups (6 groups of 5) and complete 2 10-15-minute activity rotations. 3 groups will be provided with various packaged items to measure the gross and net weight and record in their books.<br>The other 3 groups will be provided with various word problems (as above) and complete in their books. This can be provided as a worksheet or task cards. Monitor around the classroom. Ensure to place at least one Main (*thumbs up student*) in all groups. |
| **Group Activities** | **Middle Group- Names** | Provide task cards for these students with like fractions to add and subtract. To extend these students by including fractions with whole numbers to add and subtract. Alternatively, students can create their own fractions using dice or decks of cards. | Use the following link to create a variety of task cards for the students to complete. After 15 minutes, go through the answers with the group.<br>https://nzmaths.co.nz/sites/default/files/SimplifyingFractions_0.pdf | Students complete the following task questions as a group:<br>http://www.k5learning.com/worksheets/math/grade-5-improper-fractions-to-mixed-numbers-harder-b.pdf<br>http://www.math-aids.com/cgi/pdf_viewer_3.cgi?script_name=fractions_improper.pl&difficult=2&language=0&memo=&answer=1&x=178&y=20<br>After 15 minutes, go through the answers with the students. | **5/6M Town Groups Based on Continuum Clusters** | |

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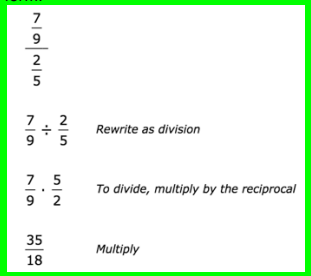
| **Group Activities** | **Main Group – Names**<br>Extend this group by providing them with task cards that involve adding and subtracting fractions with whole numbers. Ensure that these fractions have 'unlike' denominators for students to turn into 'like' fractions. Example: 14 3/8 + 17 1/4 = 31 5/8<br>***Example:*** http://www.math-aids.com/cgi/pdf_viewer_3.cgi?script_name=adding_mixed_numbers.pl&difficult=4&probs=15&language=0&memo=&answer=1&x=131&y=24 | | Extension: simplifying complex fractions. Using the following link, create task cards for students to solve. Model an example to the group:<br>***Example:*** Simplify. Write your answer as a proper or improper fraction in simplest form.<br>  <br>$\frac{\frac{7}{9}}{\frac{2}{5}}$<br>$\frac{7}{9} \div \frac{2}{5}$ *Rewrite as division*<br>$\frac{7}{9} \cdot \frac{5}{2}$ *To divide, multiply by the reciprocal*<br>$\frac{35}{18}$ *Multiply*<br>https://au.ixl.com/math/year-9/simplify-complex-fractions | Students independently complete the following task questions:<br>http://www.math-aids.com/cgi/pdf_viewer_3.cgi?script_name=fractions_improper.pl&difficult=3&language=0&memo=&answer=1&x=101&y=5<br>After 15 minutes, go through the answers with the students. | **5/6M Town Groups Based on Continuum Clusters** | |
| **Feedback/ Exit Slip** | **Feedback –** Use the thumb method after explicit modelling to determine students understanding and where they will be placed for group activities. **Marking Exit Slips** – Next to each students Exit Slip, the teacher will check students answers and will either write an: A = Achieved N/Y = Not Yet N/Y students will become your target group. | **Revision:** 2/9 + 5/9<br>12/20 – 9/20<br><br>**Middle:** 3 12/20 + 5 5/20<br>14 16/20 – 9 8/20<br><br>**Main:** 4 11/12 + 5 20/24<br>8 3/8 – 2 6/11 | *Simplify fraction's:*<br>**Revision:** 4/8<br>8/16<br><br>**Middle:** 52/80<br>7 26/54<br><br>**Main:** 4 15/27<br>19 18/56 | **Revision:** 9/6<br>3 1/4<br><br>**Middle:** 32/18<br>7 3/7<br><br>**Main:** 72/58<br>23 8/12 | **Revision:** *Peter had 1,000 grams of chocolate. If he ate 360 grams, how much chocolate did he have left? 640g*<br><br>**Middle:** *Yesterday I bought 3.2 kilograms of grapes and ate half of it. How many grams of grapes did I have left? 1.6g*<br><br>**Main:** *A forklift is carrying a box that weighs 2.4 tonnes and a box that weighs 1.8 tonnes. If the forklift's maximum load is 5 tonnes, should another 1.8 tonne box be added?*<br>*No – it will weigh 6 t* | *Students answer the following word problems related to 'gross' and 'net' mass.*<br>**Revision:** *If the gross mass is 320g and the net mass is 300g. What is the mass of the packaging?*<br><br>**Middle:** *A bag of rice has a net mass of 1kg. The packaging has a mass of 80g. What is the gross mass?*<br><br>**Main:** *The total mass of 4 identical toy cars is 2.4 kilograms. What is the mass of 12 such toy cars in grams?* |
| **Early Finishers/ Extension** | https://au.ixl.com/math/year-6/add-and-subtract-fractions-with-like-denominators-word-problems<br>https://au.ixl.com/math/year-6/add-and-subtract-mixed-numbers-with-like-denominators-word-problems<br>Using the above links, create as word problem task cards for the students to solve.<br>Students work in pairs and create/practice their fractions knowledge by having to add, subtract, simplify or turn into mixed numeral or improper fractions using whiteboards.<br>Students complete Mathletics or iMaths worksheets.<br>Allow the students to use the fractions cards to play a variety of card games in pairs. Some examples of such games include 'Memory' (students must match equivalent fractions to win a pair), 'Snap' (students must snap when equivalent fractions appear on top of one another) and 'Go Fish' (students must ask their partners for equivalent fractions to make a pair). As students select their fraction, they are required to write it down with the equivalent fraction card e.g. 2/3 = 4/6 - https://www.teachstarter.com/teaching-resource/equivalent-fractions-cards/<br>Students use decks of cards and select 2 digits by 2 digits. They turn these into the numbers they will use to create fractions. Depending on where students are up to, they can add and subtract these fractions OR create improper fractions and work out the mixed numerals.<br>Students create their own Match the Fraction Pair card game. They will need to create the problem and answer cards. | | | | Use the following links to create word problem task cards for students to solve. These can range from whole number or decimal problems involving mass:<br>https://www.mathinenglish.com/worksheetview.php?id=1058&stid=230030<br>http://www.math-only-math.com/worksheet-on-word-problem-on-measuring-mass.html<br>https://www.tes.com/teaching-resource/differentiated-weight-word-problems-6324812<br>Students continue measuring items using scales.<br>Students complete Mass activities in Mathletics and iMaths books.<br>Students create their own word problems based on the items that they have measured.<br>Students complete work tasks *(similar to above).*<br>Provide students with a range of gross mass measurement cards. Students will need to create the exact measurements on their cards using pebbles or jellybeans in bags or containers. | |
| **Reflection/ Registration/ Feedback** | | | | | | |