Work Program for B2FMaths@Home Week 5 Year 7

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 area. The reason to teach area now is that it is basically an extension of the array concept that we have worked on for the previous two weeks.

Area is a measure of flat space. For example: how many tiles cover the floor in your bathroom. We measure land area in square metres or hectares. We measure smaller areas in square centimetres or square millimetres.

If you imagine one square metre, you can overlay a grid made up of square centimetres. Each side of our metre square would be equal to 100 cm. That means that in our square metre we have 100x100 square centimetres, or 10 000cm^2. The same kind of thinking applies to hectares. One hectare is the same as a square that is 100m long and 100m wide. That means that there are 10 000m^2 in a hectare. If a house and backyard in a city has an area of roughly 500m^2, you would need 20 of these to be the same as one hectare – it is a large amount of land!

Students need to work out:

- Area is a measure of flat space, it is not a distance.
- We calculate area by covering flat space with a grid or an array.
- Area is two-dimensional. That means that we need to measure it in 2D units (e.g. square metres or square centimetres).
- An array is the same as area of a rectangle.
- Please note: students need to use formulas for area of rectangles in years 6/7 (base x height, or length x width)
- To receive an A or B students also need to explore and establish formulas for area of triangles (half the rectangle that surrounds it, so ½ base x height) and parallelograms (same base x height formula)

You will need:

- Copies of the grid paper

Teacher Overview

Students will be thinking about area, and its link with arrays. We are teaching area now as we have just spent two weeks on arrays. This should mean that it is easier to connect the concept to what students already know.

Students need experience covering areas with arrays and grids, comparing areas by counting, and looking for patterns in how the areas compare. See the information in "What you need to know this week" for more detail.

What to emphasise

If you have time online with a webcam
Discuss the at-home investigation with children. The idea is to compare flat space by covering it with appropriate units for measurement. We are deliberately trying to compare furniture that has a flat surface, but also furniture that is not in the same room so that direct comparison is not possible.

Check that the parents have understood and completed the number tasks for the week. You may also need to reinforce with parents that by the end of Year 4 students are expected to recall division and multiplication facts.

If you have only email or phone contact
Check that parents have read the "What you need to know this week" section. Check that they understand the importance of using the number tasks and interleaving sheet so that students retain what they have learned and think regularly about number.

Tracking student achievement

This week we are focusing on applying what we have learned about arrays to area:

- Can the student use formulas for the area… of rectangles (**M4C**)?
- Does the student also explore area of triangles and parallelograms (**M4B**)?
- Does the student establish formulas for area of triangles and parallelograms and use these in problem solving (**M4A**)?

Wednesday's and Friday's tasks also align with the following parts of algebra:

- **N5C**: Represent numbers using variables
- **N10C**: Evaluate algebraic expressions after numerical substitution

This week's activities build on and reinforce the multiplication and division that we have been working on previously.

Monday: At-Home Investigation

You will need:

- A copy of the grid paper from the next few pages.
- Multiple pieces of A4 paper. Please note: these do not need to be new sheets. Copies of old worksheets or this page with instructions will be just fine.

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 solve the first problem. Encourage them to plan how to measure the number of pages it would take to cover the bed or table first, and to guess at roughly how many it will take.
3. Make sure that your child draws the answers rather than just writing the numbers. They need to show their working. The grid paper is a good way to do this.
4. Watch out for situations where your child will need to cut the paper to make it fit. This should be recorded on the grid.
5. Watch out for using the long side of the paper to measure the length and then the same long side to measure the width. The paper is not square, so one side should be measured with the shorter side of the paper (look at the grid provided to get the idea).
6. If you have time, ask your child to work out how many square metres or square centimetres the furniture would take up. This will be reinforced later this week.
7. 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.

At-Home Investigation

Area is a measure of flat space. Today you will compare the area of the top of your dining table or desk with the area of the mattress on your bed.

Does your mattress or your table have more area?
How many pieces of paper would it take to cover the top of your dining table?
How many pieces of paper would it take to cover the mattress on your bed?
Explain your plan for working it out.

Carry out your plan and explain your findings:
Draw what you found out on the next page. The boxes are scaled to represent A4 pieces of paper. Calculate the area of each piece of paper (30x21cm) and use this to work out how many pieces of A4 paper is the same as $1m^2$. Now that you have this measurement, convert the areas you measured into m^2 for comparison.

Account for difficulties:
How did you account for partial pieces of paper? How did you make sure that your measurements were accurate?

Each box below is scaled to be similar to A4.

Teacher Overview

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

The emphasis is on *modelling* sharing and discussing the *similarities*, *differences* and *patterns* or *characteristics*. We want students to explore area as flat space. There is also an emphasis on *generalising*. Try to make sure that children use the grid paper for recording their findings.

Watch out for:

- Using the long side of the A4 paper to measure both the length and the width rather than covering the space
- Measuring perimeter rather than area

Good questions to prompt thinking:

- Have you completely covered the space?
- Did you have any overlapping pieces of paper? How about any gaps?
- What did you do when you only needed part of a piece of paper to cover a remaining space?
- Which was bigger? How do you know?
- How could you use arrays to help you work this out?
- If each A4 piece of paper is 21x30cm (roughly), how many cm^2 is that?
- How many cm^2 are there in one square metre?
- How could we use this information to work out how many pieces of A4 paper there are in $1m^2$?

Students requiring support:

- Use smaller spaces (e.g. coffee table) and ensure that multiple pieces of paper are used rather than one repeated

Extension:

- What if you only had one piece of paper? How could you work it out? What would you need to do? What operations are involved?
- How many tiles are there in your bathroom/kitchen?

Tuesday: Connecting Lesson

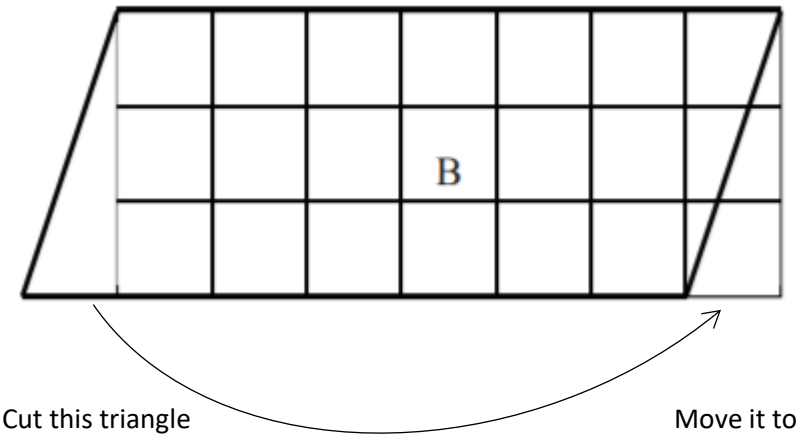
Multiplication and division practice: 10-20 mins
Have your child complete one of the multiplication or division practice grids provided on the following pages each day this week. The division grids are more difficult as they require students to work backwards. This means looking in a row or column to identify what factor the numbers have in common, then using each factor to figure out the missing numbers.

Please note: the numbers in the division grid are <u>not</u> in order from 2-10.

Worksheet task: 20-25 minutes

The first activity should be a revision task for area of a rectangle. Students need to find the rule: Area = base x height.

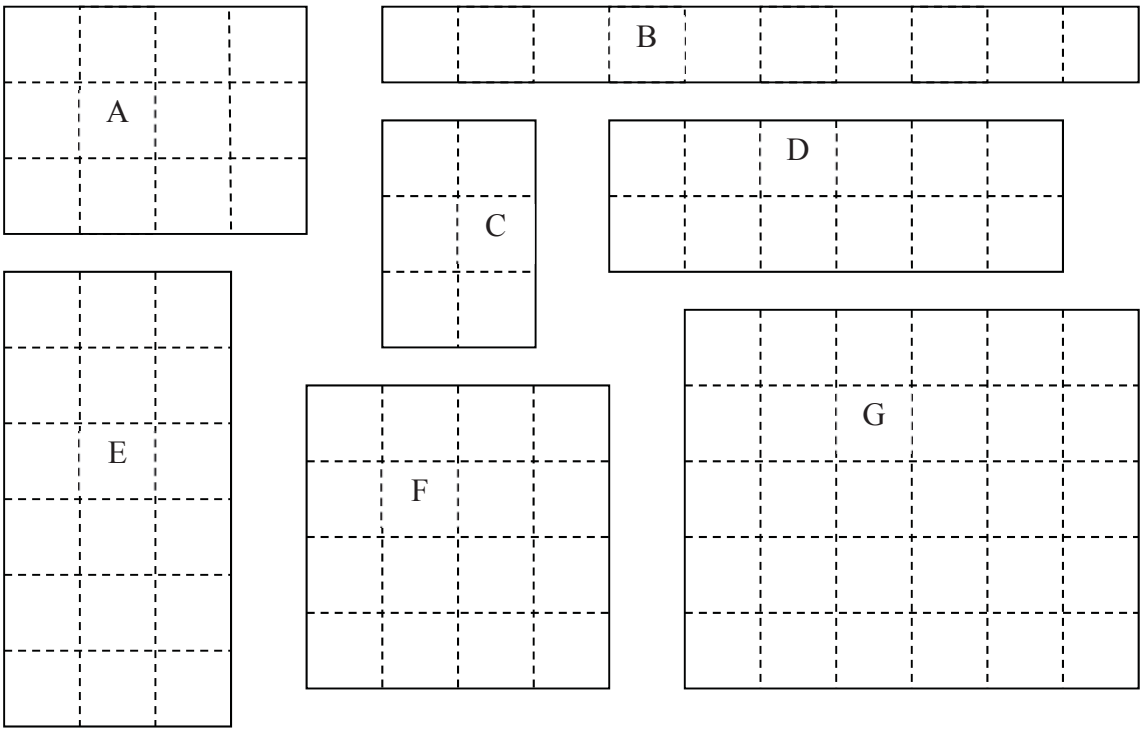
The second activity is very similar to the first. If you look at the parallelograms on the sheet you will see that they can be easily cut and rearranged to form rectangles. This means that the formula for area is the same as a rectangle: area = base x height.



E5. Area of a rectangle

TR p108

Use the following examples to help you to work out a rule for finding the area of a rectangle.



Rectangle	Base measurement	Height	Area	**What is the rule?**
A				
B				
C				
D				
E				
F				
G				

What is the rule for finding the area of a rectangle?

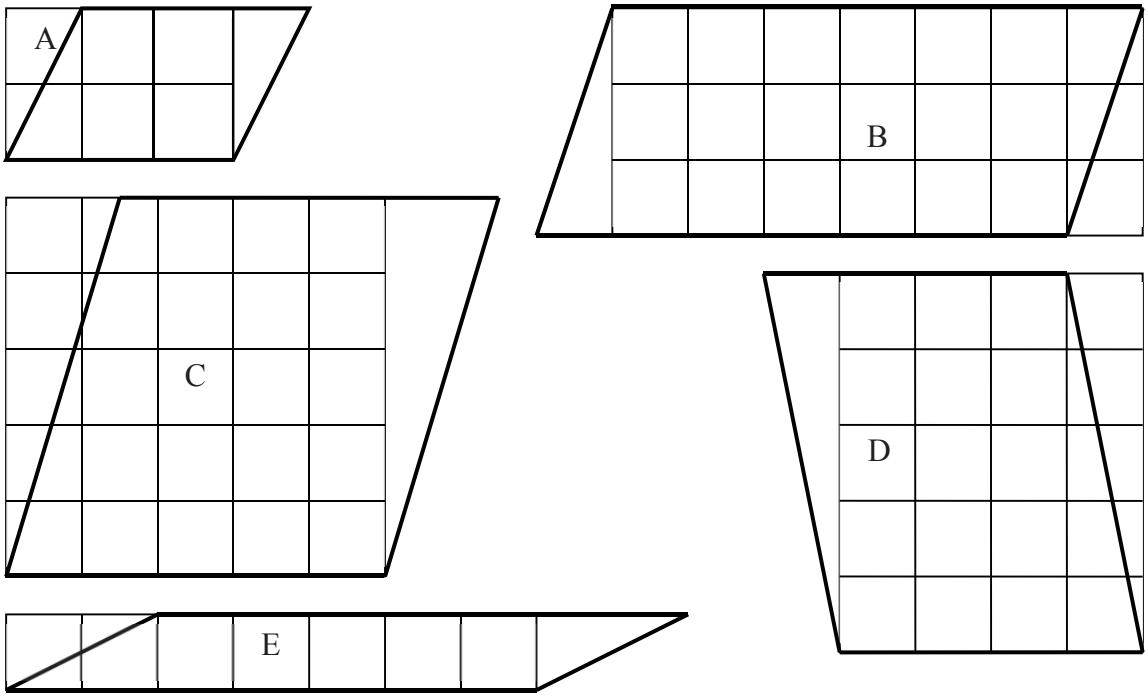
Backwards Question:

If the area of a rectangle was 25cm^2, what could its sides be? How long would the sides be if it was a square?

E7. Finding the area of parallelograms

TR p110

The area of a parallelogram is related to the area of a rectangle. Use the shapes below to help you formulate a rule for finding the area of a parallelogram based on the area of a rectangle.



Shape	Base of rectangle and parallelogram	Height of rectangle and parallelogram	Area of rectangle	Rule for area of rectangle	Area of parallelogram (counted)	Pattern between rectangle and parallelogram
A						
B						
C						
D						
E						

What is the rule for finding the area of a parallelogram?

BACKWARDS QUESTION:

If the parallelogram and a rectangle had the same area, would they have the same length sides?

Multiplication and division practice grids:

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

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

÷									
		16					6		
			21		15				
						8		40	
	20			30					
			42						54
					35		21		
		64		48					
	36								81
						20		100	

÷									
		27							30
			6				4		
	40							25	
				24		36			
	56			28					
					63			45	
						60			100
		36					8		
			48		56				

Teacher Overview

This is an ***Understanding and Reasoning*** task.

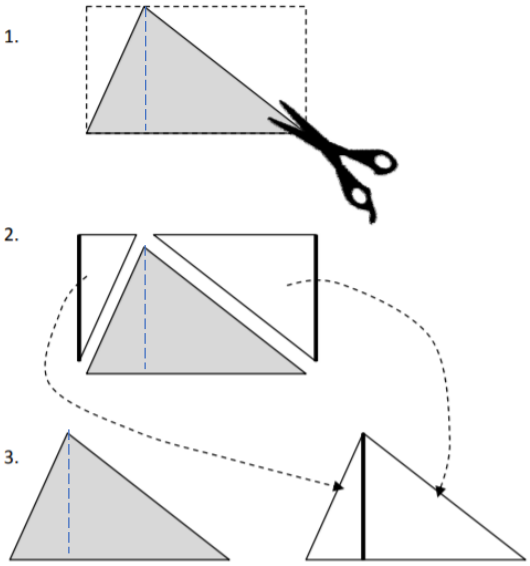
The purpose of this lesson is to *connect* the work we have been doing on arrays with area of rectangles, then to further connect the formula for rectangles to parallelograms

To help students retain the information, make sure that they have *explained their patterns* and *summarised their formulas* to their parents. If you have time online with families, emphasise the importance of connecting arrays for multiplication and division with area.

Please note: the division grids require students to find common factors. This is important for upcoming work on fractions.

Wednesday: Connecting and Generalising Lesson

This lesson encourages your child to explore the area of triangles compared with rectangles. You will need to start by **demonstrating how to turn a rectangle into two identical triangles**. Here is a diagram. You can make the point of the triangle anywhere along the top and it will still work. The diagram below should make this clear, but if not, please contact your teacher for help.



In the lesson, your child should work out that there is a clear pattern between the area formula for the rectangle and the triangle. Because two identical (congruent) triangles make up the rectangle, we know that the area of one triangle is half the rectangle. This will even work for the triangle that you can see in the “Manipulation Problem”.

Please also complete one of the grids on multiplication/division facts from the previous lesson.

Problem 19: Calculating Area

Your teacher says that the area of any triangle is just half that of the rectangle with the same base and height. Prove or disprove this statement by creating rectangles and triangles and using a spreadsheet to show the relationship between their areas.

Choose a height and a base for your triangle. Draw five different triangles as you can that have this base and height. Work out the area of each, then put your results into the table below. You will need your own paper.

Triangle	Base	Height	Area	Is there a pattern?
A				
B				
C				
D				
E				

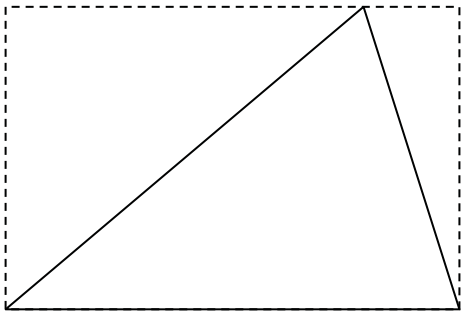
What patterns did you find for your triangles?

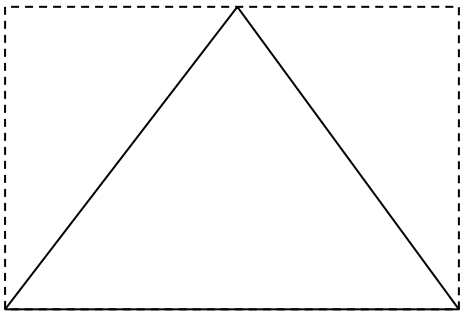
What would the area of a rectangle with the same base and height be?

Does this fit with the statement above?

Compare your data with the rest of your class. What do you find? How can you use this information?

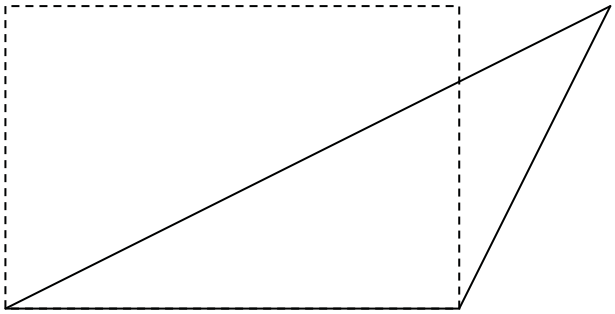
Consider the following triangles and work out their area just by using the pattern that you have found:





Communicating and Reflecting:
How did you work out your answer? How do you know that this is the right way to work out the solution? What pattern, strategy or formula did you find?

Manipulation problem:
See if you can work out the area of this triangle.
Explain how you did it and any patterns that you found.



Teacher initials:

Date:

Problem solving / T&R:
- o Problem solved with minimal or non-mathematical prompting
- o Some leading questions were used to prompt thinking
- o Solved after explanation
- o Did not work out solution
- o N/A- not a novel problem

Reasoning / Comm.:
(verbal, written, working and equations, or visual representations)
- o Clearly and logically reasoned
- o Easily understood
- o Understood with some interpretation needed
- o Some gaps but on topic
- o Minimal or off topic

Understanding / Reflect:
- o Connected manipulation problems to previous questions and answered easily
- o Connected manipulation problems to previous questions with some prompting, and answered correctly
- o Answered once the similarities to previous questions had been pointed out
- o Had some problems in answers but was on the right track
- o Did not answer appropriately

- o Student not observed

Teacher Overview

In this lesson students are given an opportunity to explore area of triangles. The diagrams in the family explanation should make clear how this works, but you may find it beneficial to demonstrate the process online. There is a video explanation in the recorded webinar on area that is in the Teachers' Lounge.

While triangles and parallelograms are not necessary for the C standard, it is important to play with them both for achieving a higher level in Area and also for developing some of the thinking necessary for algebra.

This task has cross-overs to the following statements from algebra:

- N5C: Represent numbers using variables
- N10C: Evaluate algebraic expressions after numerical substitution

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.

Please also complete another multiplication/division grid.

Interleaved practise

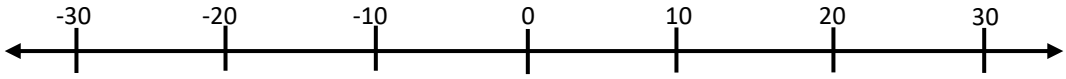
Year 7, week 5

Number:

1. Complete the table below

Index Notation	Product	Numeral
10^2		100
	10 x 10 x 10	
		10 000
10^5		
	10 x 10 x 10 x 10 x 10 x 10	

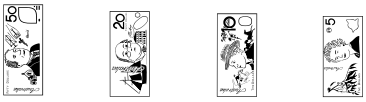
2. Show where these numbers would go on the number line: -6, 12, -24, 9, -15



3. Write the next 3 numbers for this pattern of square numbers. How do you know they are square numbers?

   4, 9, ____, ____, ____

4. Circle the note or notes would you use to pay for the following items so that you receive the least amount of change?
   Milk $3.59, eggs $4.50, bread $2.30, apples $5.90, orange juice $5.27 and cereal $3.75



Hint: You don't need to work out the exact amount so consider rounding.

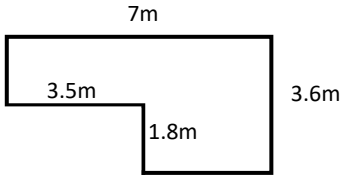
5. True or False? Explain your thinking

   $11 (x + 37) = 11x + 407$

Measurement/Geometry:

6. On the back of this page, draw and label an example of each of the following types of angles - **acute**, **obtuse**, **right** and **reflex angles**

7. This is a drawing of the coop I am building for my chickens. What length of chicken wire will I need to buy to enclose it?



8. How many litres of water will I have to take on a camping trip to allow for 90 cups of water if my cups hold 275mL?

Chance/Data:

9. The solar panels on my house produced the following amount of electricity. What is the average amount of electricity produced per month?

Period	Kilowatts (kW)
Jan-April	1866 kW
April-July	1595 kW
July-Oct	1222 kW
Oct-Jan	1697 kW

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: Generalising Lesson

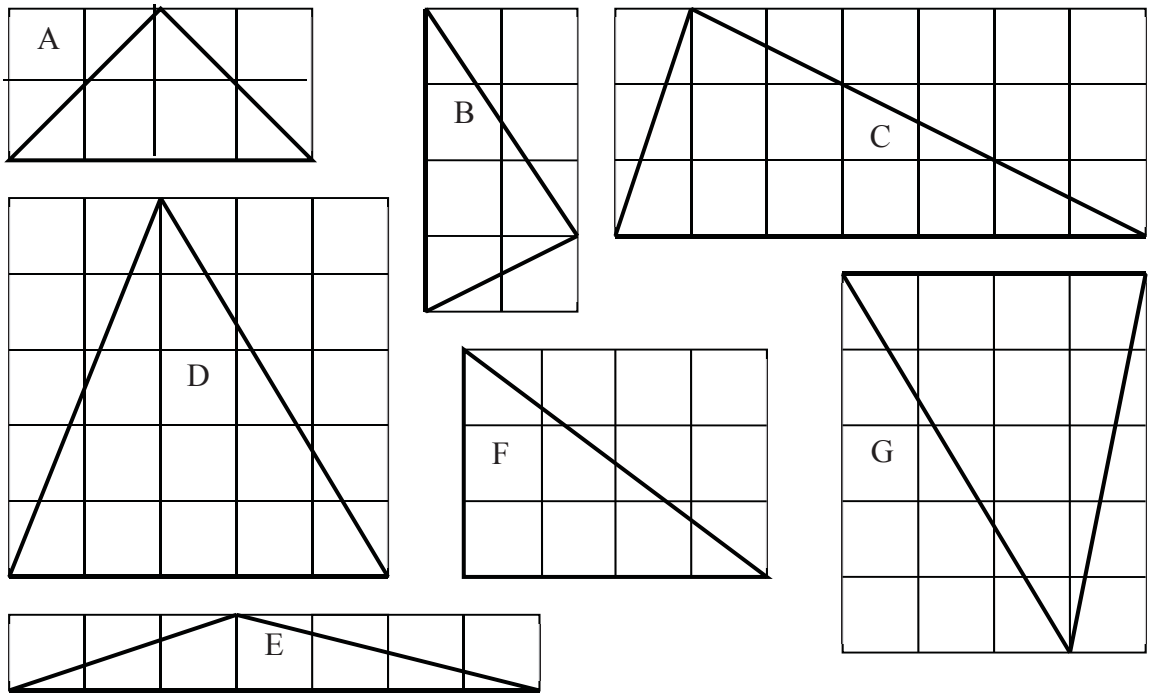
The worksheet provided puts together the ideas for the week to find a pattern for area of a triangle. The idea for this lesson is to find the pattern for calculating area rather than just memorising a formula. Please see the explanation from Wednesday for more information.

Please complete the final multiplication/division grid.

E6. Finding the area of a triangle

TR p109

The area of a triangle is related to the area of a rectangle. Use the following questions to help you formulate a rule for finding the area of a triangle.



Shape	Base of rectangle and triangle	Height of rectangle and triangle	Area of rectangle	Rule for area of rectangle	Area of triangle (counted)	Pattern between rectangle and triangle
A						
B						
C						
D						
E						
F						
G						

What is the rule for finding the area of a triangle?

BACKWARDS QUESTION:

If the area of a triangle was 25cm^2, what could its sides be?

Teacher Overview

This is a ***Generalising*** lesson, designed to help students connect area formulae. It promotes ***Reasoning***, by asking students to show and explain how they have worked out the answers. It also provides an opportunity to demonstrate calculating area of rectangles, which is part of the Achievement Standard, and extending this to triangles which is an A/B standard.

To extend thinking further:

- Combine different shapes together and provide only some side lengths. Students need to work out unknowns then combine these to calculate the area.