
Year 3 Primary Critical Thinking

Lesson 5 Non-Verbal Reasoning Part 2 2023 Term 1

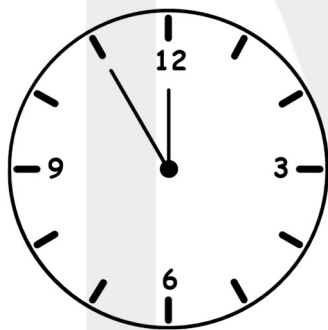
1. Rotations of Shapes

1.1 Clockwise and Anticlockwise

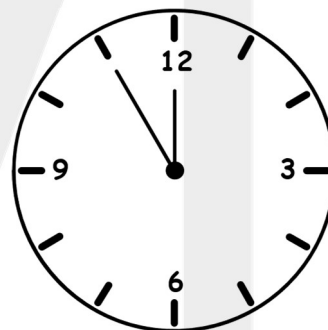
A *rotation* of a shape is where the shape has been *turned around*.

When we rotate a shape, we can rotate it in many different directions! To keep things simple, we're going to rotate shapes *clockwise* and *anticlockwise*. Clockwise means *in the same direction that the hands on a clock turn*, and anticlockwise means *in the opposite direction that the hands on a clock turn*. Using an arrow, draw these directions on the clocks below!

Clockwise



Anticlockwise

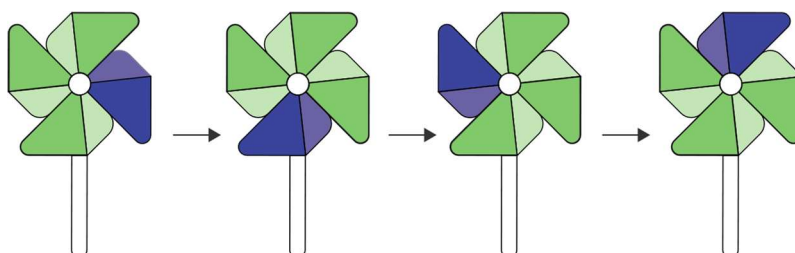


A synonym for “anticlockwise” is “counterclockwise”. If you see either of these two words, they are talking about the same direction!



Examples

The pinwheel below is spinning in the wind. It is rotating _____.

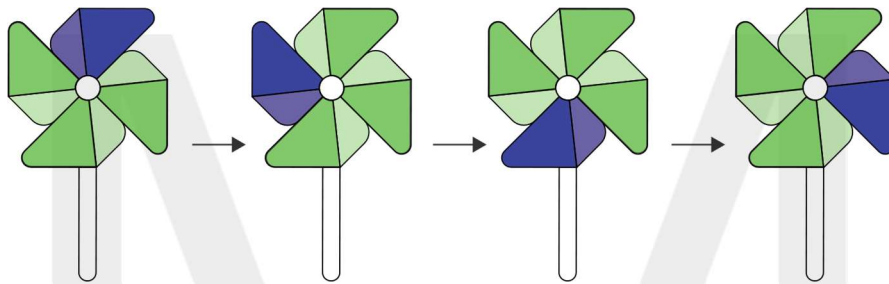


2 Our students come first

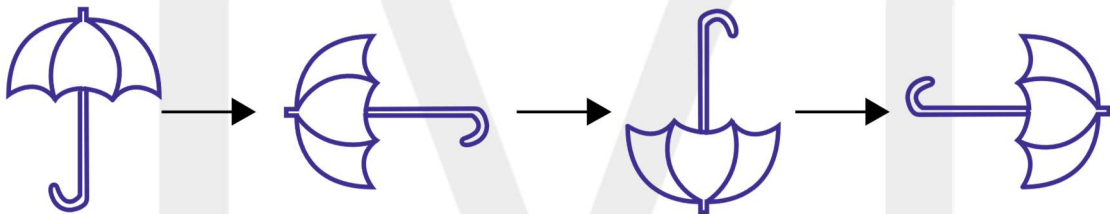


The easiest way to figure out which way the pinwheel is rotating is to put your finger on the darkest fin and trace its path as it spins. The *motion of your finger* will tell you whether it is rotating clockwise or anticlockwise!

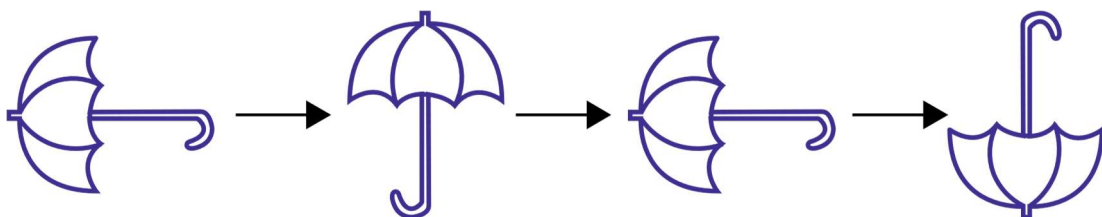
The pinwheel below is rotating _____.



An umbrella is being tossed around on a windy day! Which way is the umbrella rotating? _____



The umbrella below is rotating _____.

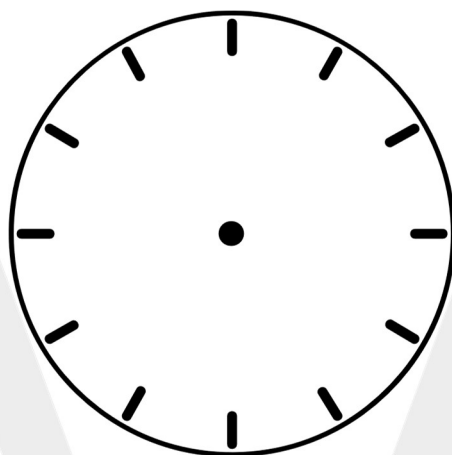


For tricky shapes, pick *one part* of the shape to follow and trace out its motion with your finger as it rotates to see the direction. For the umbrella, the handle is the easiest part to follow!



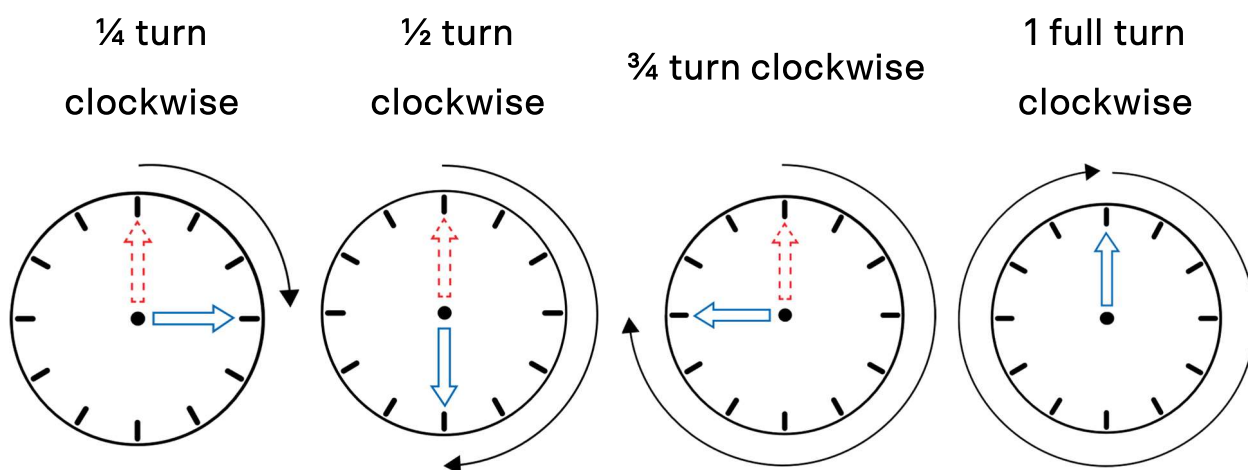
1.2 Amounts of Rotation

Just like we can rotate a shape in different directions, we can also rotate a shape by different amounts! To begin, let's think back to a clock. On the clock below, mark where $\frac{1}{4}$ of an hour, $\frac{1}{2}$ an hour, $\frac{3}{4}$ of an hour and 1 full hour are on the clock:

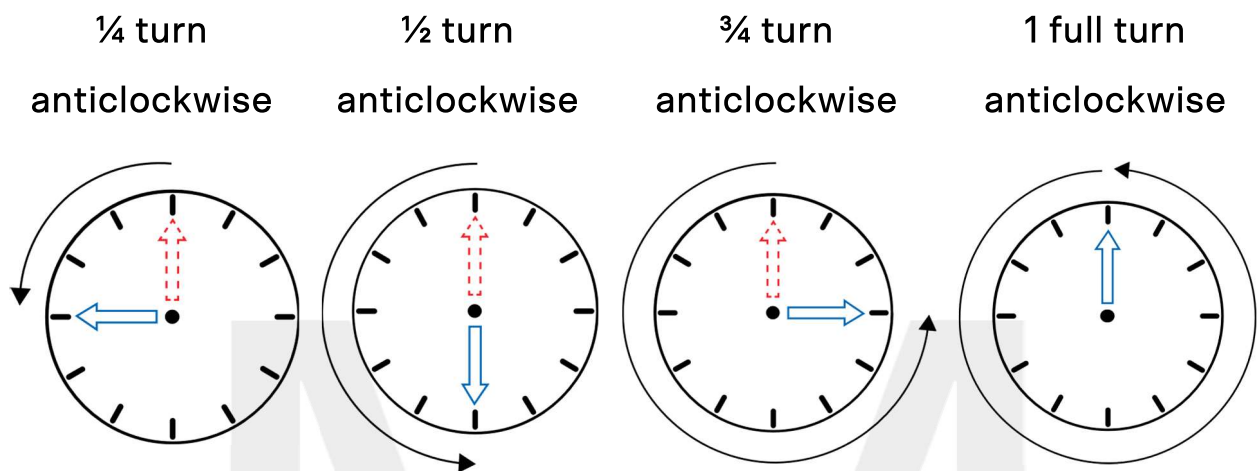


One *full turn* around the clock means *one full hour* has passed. If we divide the clock into four *quarters*, this will tell us where *each quarter* of an hour will be!

If we start at 12 o'clock (at the top of the clock), turning an arrow towards each of these points means the arrow has turned by a *quarter of a turn* clockwise each time!



What if we turn the arrow in the *anticlockwise* direction instead? It would look like this:



Notice how no matter the direction of rotation, after *one full turn* the arrow is back to its *original position* and looks the same as if we hadn't turned it at all!

Notice as well that the *half turn* looks the same no matter whether we turned the arrow clockwise or anticlockwise.



Examples

By how much have the shapes below turned clockwise?

 _____	 _____
 _____	 _____



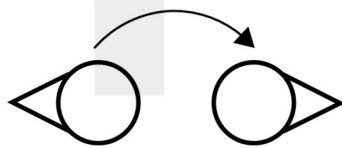
Use the $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and full turn positions on the clock to help you see how many quarter turns the shape has made from its original position!

By how much have the shapes below turned anticlockwise?

 <hr/>	 <hr/>
 <hr/>	 <hr/>

Be careful not to get rotations and reflections mixed up! Some shapes *look* like a reflection when they have rotated half a turn, such as

Half-turn rotation



Reflection

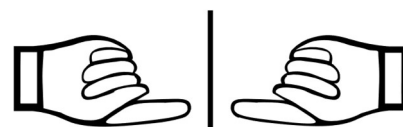


but this is only because it is a simple shape with symmetry! If we rotate a shape with no symmetry, it is easier to see that a half turn rotation is actually *not the same* as a reflection:

Half-turn rotation

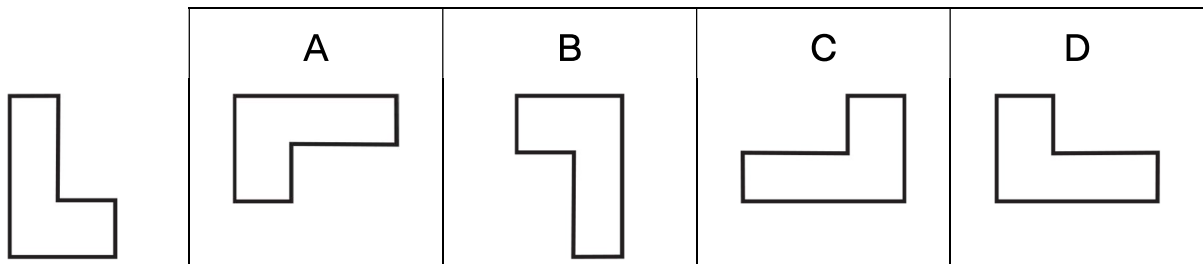


Reflection



Activities

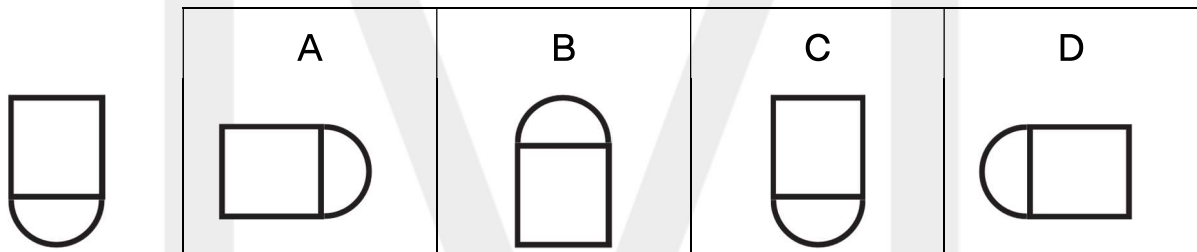
Identify what the shape on the left would look like after an anticlockwise quarter turn:



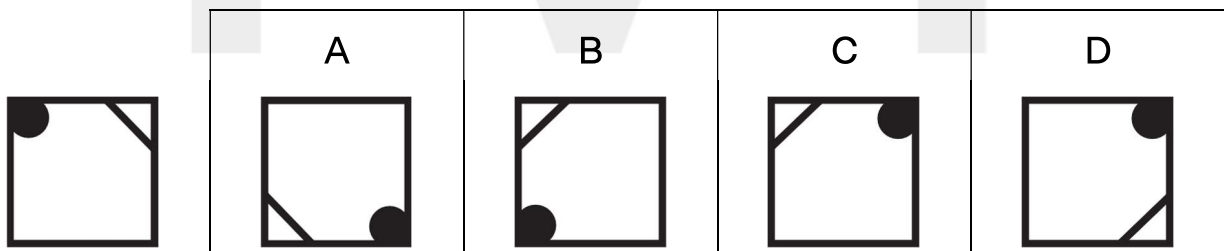
Use your finger to trace out where the top of the shape would end up after a quarter turn to help you!
Remember: anticlockwise goes in the *opposite* direction that the hands on a clock rotate.



Identify what the shape on the left would look like after a half turn:



Identify what the shape on the left would look like after a clockwise quarter turn:



Use the *corners of the square* to help you – *each corner* is a quarter turn.
This one is tricky because we must make sure that *both* the black dot and line in the corners are in the correct final position. Remember to check that both have rotated clockwise by a quarter turn!