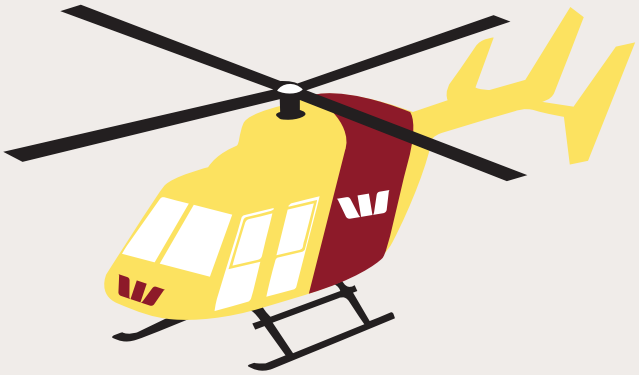


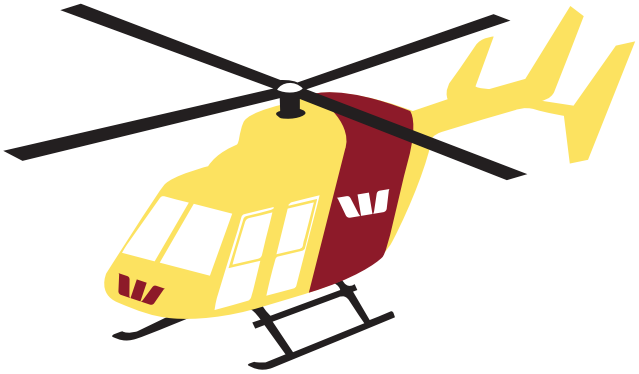
Science

The wonders of light

Time recommended: 2 hours
Year 5 and 6

Strand:	Science Understanding
Descriptor:	Physical Sciences
Light from a source forms shadows and can be absorbed, reflected and refracted (ACSSU080)	
Strand:	Science as a human endeavour
Descriptor:	Nature and development of science
Science involves testing predictions by gathering data and using evidence to develop explanations of events and phenomena (ACSHE081)	
Strand:	Science Inquiry Skills
Descriptor:	Questioning and predicting
With guidance, pose questions to clarify practical problems or inform a scientific investigation, and predict what the findings of an investigation might be (ACSIS231)	
Strand:	Science Inquiry Skills
Descriptor:	Planning and conducting
Decide which variable should be changed and measured in fair tests and accurately observe, measure and record data, using digital technologies as appropriate (ACSIS087)	

Name: _____



The wonders of light

In groups of four, conduct the following two experiments below to learn about light.

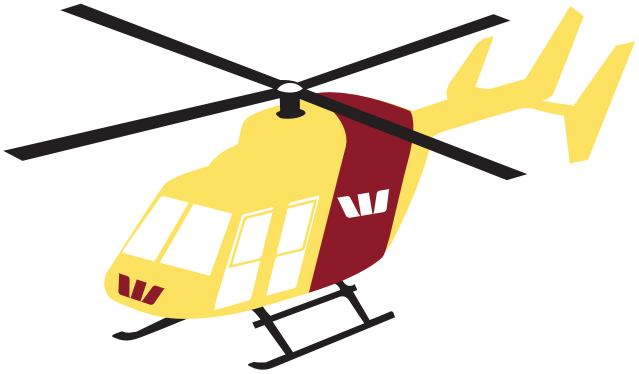
The Westpac Lifesaver Rescue Helicopter Service mostly operates in the day time. Sometimes, however, they have to participate in night time missions.

A big factor in both day and night missions is light. We see objects only when light travels the object to our eyes. These objects might be primary light sources which give out their own light, such as the Sun, or they might be secondary light sources which reflect light to the eye.

Day missions can often be very sunny and glary, so the crew have special helmets that protect their eyes from the sun. These work in a similar way to the sunglasses you or your parents might wear.

Not all day operations are sunny, so helicopters are also fitted with a large light at the front of the helicopter called 'Night Sun', to help the crew see at night, or on a cloudy day.

'Moonshine' helps the crew to see where they would not normally see. The light is extremely bright, lighting up several metres in front of the helicopter.

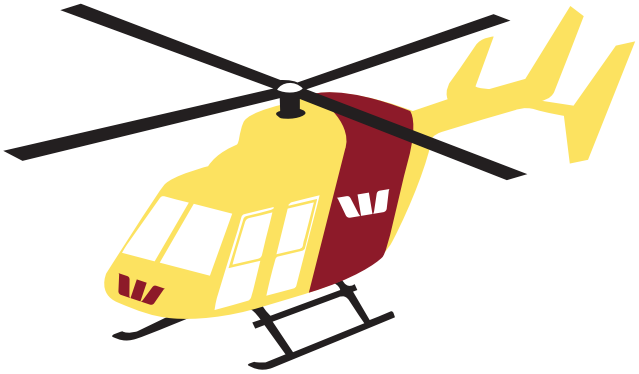


TASK ONE:

Ray diagrams use lines to show light travelling.

In the below blank boxes, draw a simple ray diagram to show the paths of light from a source to our eyes.

Remember to correctly label your ray diagram, using straight lines to show light, and arrowheads to show the direction the light is travelling.



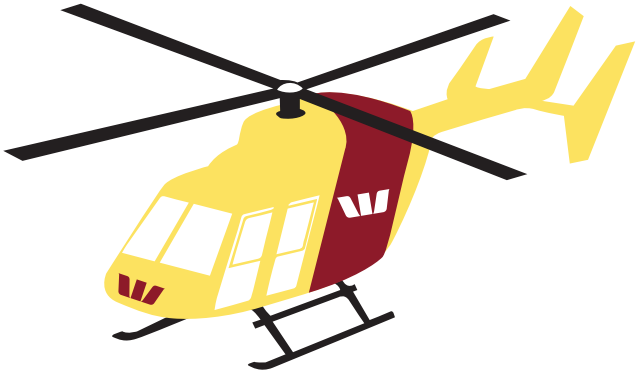
TASK TWO:

When on a rescue mission the crew have to look carefully for objects or people can sometimes mistake them for shadows.

Shadows are dark shapes that light cannot travel around and are called an opaque material. Materials that allow light to travel through them are known as transparent materials.

In pairs, use a torch to investigate materials inside the classroom and on the school oval that are transparent, translucent, and opaque.

When you have finished investigating these different types of materials, draw a labelled ray diagram in the space below showing light travelling through an object.



TASK THREE:

Once you have investigated which objects are transparent and which objects are opaque, make a list of ten things that might be transparent or opaque when the crew are on a mission and looking down from the helicopter.

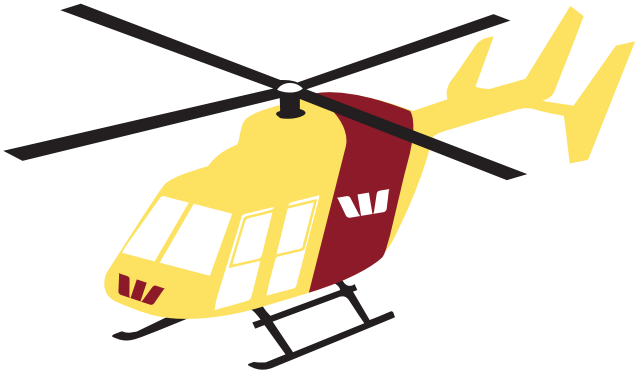
_____ _____

_____ _____

_____ _____

_____ _____

_____ _____



TASK FOUR:

The WLRHS participate in a range of different missions. These can be in coastal areas or rural and regional areas.

Sometimes the WLRHS will fly over water (the ocean, ponds or lakes) and to search for objects or people.

In groups, using the methods below conduct an experiment to understand how objects sometimes appear differently to what they would normally when the crew are looking in water.

In groups of four; collect the following items;

- Pencil
- Clear empty plastic cup
- Measuring cup

Follow the steps below:

1. Using the information you have learnt about opaque and transparent materials, make a list of questions that your team could investigate what will happen to the pencil when placed behind the cup of water.

   _____

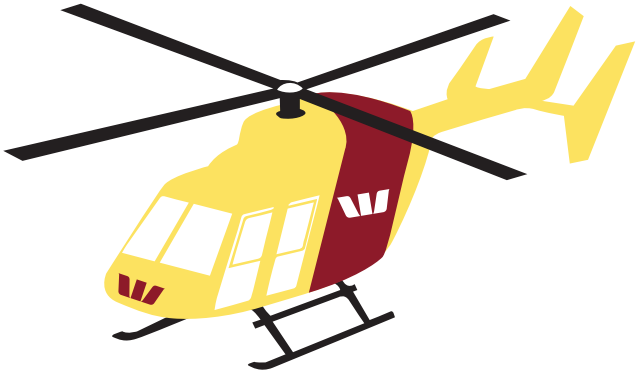
   _____

   _____

2. Once you have created a list of questions, try to predict the findings of your investigation.

   _____

   _____



3. In your group, discuss how to ensure this experiment is as fair as possible. Write your answer in the space below.

_____

_____

_____

_____

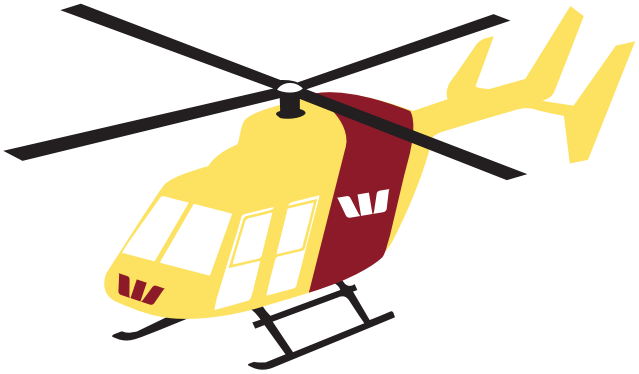
4. Different tools are used for different investigations. List the tool that will give you the most accurate measurements.

_____

_____

It is important to record and label all of your observations in this experiment in the space provided below.

5. Hold the pencil in the centre behind the empty clear plastic cup. Record what you see.
6. Hold the pencil to the side of the empty clear plastic cup. Record what you see.
7. One member of your group should pour 200mL of water into the measuring cup, and then pour the water into the plastic cup.
8. Hold the pencil behind the clear plastic cup of water in the centre. Record what you see.
9. Hold the pencil to the side of the clear plastic cup of water. Record what you see.

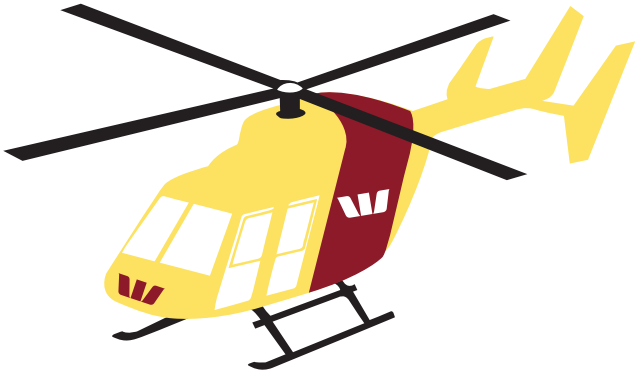


Pencil in the centre of the cup without water

Pencil to the side of cup without water

Pencil in the centre of cup with water

Pencil to the side of cup with water



TASK FIVE:

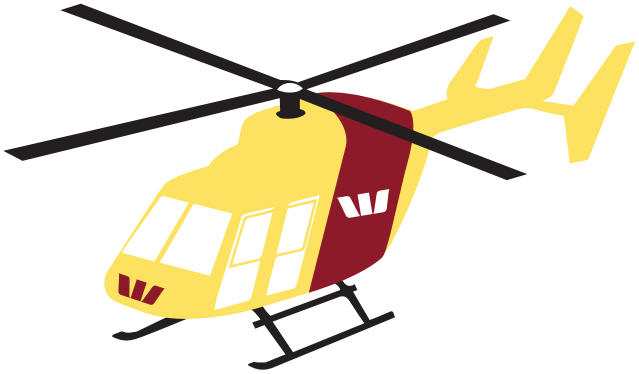
Using the recorded observations from your experiment and your knowledge of opaque and transparent objects, answer each of the below questions:

1. What did your group see before water was added?

2. What did your group see after the water was added?

3. What happened when you viewed the pencil directly behind the container?

4. Can you think of other objects that might magnify?



5. What happened when you viewed the pencil through the curved edge of the container?

_____

_____

_____

6. Why do you think this happened?

_____

_____

_____

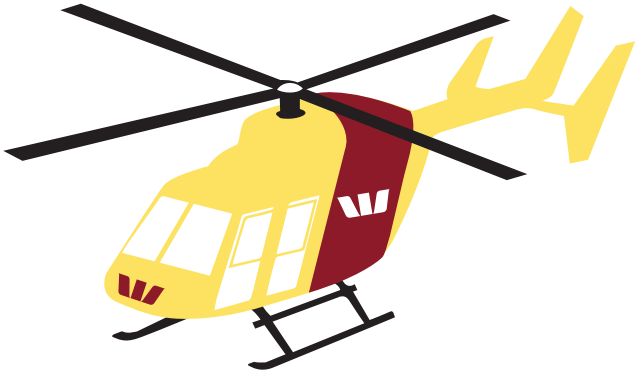
Sometimes objects appear distorted when viewed through transparent materials; for example, a straw in a glass of water.

When light is transmitted through two transparent materials, such as air and water, it can bend where the two surfaces meet. This process is called refraction.

The WLRHS must take care when on a water-based mission, as objects can often look different to what they normally do, due to refraction.

The convex shape of the water in the cup can help magnify objects by refracting the light reflected by an object before it meets your eyes.

An object might seem to disappear if it is positioned behind the curved edge of the cup because the light reflected by the object is bent in another direction and does not meet your eyes.



TASK SIX:

Refraction is not the only thing that may affect the crew's ability to see objects in the water from the helicopter.

In groups, using the methods below conduct an experiment to understand how objects can sometimes be very hard to see when the crew are looking in water.

In groups of four, collect the following items:

- Pencil
- Clear empty plastic cup
- Measuring cup
- Salt
- Table spoon

Follow the steps below:

1. Using what you have learnt about opaque and transparent materials, make a list of questions that your team could investigate will happen to the pencil when placed behind the cup of salt water, compared to tap water.

_____

_____

_____

2. Once you have created a list of questions, predict what the findings of your investigation.

_____

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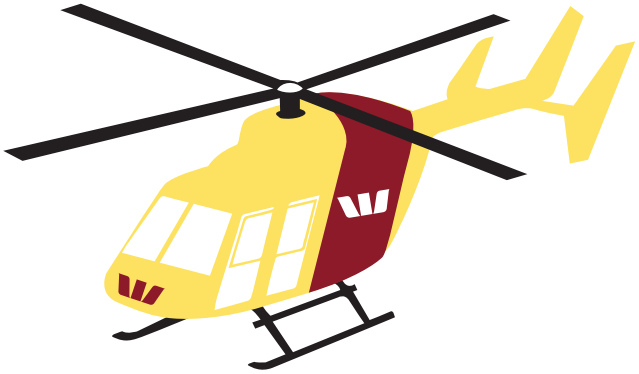


3. In your group, discuss how to ensure this experiment can be as fair as possible. Write your answer in the space below.

_____

_____

_____

4. Different tools are used for different investigations. List the tool that will provide the most accurate measurements.

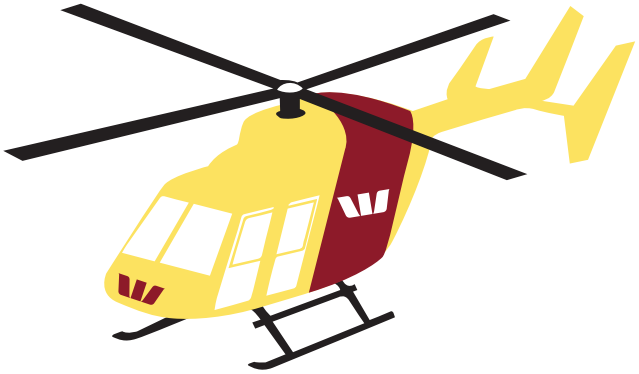
_____

_____

_____

It is important to record and label all of your observations in this experiment in the space provided below.

5. One member of your group should pour 200mL of warm water into the measuring cup and then pour the water into the plastic cup.
6. Hold the pencil behind the clear plastic cup of water. Record what you see.
7. Another member of the group should add 2 tablespoons of salt and stir for one minute.
8. Hold the pencil behind the clear plastic cup of salt water. Record what you see.



Pencil in the centre of the cup with plain tap water

Pencil in the centre of the cup with salt added to the water

TASK SEVEN:

Using the recorded observations from your experiment and your knowledge of opaque and transparent objects, individually answer the questions below:

1. What did your group observe after salt was added to the water?

_____

_____

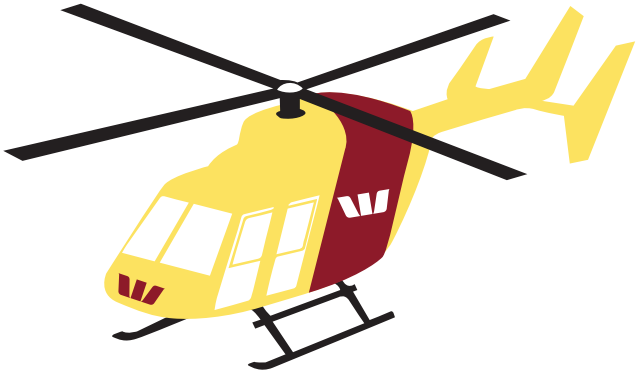
_____

2. What happened when you viewed the pencil directly behind the container?

_____

_____

_____



When the salt was added to the water, light still passed through the cup but at a limited rate, making it harder to see the pencil directly behind the cup. This is an example of a translucent material.

Ocean rescues in particular are affected by translucent materials.

Once you have completed all of the above steps, each member of the team is to one piece of equipment.