Work Program for B2FMaths@Home Week 2 Year 6

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 of **2D shape and angles**. In particular, we are focusing on solving problems using the angles in 2D shapes as this is the "C" standard.

Students need to work out:

- Squares and rectangles have right angles (square corners). Opposite sides are equal in length and parallel. Squares are rectangles with the same length sides.
- Angles are measures of turn and are measured in degrees.
- Right angles are "square". Angles can be classified as smaller than right angles (acute), between right angles and straight angles (obtuse), or larger than straight angles (reflex).
- "Regular" shapes have sides and angles that are equal. For example, a regular 4-sided shape is a square. A regular octagon looks like a stop sign.
- When naming shapes, the prefix tends to refer to the number of sides or angles.
    - Tri = 3: a tricycle has 3 wheels, a triceratops has 3 horns, a triangle has 3 angles or 3 straight sides (tri = 3, angle = angles)
    - Quad = 4: a quad-bike has 4 wheels, a quadrilateral has 4 sides (quad = 4, lateral = refers to lengths or sides). Squares, rectangles, parallelograms and trapeziums are some types of quadrilaterals.
    - Pent = 5: a pentagon has 5 sides, a pentagram is a 5-pointed star. The sides do not have to be the same length.
    - Hex = 6: a hexagon has 6 sides. The sides do not have to be the same length.
    - Oct = 8: an octagon has 8 sides, an octopus has 8 legs. The sides of an octagon do not have to be the same length.
- For all straight-sided 2D shapes, the angles will add up to be the same amount of degrees. The angles of a triangle add to 180^{o} because if you tear the triangle apart and line up the corners, it makes a straight line (see the video).
- How to classify types of triangles by their side lengths and angles
- 3D objects can be represented by 2D drawings. One way to do this is to draw a "net", which would fold up and connect to form the object.

We are also hoping that students will learn over the next few years:

- Which angles are the same when a set of parallel lines (lines running in the same direction) is cut by a line running in a different direction (called a transversal)
- How to classify types of quadrilaterals (4 sided shapes) by their lengths and angles
- How to draw 3D objects from different views

You will need the following objects:

- A protractor for measuring angles. This might look like half a circle with lines and a measurement going around the outside: NB we will be making one on Monday using a sheet of paper and a plate to trace around. If you have a real one, it would be great to have that available to check how accurate the one we make is.
- Some small 3D objects that students can use to trace around each face (e.g. a block or box for a rectangular prism, an ice-cream cone to be a cone, an empty roll to be a cylinder)

Teacher Overview

Students will be thinking about measuring and constructing angles, and using nets in combination with common 3D objects.

For year 6, the achievement standard requires students to solve problems involving angle properties. We are doing this through the activity on angles in triangles. It also requires students to construct simple prisms and pyramids. As we don't usually have pyramids at home, we are focusing on prisms but also including cylinders.

What to emphasise

If you have time online with a webcam
Ask students questions that emphasise the "students need to work out" section from the previous page, such as asking them to explain what they learned about angles in triangles. Ask them to explain what they found difficult in the At-Home Investigation. You might also want to show them some simple 3D objects and ask them to sketch a net so that you can see it. That way you could include pyramids.

Check that the parents understand how the number tasks for the week work and make sure that you ask the student if they have completed them yet. These tasks are a repeat of last week.

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

Has the student solved problems using properties of angles?

- If so, tick **M7C** on the tracking sheet. M7B is using unknowns for an angle.
- M7A has several unknowns (e.g. an isosceles triangle where you only know one angle)

Has the student constructed simple prisms and pyramids?

- If so, tick **M10C** on the tracking sheet.
- **M10B** involves constructing simple pyramids and prisms from a description of their properties rather than nets. It is hard to get parents to do this, but one way for you to do it would be to show the students an object online, then list its properties. They could construct it from the description and show you.
- **M10A** is similar, but the objects do not have to be simple.

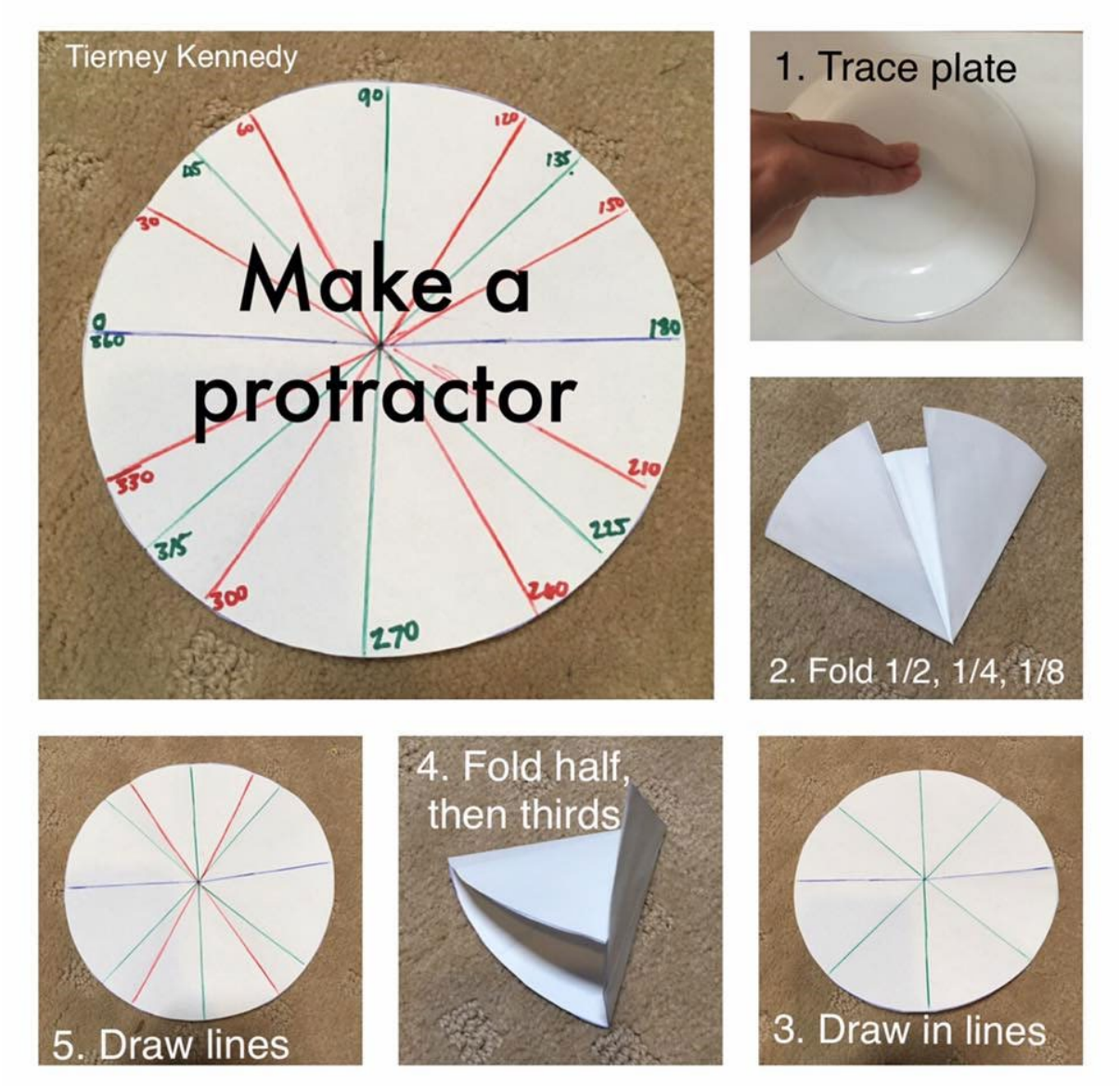
Monday: At-Home Investigation

Making a protractor and measuring angles

You will need:

- Paper to fold to make a protractor
- Scissors
- A small plate or bowl
- Protractor if you have one

Here is a photo showing how to make a protractor. If you fold each 30° angle in half again, you will have 15° sections. This is close enough for estimating angles for this task and the next few.

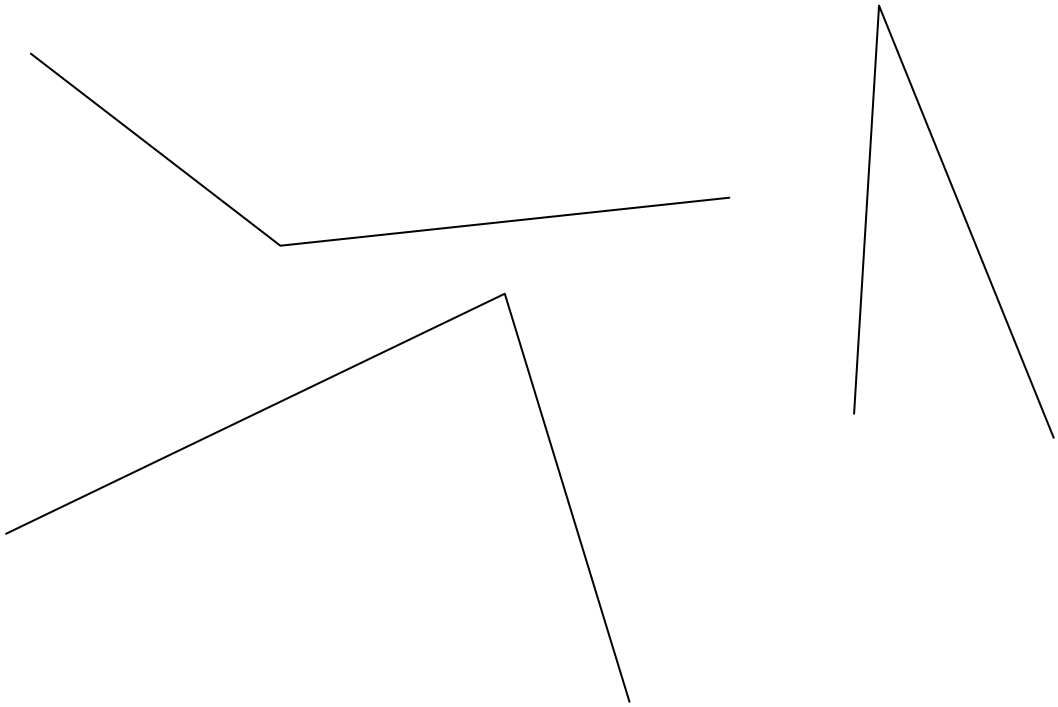


Once you have made your protractor together, use it to measure/estimate the angles on the work sheet. If you can, emphasise the relationship between the number of pieces you are folding into, fractions, and the angle (e.g. folding into 6 pieces is sixths, that is the same as 360° ÷ 6, or 60°)

E11. Using a protractor

TR p109

Use a 360° protractor to measure the following angles, and write the number of degrees beside each one. Remember to include measurements for both the inside and outside angles.



Use a 360° protractor to draw the following angles. Write the measurement beside each angle.

1. 55°
2. 105°
3. 155°
4. 205°
5. 255°
6. 300°
7. 355°

BACKWARDS QUESTION:

What would an angle of 450° look like?

Teacher Overview

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

The emphasis is creating a device to measure angles and using that device accurately. We want students to explore angles and determine whether they are bigger, smaller or equal to a right angle.

It is probably worthwhile constructing the protractor online with students if you can. You can then teach them to use the protractor by folding it to match the angles on the paper, then unfolding to determine the size. This task requires some estimation as the protractors only measure in increments of 15°. If students have a real protractor, they might like to use that instead for the work sheet.

Watch out for:

- Bending the home-made protractor so that it fits
- Measuring from 0 using a commercial protractor, rather than reading back from 180°.

Good questions to prompt thinking:

- When you folded your circle in half to make a straight line, how many degrees was that? What is half of 360 degrees?
- How about when you folded it in quarters? What relationship can you find between quarters, 90° and 360°?
- Given that your protractor only shows increments of 15°, how will you know the angles if they are not exactly on a line?

Students requiring support:

- Classify the angles as acute, right or obtuse and draw those instead of specific degrees. Make an angle tester for "right" angles by folding the circle into quarters rather than marking on every other angle.

Extension:

- Use the same plate to trace a new circle, then draw a line from the centre to the top. Collect 12 or 18 blocks and organise them by colour around the outside of the circle. This creates a simple pie chart, with pretty easy fractions. Use the fraction to calculate the angle we would use, then use the home-made protractor to construct the chart.

Tuesday: Connecting Lesson

Number task for 10-15 minutes: *Finding a total*

Choose a number between 10 and 50. *Please note, 24 and 36 are the easiest, 41 and 37 are particularly hard.*

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:
This lesson is about comparing and classifying triangles and quadrilaterals (4 sides). It teaches students about triangles that have equal sides and angles (equilateral), that have two sides the same length and two angles the same size (isosceles), and those that have three different length sides and angles (scalene). The classification of quadrilaterals can be difficult, so check the video online if you are stuck.

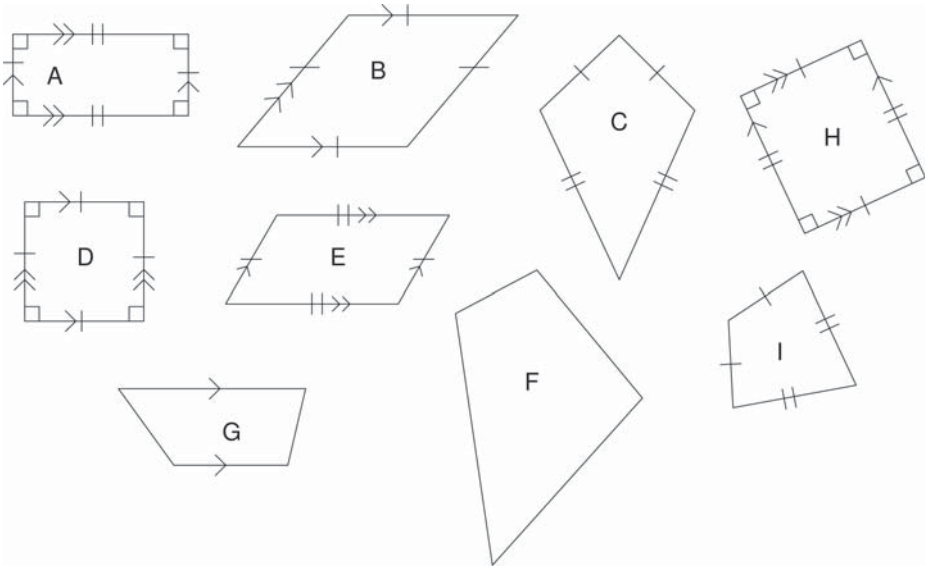
The lines on each side are there to show you if they are the same (will have the same number of marks) or if they are different (different numbers of marks). For example, shape B has all three sides the same. We suggest that your child reinforce what they did with length last week by measuring each side, and also measure each angle. You can then explain what the marks mean afterwards.

K4. Revising subfamilies of quadrilaterals and triangles

TR p143

Families of shapes have subfamilies. Compare the family of shapes shown below. Write the letters of each shape that match the definition.

Quadrilateral: All closed shapes that have four straight sides.



Trapezium: Quadrilaterals that have at least one set of parallel sides.

Diamond: Quadrilaterals that have two sets of equal sides, which are adjacent.

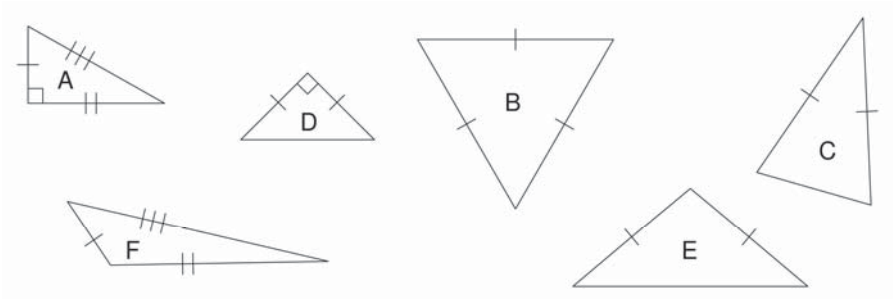
Parallelogram: Quadrilaterals that have two sets of parallel sides and two sets of equal sides.

Rectangle: Parallelograms for which the angles are all 90^o.

Rhombus: Parallelograms for which all the sides are equal.

Square: All sides equal. Two sets of parallel sides. All angles are 90^o.

Triangles: All closed shapes that have three straight sides.



Equilateral triangles: Triangles that have three equal sides, and three equal angles.

Isosceles triangles: Triangles that have two equal sides and two equal angles.

Scalene triangles: Triangles that have three different sides and three different angles.

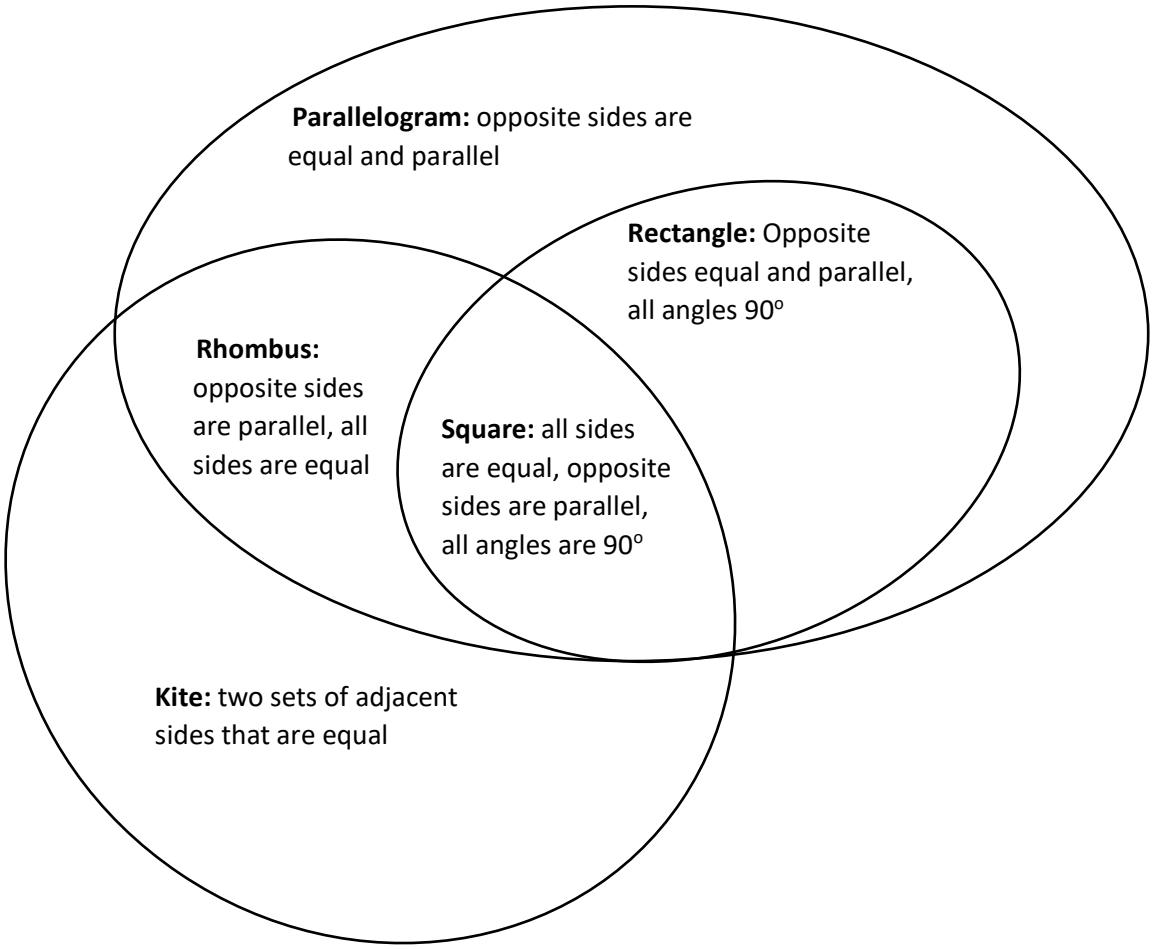
Right angled triangles: Triangles that have a right angle.

Teacher Overview

This is a ***Reasoning*** task.

The purpose of this lesson is to *discuss, analyse* and *evaluate* the *similarities* and *differences* between types of triangles and quadrilaterals. Students will need to measure each side and each angle, then discuss what the marks on the sides mean.

Types of quadrilaterals is a particularly difficult task, even for teachers. To help you understand it, check out this Venn diagram:



What this means:

- Rectangles are parallelograms with right angles
- Rhombuses are parallelograms with equal side lengths
- Squares are all three: rectangles with equal sides, rhombuses with right angles, or parallelograms with both

While there are more factors to the definitions, this makes a pretty good starting point. To help students retain the information, make sure that they have *explained their reasons* for classifying each shape to their parents. If you have time online with students, refer more specifically to the angles of the shapes.

Wednesday: Connecting lesson

This lesson allows your child to think about the angles in triangles, and work out that when we add them up it always makes 180°, or a straight angle.

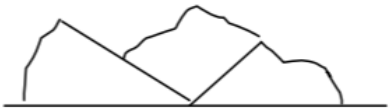
You will need:

- A cut out triangle or a few of them
- A ruler to act as a straight edge
- A protractor, or the one we made on Monday.

Here is a diagram to show how to tear up a triangle into 3 parts. Once you have done this, you will have 3 angles that you can place together along a line. The worksheet will confirm this finding. The last question is necessary to do.

1. Tear the triangle

2. Place the three angles together:



3. The angles form a straight line, so they must add up to give 180°.

Number task for 10-15 minutes: ***Multiplication grid below***

X	3	4	5	6	7	8	9
3							
4							
5							
6							
7							
8							
9							

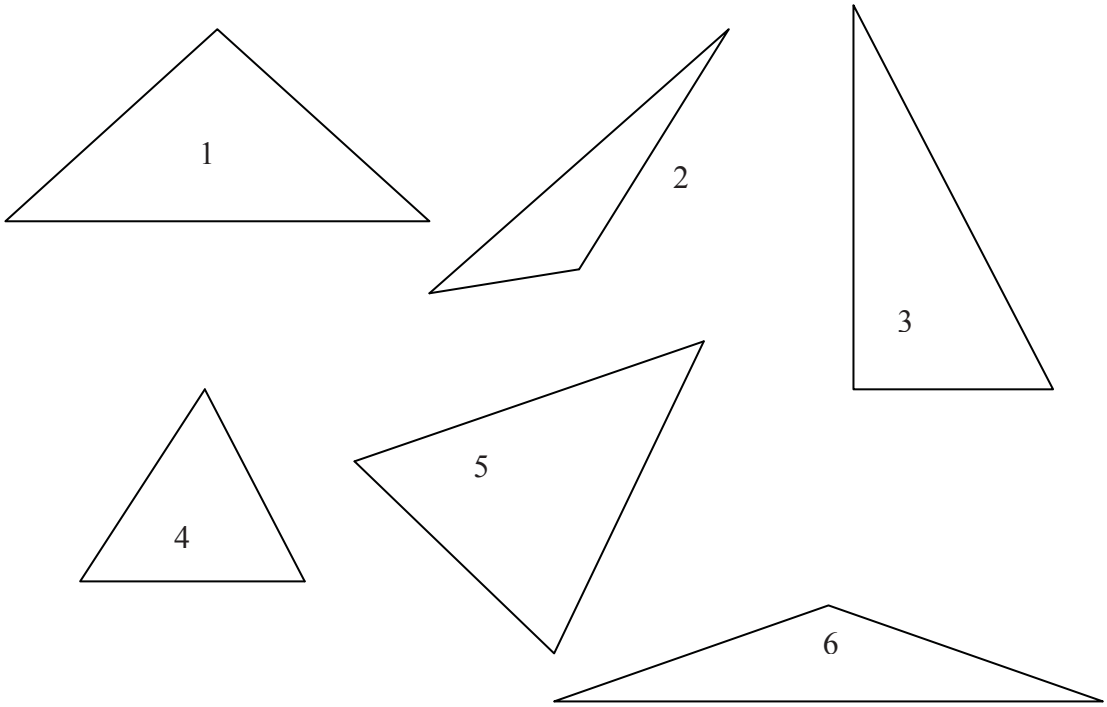
Record your time here for the 49 questions:

Mark your answers using a calculator or with an adult. Circle any that are wrong.

K5. Internal angles of a triangle

TR p143

Measure each of the angles in the following triangles and record your results in the table below. Add up the three internal angles for each of the triangles and see if you can find a pattern.



	Angle 1 (^{o})	Angle 2 (^{o})	Angle 3 (^{o})	Sum of angles (^{o})
Triangle 1				
Triangle 2				
Triangle 3				
Triangle 4				
Triangle 5				
Triangle 6				

BACKWARDS QUESTION:

If one angle of a triangle was 45^o and another was 60^o what would the third angle be? Explain your answer:

Teacher Overview

This is an ***Understanding*** lesson. It explores the *connections* between angles. It encourages students to *investigate*, find *similarities* and *differences*, *measure*, *experiment*, *verify* and change their minds as needed. Students use a somewhat deductive process to work that the angles of a triangle always add to make a straight line. You may wish to demonstrate this process online as the diagram on the families' page may not be clear.

Other considerations:

- Check that the student completed the number tasks and remind parents that it is important.
- If the student can work out that the angles will always add to 180^{o} that is the "C" standard.
- Solving problems with angles including unknowns takes the work to a B or A, so try giving students triangles without all the angles marked.

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: ___ , -6 , -2 , ___ , 6 , 10 , ___ , ____

2. 21 457 + ____ = 30 634

3. Write down all of the factors of 48. Draw arrays that show the factors you have listed?

4. What number comes after 23 509 999?

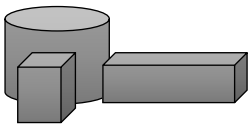
5. How many weeks would it take to save up for a new bike that costs $358.90 if you earn $15 per week pocket money?

Measurement/Geometry:

6. Use a ruler or tape measure to find the length of 5 objects that are longer than 60cm and shorter than 2 metres. Write the name of the objects and their length in both centimetres and metres.

7. What time will it be in 110 minutes? Write your answer in analogue and 24-hour time.

8. Draw what this shape would look like from above and from the other side.



Chance/Data:

9. This table shows data collected when students were asked to choose their favourite colour.
Fill in the missing data and write down three facts that you can learn from the table.
What is one thing that the table **does not** tell you?

	Red	Blue	Purple	Yellow
Girls	6	5	3	
Boys	4	7		1
Total			**8**	**6**

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 the B2FMaths@Home so that parents can find them if needed.

Support for struggling students:
You might like to try the Interleaved questions from a lower year level, or simply reduce the numbers in the questions. You might also give the student the answer, then ask them to work out how the answer was obtained.

Friday: Connecting Lesson

Worksheet task:
This lesson is about comparing and classifying nets and deciding what 3D object they would represent. It involves applying what your child learned in previous years about nets, but this time using the 2D representation to predict the 3D object rather than the other way around.

K9. Predicting the shape from the net

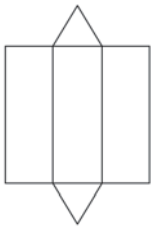
TR p145

It is often useful to be able to tell which 3D shape goes with which net. You can tell which ones match by their properties such as the number and shape of their faces, and their angles.

Look at the pictures of the 3D shapes below. Answer the questions about each, then write which net would fold to give that shape.

Cube:

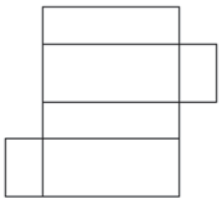
1. How many faces does it have?
2. What shape are the faces?
3. What is special about the angles?



A

Rectangular Prism:

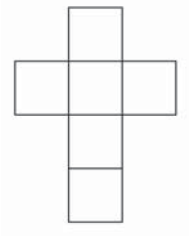
1. How many faces does it have?
2. What shape are the faces?
3. What is special about the angles?



B

Triangular Prism:

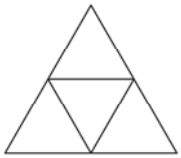
1. How many faces does it have?
2. What shape are the faces?
3. What observations can you make about the angles?



C

Triangular Pyramid:

1. How many faces does it have?
2. What shape are the faces?
3. What observations can you make about the angles?



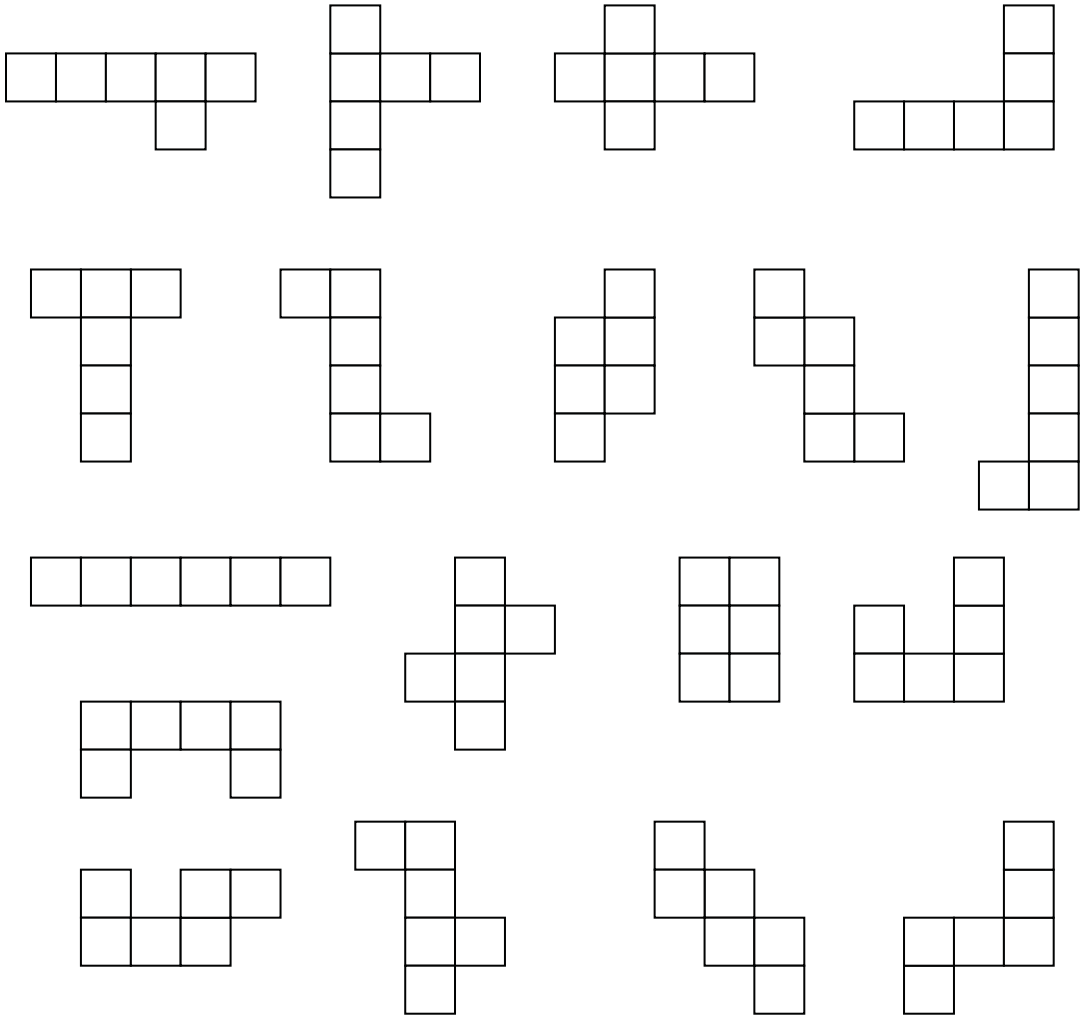
D

BACKWARDS QUESTION:

What shape other than a cube would have 6 faces with at least 5 congruent?

Identifying cube nets

Examine the diagrams below and circle the nets that would fold to give a cube.



BACKWARDS QUESTION:

Draw three nets that would fold to give the same triangular pyramid:

Teacher Overview

This is a ***Conceptual Understanding*** and ***Reasoning*** lesson. It is designed to help students represent 3D objects for the Achievement Standard.

Download the card game for the week and have students sort the cards without instructions. If they get stuck, let them know that the cards show a top and side view of some blocks, as well as 2 different perspective drawings.