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Week overview

Students need to work out:

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

You will need the following objects:

Monday: At-Home Investigation

Tuesday: Connecting Lesson

Wednesday: Connecting Lesson

Thursday: Interleaved Practice Questions

Friday: Generalising and Extending Lesson

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 angles in 2D shapes as this is the “C” standard.

Students need to work out:

- 2D shapes are flat. A round ball is not a circle, it would be a sphere. A pyramid is a pyramid, not a triangle, even though its faces are triangular.
- 2D shapes are generally classified by the number of sides and angles that they have, not by “pointiness” or the orientation (if it is straight or on an angle). That means that a triangle that has the point at the bottom is not “upside down”. It is just a triangle. Likewise, a square that is angled is not a “diamond”. It is still a square.
- Triangles can have different length sides. They don’t have to be the same.
- A square is a special type of rectangle (*see the video on the website*). A rectangle has opposite sides that are equal (same length) and parallel (run in the same direction), with right angles (square corners). It actually doesn’t have to have 2 long and 2 short sides – that’s just how we tend to see it.
- Squares and rectangles have right angles (square corners)
- Angles are measures of turn, and can be described as the amount you have turned (e.g. half turn, quarter turn).

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

- “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° because if you tear the triangle apart and line up the corners, it makes a straight line (see the video).

You will need the following objects:

- For Friday: paper of two colours if you can, a bowl to trace around, scissors.

Teacher Overview

Students will be thinking about 2D shapes, particularly angles.

Students need experience in sorting shapes into conventional categories. In the early years, students need to have a well-developed understanding of the criteria being applied in order to successfully sort shapes.

For year 3, the achievement standard looks at 3D objects and also angles. Our teaching this week will review shape classification as it is needed for Year 4 and focus on angles.

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 and turns. Ask them to explain what they found difficult in the At-Home Investigation.

Check that the parents understand how the number tasks for the week work and make sure that you ask the student if they have played 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 recognised angles as degrees of turn in real-life situations rather than just in shapes?

- If so, tick **M3C** on the tracking sheet. M3D is recognising angles in 2D shapes.
- Have they created different angles? Tick **M3B**.
- Have they created angles and linked these with the amount of turn? Tick **M3A**.

Monday: At-Home Investigation

You will need:

- A table and chair
- 4 objects that you can place in front of, behind, to the left of and to the right of a child sitting on the chair at your table (see picture on student sheet).

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 problems. Encourage them to try turning as indicated in the questions. Ask them to come up with a description of what half and quarter turns mean, and what clockwise and anticlockwise mean. NB: clockwise is the direction that the hands of a clock move around. They move from the 1, then follow the numbers all the way to the 12. Anticlockwise is if the hands on the clock moved backwards.
3. Make sure that you try out their ideas first before you try to help them come up with a better plan. This is important because then they will know *why* their idea didn’t work.
4. Help your child to describe their thinking about turns. Have them write directions to their bedroom from the table using number of steps and direction of turn.
5. Encourage your child to draw or write answers to the questions on the page. Be the “friend” mentioned, and follow their directions to the bedroom. Say what you are doing out loud so that they can see any problems with their directions. Encourage them to correct their ideas and make them more specific. Focus carefully on how accurately they describe the turns.
6. 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.
7. **Ignore** the box on the right of the second page. That is for teachers to use if they run the lesson with your child online. Otherwise it will not be used.

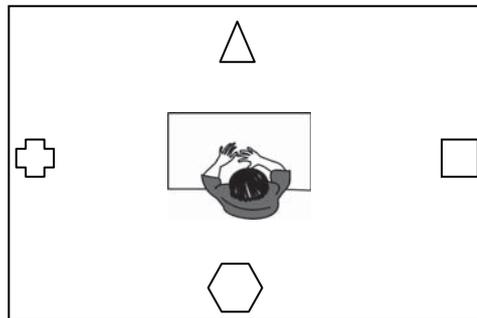
PROBLEM 35: ANGLES AND TURNS

Look at the following situations and work out what the descriptions mean. Use this understanding to give your own directions to the places specified below.

Degrees of turn:

Look at the picture below and the instructions given.

See if you can work out what 'quarter turn' and 'half turn' mean.



- Jemma sits in the middle and faces the triangle. She turns a **half-turn**. This means that she is facing the hexagon.
- Jemma faces the triangle. She turns a **quarter-turn clockwise**. This means that she is facing the square.
- Jemma faces the triangle. She turns a **quarter-turn anticlockwise**. This means that she is facing the cross.

1. What does a half-turn mean?

2. What does a quarter-turn mean?

3. Stand up behind your desk. Turn a half-turn. What are you facing?

4. Stand up behind your desk. Turn a quarter-turn clockwise. What are you facing?

5. Stand up behind your desk. Turn a quarter-turn anticlockwise. What are you facing?

6. Stand up behind your desk. Turn a half-turn, then a quarter-turn clockwise. What are you facing?

7. Stand up behind your desk. Turn a half-turn, then another half-turn. What are you facing?

Giving your own directions

Using what you have learned about turns, write some directions for a friend to follow:

Work out what they would be facing at the end but don't write it down.

Swap books with a friend and follow each other's directions to find out how well the directions worked. Write your answer on your friend's book and have them write their answer here:

Friend's name: _____

How well did the directions work? Explain your answer:

 **Understanding and manipulation:** Start facing where your directions ended. Reverse your directions so that you end up where you started. Write them here:

Teacher initials:

Date:

Problem solving / T&R:

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

Reasoning / Comm.:

(verbal, written, working and equations, or visual representations)

- Clearly and logically reasoned, clear directions
- Easily understood reasoning and directions
- Understood with some interpretation needed
- Some gaps or miscommunications
- Minimal or off topic

Understanding / Reflect:

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

Teacher Overview

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

The emphasis is on connecting turns with the real world to develop the concept of angles. We want students to explore moving around, using turns to describe directions, and linking the turns with something specific such as moving through their house.

This task is a little difficult to do online, but important to try if you can. You can observe the child turning and ask them to then write directions to get somewhere specific. Check that the child understands what “clockwise” and “anticlockwise” mean.

Watch out for:

- Classifying subsequent turns according to the original orientation instead of the direction the child is facing now.
- Writing the directions *after* walking the path rather than predicting them before. Predicting requires a stronger degree of visualisation.

Good questions to prompt thinking:

- How do you need to turn to face...?
- What do you think a half-turn means? How about a quarter turn?
- How does the hour hand move around a clock? Which way do the numbers get bigger?
- What did you find tricky?

Students requiring support:

- Stick with angles in squares, rectangles and triangles
- Emphasise the idea of bigger, smaller or equal to a right angle or turn
- Use describing words for position: behind, in front of, left, right

Extension:

- Ask students to describe what they would do to walk around the edge of a rectangle, including the turns.
- Python is a coding application that can be used to make the little turtle draw shapes. This is a free program and will let the child try out designing shapes and giving clear instructions.

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:

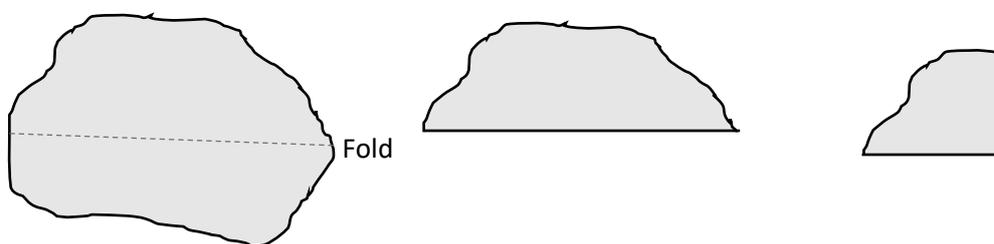
- Not all 4 numbers have to be used
- A number can only be used once
- Use any operation you like (+ - x ÷) and any others that you know (e.g. powers or square roots, ! etc.)

Try at least 3 numbers.

Worksheet task:

This lesson is a review of 2D shapes. In addition to the questions listed, please ask your child to describe the angles in the shapes as this is important for the “C” standard.

Angle or corner – discuss how many angles each side has, and try to describe the angles as amounts of turn (bigger than a quarter turn but smaller than a half turn). Note: you can make a quarter turn or right angle by folding any piece of paper, then folding again along the line you have made. This makes a right angle, like the corner of a square or rectangle, and like most corners in your house. You can also use the paper to test any angles to see if they are bigger, smaller or equal to a right angle/quarter turn.



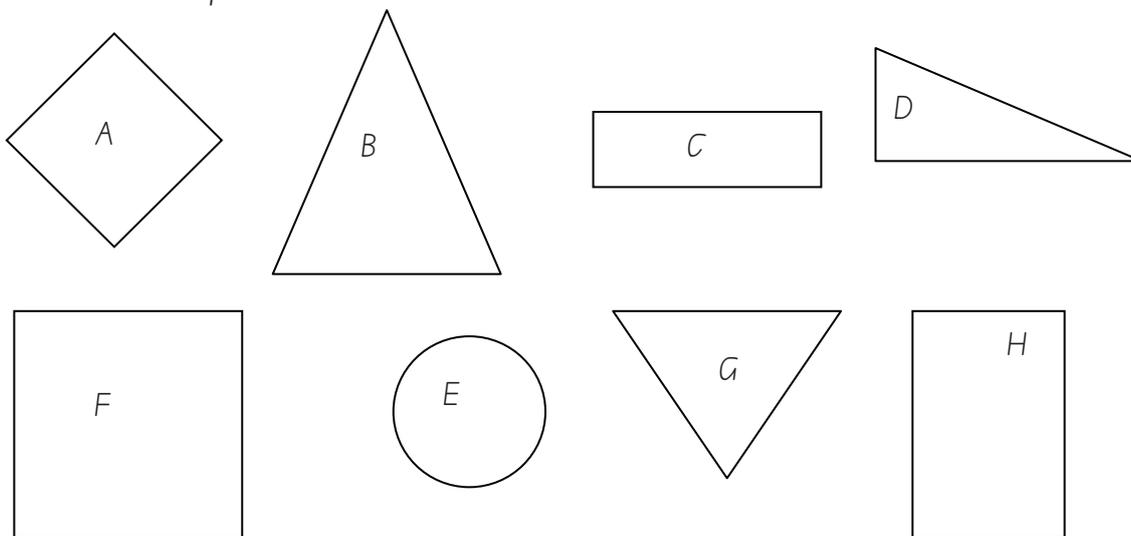
K1. Properties of 2D shapes

2D shapes are flat. They can be described in lots of different ways. In this activity you answer some questions about 2D shapes.

Questions you can ask about 2D shapes:

1. How many sides are there? Are they straight or curved?
2. Are the sides the same length as each other? How long are they?
3. How many corners are there?
4. What is the name of the shape?

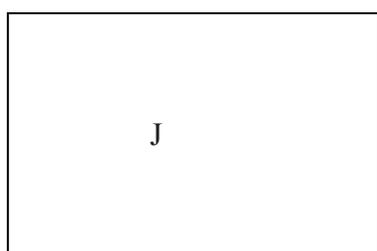
Look at the shapes below, work out the answers and write them in the table below:



Shape	How many sides? Straight?	Are the sides the same length? How long?	How many corners?	Name of the shape.
A				
B				
C				
D				
E				
F	4 straight sides	Same. 3cm long	4 corners	Square
G				
H				

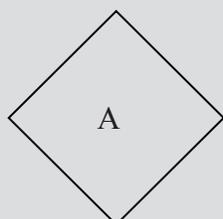
What is one way that I could group the shapes above? List the categories that you could use to group them, and draw the shapes that fit into each group. Remember to write the right letter on them.

Add these shapes into your categories:



BACKWARDS QUESTION:

Shape A looks like a diamond. Try turning your book to see if you can find another shape that it looks like. What do you find?



Teacher Overview

This is a **Reasoning** task.

The purpose of this lesson is to *discuss, analyse* and *evaluate* the *similarities* and *differences* between shapes and the angles within each shape. Make sure to emphasise describing the angles as degrees of turn (smaller than a quarter turn, between a quarter and a half turn...)

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 as degrees of turn and focus on describing them.

Wednesday: Application Lesson

This lesson allows your child to think further about the characteristics of shapes and how we might group them. Please note, shape L has been included in 2 groups deliberately so that students can find out that it is an error. It should not be in the group of pentagons.

Number task for 10-15 minutes: *Place Value*

Give your students 3 numbers that have 3 digits each (e.g. 412, 378 and 903). For each number ask them how many hundreds, tens and ones are in the number. Ask them to write the number in words. Ask them to add the 2 smaller numbers. Ask them to subtract the smallest number from the largest number.

Worksheet task: 15-20 minutes

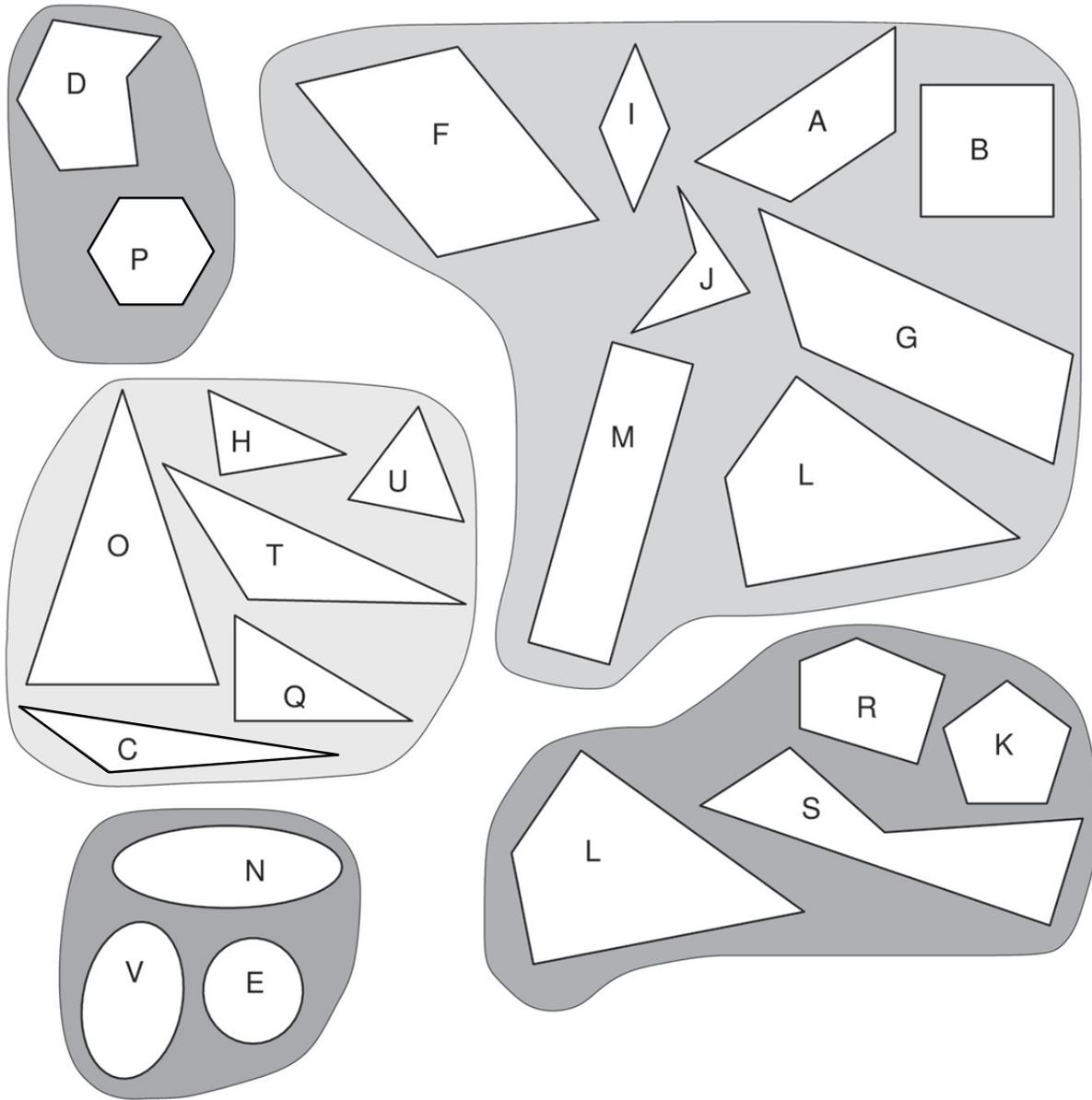
This lesson is following on from what your child learned yesterday about **describing shapes**. The purpose of the lesson is to think about how we can use properties to classify shapes into families. While this concept is not strictly necessary for Year 3, it is a very important concept to understand for Year 4.

Make sure that your child **explains out loud** their reasons as this means that they will be more likely to remember it later.

If your child can identify characteristics, ask them to try drawing shapes that are combinations of other shapes (e.g. putting a triangle and a rectangle together in different ways), then describe the angles they have made.

K2. Shape families

How have these shapes been grouped into families?



How have the shapes been grouped into families? Did you find the shape in the wrong family?

How are the families similar? How are the families different?

Teacher Overview

This is an **Application** lesson. It gives students another chance to think through appropriate classification systems for shapes before their final chance at angles.

Other considerations:

- Check that the student completed the number tasks and remind parents that it is important.
- If the student can correctly describe the angles in triangles, rectangles, squares as bigger, smaller or equal to right angles (quarter turns) as this is the D standard. For a C standard they need to do this in real-world (3D) situations, not just for shapes.

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.

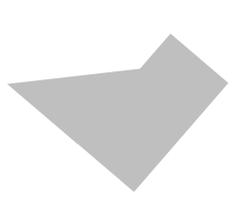
Interleaved practice

Number:

1. Starting at 120, count back in 5s until you get past 80.
2. $328 + \underline{\quad} = 502$
3. What groups can you make with 30 counters? Draw them as an array.
4. What number comes after 5 909?
5. Find two different ways to make \$6.50 without using any gold coins.

Measurement/Geometry:

6. Name three things that are longer than a metre. List them from shortest to longest.
7. What time will it be in one and a half hours?
8. Flip this shape across the line and draw what happens.



Chance/Data:

9. Choose 3 different types of toys that you have. Use tally marks to count up how many of each type you have.

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: Generalising and Extending Lesson

You will need to decide between the following options:

- Child found the thinking about angles on Monday, including describing the directions tricky: do the first worksheet so that you can make sure understanding of angles as degrees of turn is solid. To complete this worksheet, you will need a circle cut out of a piece of paper (trace around a bowl), and a square as well. Make the slits as shown on the diagram below and slide the circle onto the square. When you rotate the circle, you will be able to show different degrees of turn.



- Child found the thinking about angles on Monday too easy: do the second worksheet about using the spinner to describe turns.

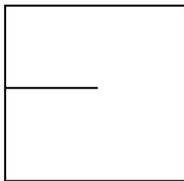
Create angles

 Angles relate to an amount of turn. In this activity you will make an angle machine, and use it to describe the amount of turn of the angles shown below.

Make your angle machine by cutting out the circle that your teacher is giving you and fitting it into the slotted paper. See below:

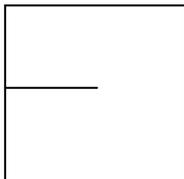


Look at the corner of your classroom. Make your angle machine show this angle. What does it look like?



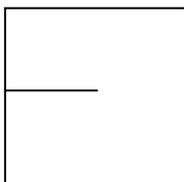
This angle is called a 'right' angle or a quarter-turn.

Open a book out flat. Make your angle machine show this angle. What does it look like?



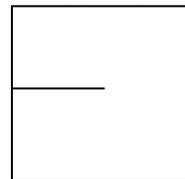
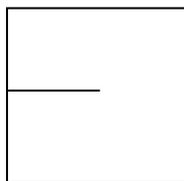
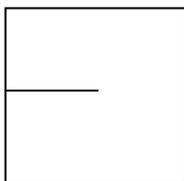
This angle is called a 'flat' angle or a half-turn.

Turn the minute hand of a clock from 12 all the way around to the 9 (clockwise of course!) Make your angle machine show this angle. What does it look like?

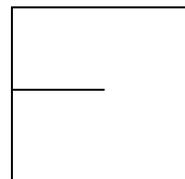
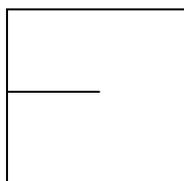


This angle is called a three quarter turn.

Angles smaller than a right angle are called acute angles. Make some here:

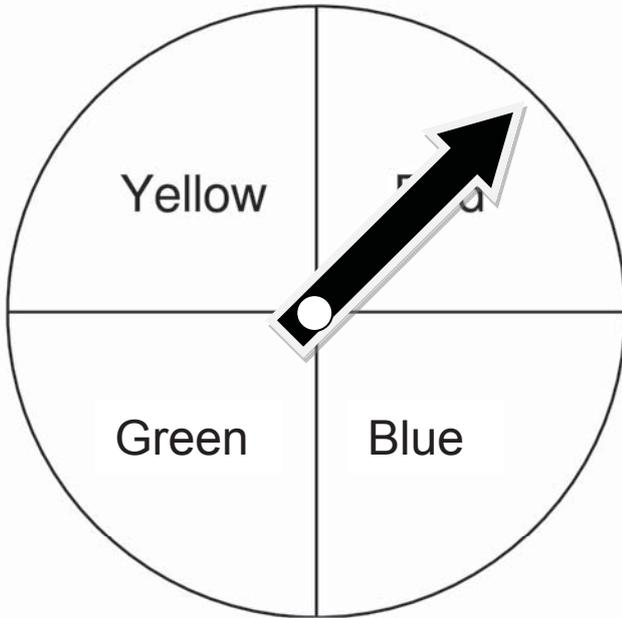


Angles that are between a right angle and a flat angle are called obtuse angles. Make some here:



Look at the spinner below. A game is played where each player gets to spin the spinner. A point is scored by the player whose section the spinner lands in. Answer the questions and work out who won the game. Use a pointer for the spinner if needed.

The spinner is currently in the middle of the Red section.



THINKING QUESTION:
How could Elijah spin the spinner from its starting position so that he would score a point? List as many ways as you can think of.

Tally chart for recording the points:

Elijah	Yellow + Red	
Jane	Green + Blue	

What really happened:

Elijah went first. He spun the spinner a half-turn. What did it land on? Add the point to the table.

Jane went next. She spun the spinner a quarter-turn clockwise. What did it land on? Add the point to the table.

Elijah spun the spinner another quarter-turn clockwise. What did it land on? Add the point to the table.

Jane spun the spinner a whole turn and another half turn. What did it land on? Add the point to the table.

Elijah spun the spinner three quarter-turns anticlockwise. What did it land on? Add the point to the table.

Jane spun the spinner three quarter-turns clockwise. What did it land on? Add the point to the table.

Who won?

Teacher Overview

This is a **Conceptual Understanding** and **Reasoning** lesson. It is designed to extend student understanding further and promote generalising for those who have mastered the idea of angles as turns in the real world.

The first worksheet gives students another opportunity to develop the understanding necessary to be a “C” standard. The second is an A/B standard task.