Work Program for B2FMaths@Home Week 3 Year 5

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.
- **Generalising lesson:** This lesson contains some extension material for use if your child found the week's lessons too easy. *If you would prefer*, you can spend this lesson playing more of the number games that are included in the connecting lesson or giving your child time to complete any of the lessons that they have not yet done.

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.

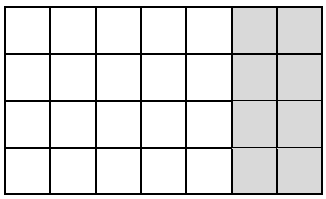
What you need to know this week

Week overview

This week we are teaching the concept arrays and counting patterns. We will particularly be focusing on arrays of objects arranged into a grid-like pattern (e.g. tiles or the top of Lego blocks). This model for multiplication and division has links with many other concepts in later years, such as area, volume, fractions and helps develop a firm foundation for understanding algebra.

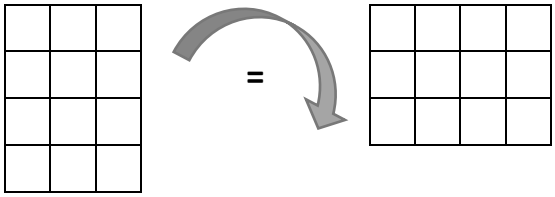
Students need to understand:

- **Distributive Property:** Arrays can be easily split to make multiplying large numbers easier.



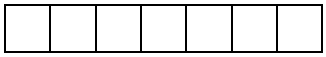
4 sevens is the same as
4 fives *and* 4 twos
4x7 = 4x5 + 4x2

- **Commutative Property:** Arrays can be rotated to demonstrate that 4x3 = 3x4.

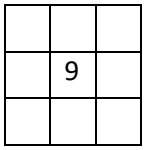


4 threes = 3 fours

- **Factors** are the length and the width of an array. The **multiple** is the amount altogether.
- **Prime numbers**, like 7, can only be made by multiplying 1 by itself. That means that they only have 2 factors: themselves and 1. When we arrange prime numbers into arrays, they make lines.



- **Composite numbers** have more than 2 factors. They make arrays other than in one line.
- **Even numbers** can all make arrays with 2 on one side (as one factor). **Odd numbers** can't.
- **Square numbers** can make square arrays.



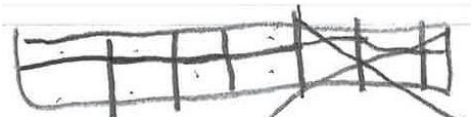
Structural stages

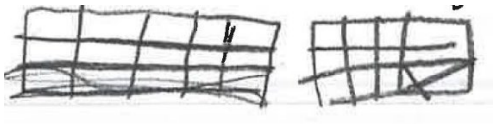
Here are some drawings to show what to look out for if you are worried about your child. We want children to be in the "structural" stage at this point, rather than one of the earlier phases. Please contact your child's teacher if you are concerned.

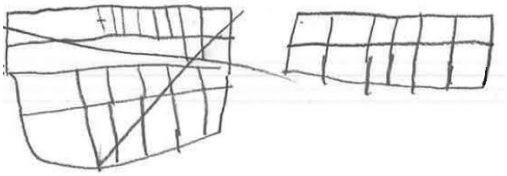
Look at your child's drawings to determine what structural level they are at. Emphasise moving to the next structural stage rather than drawing larger amounts. For teachers: Joanne Mulligan has more information on developing structural thinking in the PASMAP research available online.

Each of the drawings below is of a **tens frame** (rectangle with 2 rows of 5), drawn by a child who is familiar with tens frames but can't see one. Each drawing was completed by a child aged between 5 and 8.

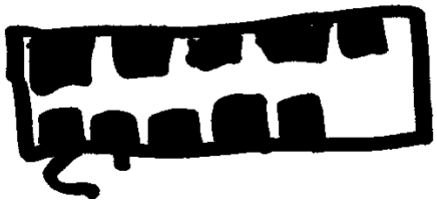
Emergent: correct number of rows or columns, but not both, or just 10 in one line but without 2 rows



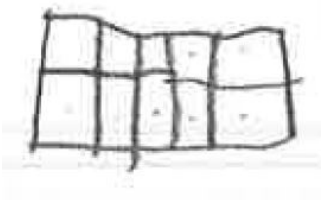


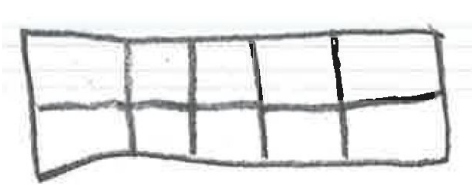


Partial structural: can draw 10, but not also keep the structure of rows and columns, often this means 2 rows of 5 but not having the squares touching



Structural: both drawings show structural thinking, however the dots on the images show that the child needed to check that there really were 10





Monday: At-Home Investigation

You will need:

- Grid paper that is provided (you will need multiple copies)
- Coloured pencils

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. Encourage your child to come up with many different rectangles or arrays using 60 squares (e.g. 6x10, 15x4)
3. 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. Try to encourage your child to explain how they have solved the problem.
4. 100 is another number with lots of factors. That is because it also has 4 prime factors (2, 2, 5, 5). Others include 54 (3, 3, 3, 2), 64 (2, 2, 2, 2, 2, 2), 96 (2, 2, 2, 2, 2, 3) and 90 (3, 3, 2, 5). To find them, simply try multiplying lots of small prime numbers together, then seeing what combinations you can come up with. Having different combinations of numbers gives more interesting factors.

Extension:

What if you had to build rectangular prisms with 60 blocks rather than just drawing flat rectangles? How many unique 3D shapes could you build (if you turn the shape side ways then it still counts as the same shape)?

Please note:

By the end of year 4, your child was expected to recall all single digit multiplication facts (up to 10x10). Now is a great time to practise these with your child so that their previous knowledge is not lost, or to build greater recall if they have not yet mastered basic facts.

At-Home Investigation

How many different arrays can we make with 60 squares or blocks?

Draw the arrays and label them

Use the grid paper to draw as many unique arrays using 60 squares as you can. In this activity, 6x10 is considered to be the same as 10x6, so you only need to draw it once. You will probably need multiple sheets of grid paper and will also need to cut it and stick it together to make the right sizes.

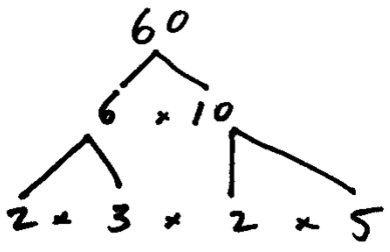
For each array, label the factors (the sides). Write each set of factors here:

Think it through

Can you find 2 other numbers between 50 and 100 that have as many or more factors than 60? Write the numbers and sketch the arrays and list the factors here:

Apply your thinking:

The factors of 60 can be broken down further into prime factors using a factor tree. The more prime factors a number has, the more factors it will have in general. Look at the factor tree below for 60. Use the same thinking to make a prime factor tree for the numbers you looked at for the previous question.



Tuesday: Connecting Lesson

Number task for 10-15 minutes: *Finding a total* **<u>This task is the same as last week</u>**

Choose a composite number between 10 and 50.

Roll a dice 4 times to get 4 numbers, or just pick any 4 numbers between 1 and 8.

Try to use those numbers to get as close as possible to your target number.

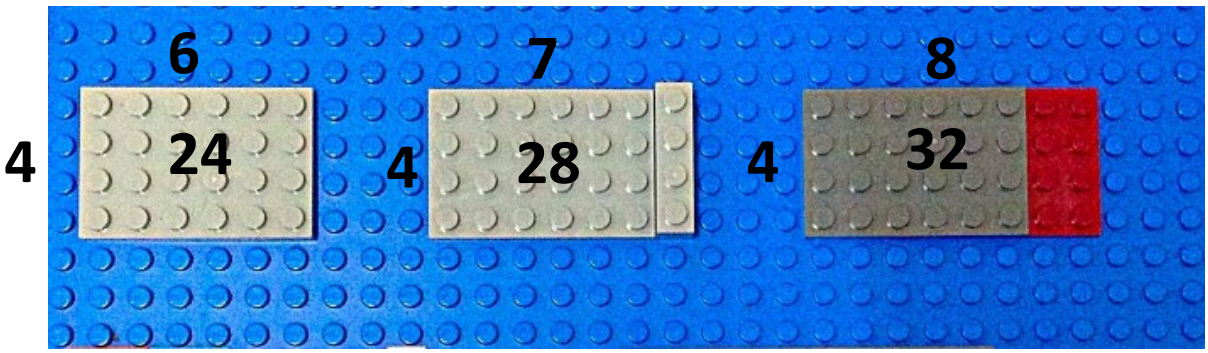
Rules:

- Not all 4 numbers have to be used
- A number can only be used once
- Use any operation you like (+ - x ÷) and any others that you know (e.g. powers or square roots, ! etc.)

Try at least 3 numbers.

Worksheet task: 10 minutes
This lesson provides an opportunity for your child to review multiplying by 10 and 100 before we move onto multiplying multi-digit numbers next lesson. It should be quick. Please also complete one of the multiplication grids on the following page to identify any multiplication facts that your child finds difficult to recall, then complete the Lego or array poster below.

Lego arrays poster task: 15 minutes
Use Lego bricks to represent any multiplication facts that your child finds hard to remember, or draw them on the grid paper provided. Take a photo of what you have made. Print it out and write numbers onto the sides as appropriate. Display your photo somewhere prominent to help build recall.



Multiplying by 10 and 100

You have previously found some patterns for multiplying by ten. In this activity you will extend these patterns to multiply very large numbers.

Work out the following questions, then use a calculator to check afterwards:

Basic fact:	**Extension of fact:**	**Further extension:**	**Check with the calculator:**
Example1: **6** x **7** = **42**	**6** tens x **7** = **42** tens	**6**0 x **7** = **4**20	
Example 2: **4** x **8** = **32**	**4** x **8** hundreds = **32** hundreds	**4** x **8**00 = **32**00	
3 x 7 =	3 tens x 7 =		
9 x 3 =	9 x 3 tens =		
2 x 6 =	2 x 6 hundreds =		
5 x 8 =	5 tens x 8 tens =		

What is the pattern? How many places have the original numbers moved away from the ones?

Use it to complete the table below:

Basic fact:	**Extension of fact:**	**Further Extension:**	**What is the pattern?**
3 x 8 =	3 tens x 8 =		
	9 hundreds x 7 =		
		2 x 40 =	
	3 x 5 hundreds =		
		60 x 40 =	
	9 tens x 6 hundreds =		

Extension:
What would you multiply 90 by to get 630?

Multiplication practice grids:

	2	3	4	5	6	7	8	9	10
2									
3									
4									
5									
6									
7									
8									
9									
10									

	2	3	4	5	6	7	8	9	10
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	2	3	4	5	6	7	8	9	10
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	2	3	4	5	6	7	8	9	10
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10									

Wednesday: Application Lesson

This lesson allows your child to apply what they have learned over the past two days to work out how to multiply by numbers with multiple digits.

Number game for 10-15 minutes: *Array fun*
You will need: a print out of the grid from Monday, 2 colours of pencil, one or two dice.

1. Player one rolls the two dice (or one dice two times). The numbers rolled are the length and width of your array to colour! (e.g. a 4 and a 3 would need a 4 x 3 array) You can turn it sideways to fit. Colour your array on the grid, then it is the other player's turn.
2. The player who wins is the last player who can draw their array.

Alternative: complete another multiplication grid

Worksheet task: 20 minutes
This lesson is following on from what your child learned yesterday about **arrays**. The purpose of the lesson is to **connect** what they have learned about the arrays for single digit numbers and for multiplying by ten, with a number that has both tens and ones. This requires the Distributive Property.

Please note, in this activity the children will be recording the multiplication by tens and ones on separate lines then adding them together. We understand that it is more efficient to put these together on a single line, however teaching multiplication like this leads to greater understanding of the Distributive property which is needed for algebra from year 7. By slowing down the process rather than teaching the more efficient strategy at the start, we are building a foundation for understanding that will help prepare the children for better understanding in high school.

Multiplying by tens and ones

Multiplying by tens and ones is easy once we can think in arrays. In this lesson we will learn how to break two-digit numbers into tens and ones to make them easier to multiply.

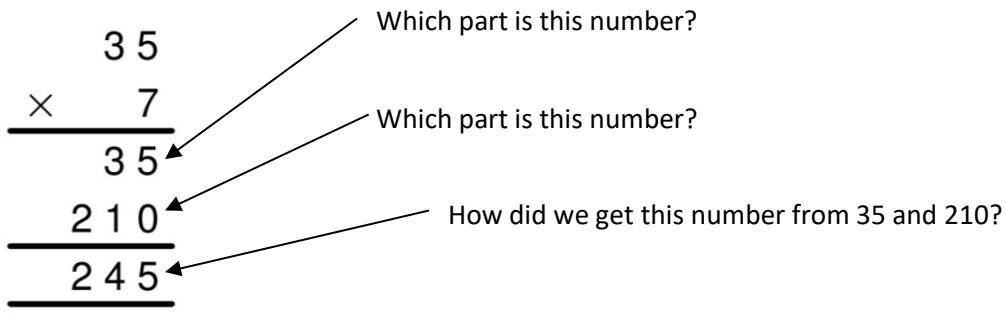
Use grid paper to draw 7 x 35

1. The 35 part can be separated into tens and ones. Draw a line to separate the 35 into 30 and 5.
2. Find the part that is 7 x 30. How many squares are there?
3. How is this similar to 7 x 3?
4. Find the part that is 7 x 5. How many squares are there?
5. So how many squares are there altogether?

Use grid paper to draw 9 x 24

1. The 24 part can be separated into tens and ones. Draw a line to separate the tens and ones.
2. Find the part that is 9 x 20. How many squares are there here?
3. How is this similar to 9 x 2?
4. Find the part that is 9 x 4. How many squares are there here?
5. So how many squares are there altogether?

The equation below represents the first question that you worked out (7 x 35). Look at it and try to find the 7 x 5 part and the 7 x 30 part.



Try these:

56	27	83	49	68	92
x 5	x 6	x 4	x 2	x 7	x 5

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. Complete the following number sequence:

   8.73, 8.83, _____, _____, _____, 9.23, _____,

2. 2 342 - _____ = 1 127

3. What number is 1 more than 495 099?
   Now write the number that is 10 more and the number that is 100 more and the number that is 1000 more and the number that is 10 000 more than 495 099.

4. Read this number and say it: 4 051 738. Round it to the nearest 10, the nearest 100, the nearest 1000, and the nearest 10 000.

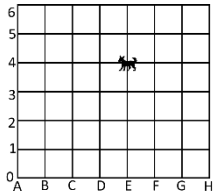
5. Share 30 counters to show halves. Draw the halves on the other side of this sheet.
   What other fractions can you make? How will you know if you have found them all?

Measurement/Geometry:

6. Use a measuring jug from your kitchen. Find one container that holds less than your measuring jug and one that holds more than it. Use the measuring jug to find out how much water, each container will hold. Record your findings.

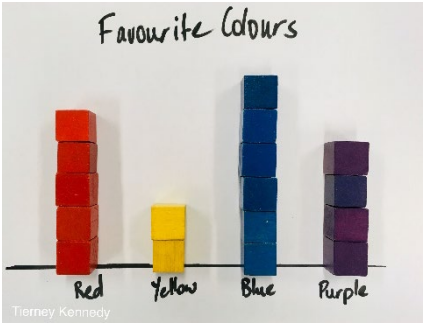
7. If you begin your lunch break at 13:20 and take 45 minutes to make and eat it, what time will you finish it? Write your answer in 24-hour time and analogue time? (reading a clockface)

8. Write the grid reference for the dog.
   Draw another dog at C,2 on the grid.



Chance/Data:

9. In this graph, each block represents 5 people.
   How many people like each colour?
   What else can you tell from the information in the graph?
   Write 2 **true** statements.



Friday: Connecting Lesson

Distributive Law
In the previous lessons this week we have considered multiplying by tens and also multiplying by ones. In this lesson your child will put these ideas together unpack a very important property of multiplication called the distributive law or the distributive property. Given the work that they have done on multiplying by tens and ones on Wednesday, this worksheet should be relatively simple.

Please consider reviewing the Lego poster from earlier this week and checking that your child is remembering those particular number facts more easily.

Here are a few quick grids of the facts that students tend to find the most difficult to recall. Feel free to use them for practise instead. They have fewer calculations, but are the harder ones.

	3	4	6	7	8
3					
4					
6					
7					
8					

	3	4	6	7	8
3					
4					
6					
7					
8					

	3	4	6	7	8
3					
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	3	4	6	7	8
3					
4					
6					
7					
8					

D18. Distributive Law

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Often using mental strategies when multiplying is quicker than using a calculator. Look at the following examples, and work out how the 'distributive law' is being applied.

Distributive Law: Used when breaking up an equation into smaller parts makes it easier.

Examples:

- 19 x 5 = (9 x 5) + (10 x 5) = 45 + 50 = 95
- 36 x 9 = (30 x 9) + (6 x 9) = 270 + 54 = 324

Try these:

33 x 4 = ( ) + ( ) = _____ + _____ = _____

23 x 5 = ( ) + ( ) = _____ + _____ = _____

35 x 7 = ( ) + ( ) = _____ + _____ = _____

54 x 6 = ( ) + ( ) = _____ + _____ = _____

37 x 2 = ( ) + ( ) = _____ + _____ = _____

What do you think the distributive law does?

How do you know?

Where could you use this?

Backwards Questions:

Try to use the distributive law together with what you have learned about extending multiplication facts to solve the following:

330 x 4 = ( ) + ( ) = _____ + _____ = _____

23 x 50 = ( ) + ( ) = _____ + _____ = _____

350 x 70 = ( ) + ( ) = _____ + _____ = _____

Look up the Distributive Law using a mathematical dictionary and write a definition for it using your own words:

