Work Program for B2FMaths@Home Week 3 Year 4

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

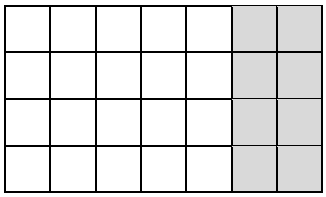
This week we are teaching the concept arrays and counting patterns. We will particularly be focusing on arrays of objects arranged into a grid-like pattern (e.g. tiles or the top of Lego blocks). This model for multiplication and division has links with many other concepts in later years, such as area,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

Students need to work out:

- How to draw arrays (grid-structures – see over next page) to represent multiplication (e.g. 4 fives as 4 rows of 5).
- Connections between addition and multiplication
- How to easily calculate multiplication for 1, 2, 3, 4, 5 and 10 facts, and be able to efficiently work out 6, 7, 8 and 9 facts so that they can recall these by the end of the year (see Distributive Property below).

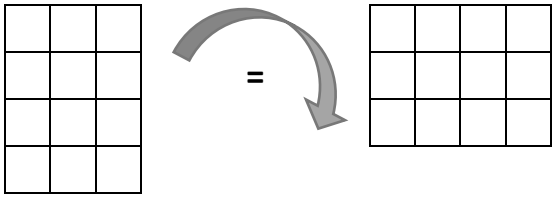
We are also hoping that students will learn:

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



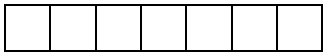
4 sevens is the same as
4 fives *and* 4 twos
4x7 = 4x5 + 4x2

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

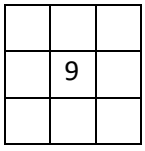


4 threes = 3 fours

- **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.



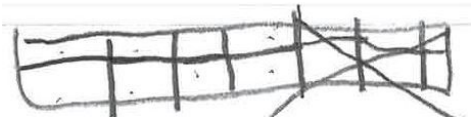
Structural stages

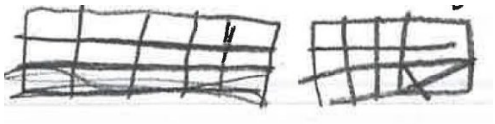
Here are some drawings to show what to look out for if you are worried about your child. We want children to be in the "structural" stage at this point, rather than one of the earlier phases. Please contact your child's teacher if you are concerned.

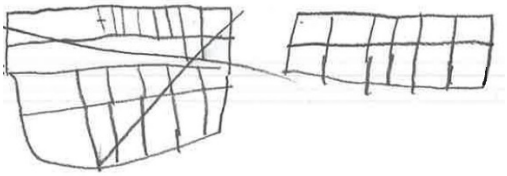
Look at your child's drawings to determine what structural level they are at. Emphasise moving to the next structural stage rather than drawing larger amounts. For teachers: Joanne Mulligan has more information on developing structural thinking in the PASMAP research available online.

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.

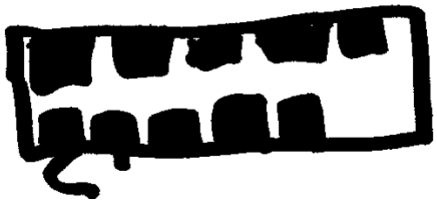
Emergent: correct number of rows or columns, but not both, or just 10 in one line but without 2 rows



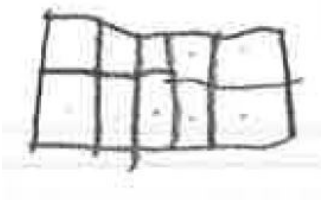


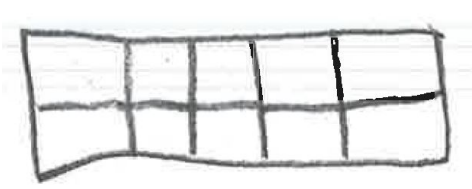


Partial structural: can draw 10, but not also keep the structure of rows and columns, often this means 2 rows of 5 but not having the squares touching



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:

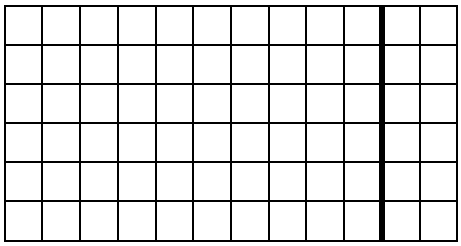
- Grid paper that is provided
- Coloured pencils
- If you have some large Lego pieces then feel free to use those instead of the image provided

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. When your child draws the rectangle of 6 x 12, they do not need to draw on all the dots. One square can stand for one dot. Just draw around the outside of a rectangle 6 x 12.
3. Ask for your child's ideas on how to solve the problem but cutting up either the 12 or the 6 to make it easier. Hopefully they will work out that cutting the 12 into a 10 and a 2 is much easier than cutting it into 2 sixes. Once they have tried their own way first, feel free to suggest using a 10 and a 2.
4. Try to encourage your child to use any multiplication facts that they already know rather than counting all the dots. For example, "Do you know your 10x facts? How about we look at this big part then? What would 6 x 10 be?"
5. 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 and focus on using that strategy for breaking up other tricky multiplication situations.

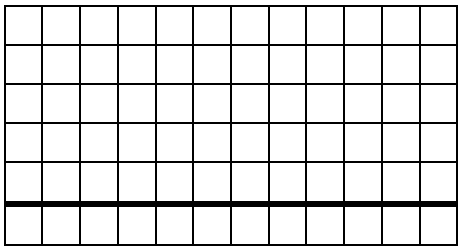
By the end of this year your child needs to recall all single digit multiplication facts (up to 10x10). Now is a great time to practise these with your child and develop recall.

Below are a few ideas for how your child could solve the problem. They both work. One is easier.



Split the 12 into 10 and 2

6x10 = 60, 6x2 = 12
60 + 12 = 72



Split the 6 into 5 and 1

5x12 = 60, 1x12 = 12
60 + 12 = 72

At-Home Investigation

Sometimes arrays are quite large and need to be broken into smaller amounts to make the multiplication easier.

Examine a large Lego piece

The Lego piece below has lots of dots on it. It is 6 dots wide and 12 dots long. Draw a rectangle on your grid paper to represent the Lego piece. How long is it? How wide is it?

Think it through

Multiplying 6 x 12 is tricky. Perhaps there is a way that we can break up the 12 or the 6 to make it easier? Write down at least 2 ideas about how you could break your rectangle up to make it easier to work out the total number of squares. Here is an example of how we could break up 4 x 7 into a 4 x 5 part and a 4 x 2 part.

		5				2
4						

Try out at least 2 of your ideas on your grid paper. Sketch what you did here and write on the numbers. What did you find that worked?

Generalise your findings:

Do you think you could come up with a similar idea for other tricky numbers too? What might you do if one side of the rectangle was 8 and the other side was:

- 7
- 20
- 15
- 25

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.

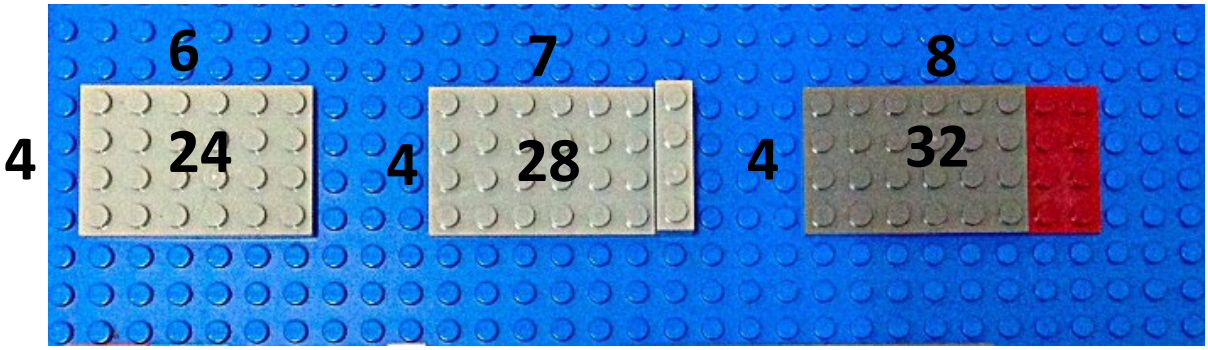
Rules:

- 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: 15-20 minutes
This lesson provides an opportunity for your child to work out any multiplication facts that they don't already know. It shouldn't be too hard to do. Knowing these facts is required for students to achieve the "C" standard at the end of the year. Use this worksheet to identify which facts your child finds hard to remember. The grids provided on the second page allow you to practise these facts regularly.

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.



D20. Work out x facts

TR p80

You need to be able to work out how to multiply numbers and remember the answers quickly. In this activity you will work out each of the multiplication questions and fill the results into the table.

Strategies to use:

1. Skip counting (3, 6, 9)
2. Doubles (2, 4, 6, 8)
3. Counting on from what you know (I know 3 x 2 is 6, so 3 x 3 must be 3 more than 6)
4. Turn arounds (I know 4 x 5 is 20, so 5 x 4 is 20 too)

Choose a blank square. Line up the row it is in with the column it is in. There will be a number at the start of the row and at the start of the column. Multiply the two numbers and put the answer in that square. (E.g. see below: 4 x 5 = 20)

x	1	2	3	4	5	6	7	8	9	10
1			3							
2			6							
3			9							
4					20					
5				20						
6										
7										
8										
9										
10										

BACKWARDS QUESTION:

If my answer was 12, what numbers could I have multiplied to get it? Give as many answers as you can.

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
2									
3									
4									
5									
6									
7									
8									
9									
10									

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

Wednesday: Application Lesson

This lesson allows your child to practise what they have learned over the past two days work out how to multiply by larger numbers

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.

Worksheet task: 15-20 minutes
This lesson is following on from what your child learned yesterday about **arrays**. The purpose of the lesson is to **connect** the arrays with both addition and multiplication. For each array, have your child describe the number of rows, the number in each row, and explain the connection out loud.

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?

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:

   1 486, 1 488, _____, 1 492, _____, _____, 1 498, _____, _____, _____

2. 2 342 - _____ = 1 127

3. What number is 1 more than 25 099? Now write the number that is 10 more and the number that is 100 more and the number that is 1000 more than 5 099.

4. Read this number and say it: 51 708. Write it in words. How many tens of thousands, thousands, hundreds, tens and ones does it have?

5. Share 30 counters to show halves. What other fractions can you make?
   How will you know if you have found them all?

Measurement/Geometry:

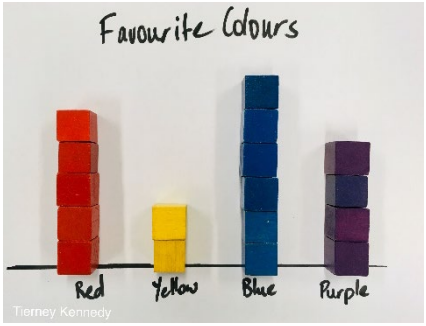
6. Use a measuring jug from your kitchen. Find one container that holds less than your measuring jug and one that holds more than it. Use the measuring jug to find out how much water, each container will hold. Record your findings.

7. If it is 2¼ hours until lunchtime, how many minutes do you have to wait? Show how you worked it out.

8. On the back of this sheet, draw a simple map to show how to get from your bedroom to the kitchen. Include how many steps are needed and the turns you need to make.

Chance/Data:

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



Friday: Connecting Lesson

Multiplying by tens and ones
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 two ideas together to multiply single digit numbers by double digit numbers.

Please note, this activity is working towards a B standard, so if your child is not ready for it yet just repeat the multiplication array game and complete a facts grid instead. They can come back to this task later in the year and try again.

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.

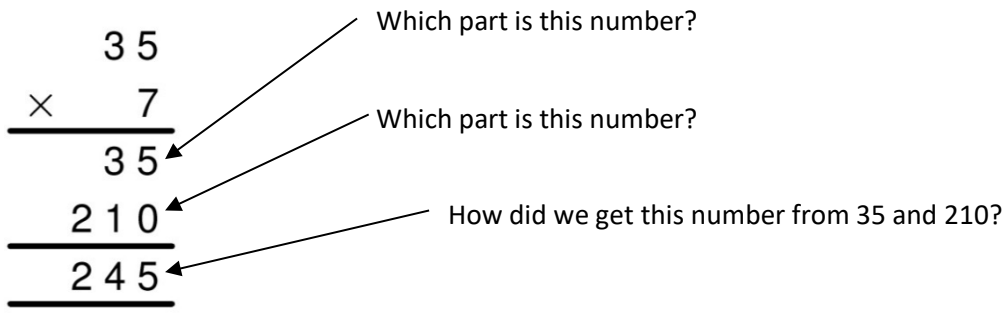
Use grid paper to draw 7 x 35

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