Make a Rainbow

A rainbow is often a welcome sight when the sun comes out after a rain storm. Find out how to make your own rainbow when there's not a cloud in sight!

Materials

- A sunny day
- A hose with a mist attachment
- An open sunny space, such as a back yard

Safety First!

- **Always be sun smart when outside during the day - wear a hat, sunscreen, and clothing that covers as much of your skin as possible.**
- **It's safest to stay in the shade in the hottest part of the day - fortunately, this experiment works best when done in the morning or afternoon.**
- **Consider doing this experiment on a grassy area or near a garden so the water you use won't go to waste! Be aware that the wet ground might be slippery.**

Instructions

1. Stand in your sunny space with the sun behind you. You should be able to see your shadow in front of you.
2. Turn on your hose. If your hose attachment has a choice of nozzles, choose the one that makes the water drops the smallest - for best results it should be a fine mist.
3. Move the spray around in front of you until you see a rainbow form in the droplets!

Further investigation...

- While looking at your rainbow, try moving to a different spot in your sunny space. Does the rainbow appear in the same place it did before?
- If you are doing this experiment with a friend, get them to stand a short distance from you. Can they see your rainbow too? What if they have a turn with the hose and make their own rainbow - can you see it from where you are?
- Try this experiment at different times of day, standing in the same spot. Does the rainbow always appear? Is it always in the same place?

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What's happening?

A rainbow forms when sunlight hits small drops of water in the air. Water is denser than air, so the light slows down and bends (refracts) a tiny amount when it enters the water drop. The light bounces around inside the raindrop, then exits again at a different angle.

White light is actually made up of lots of different colours mixed together, but our eyes see them as six distinct colours - red, orange, yellow, green, blue, and violet. Each of the different colours that make up white light bends a slightly different amount inside the water drop. When the light exits the water drop, each of these colours shows up as a distinct band.

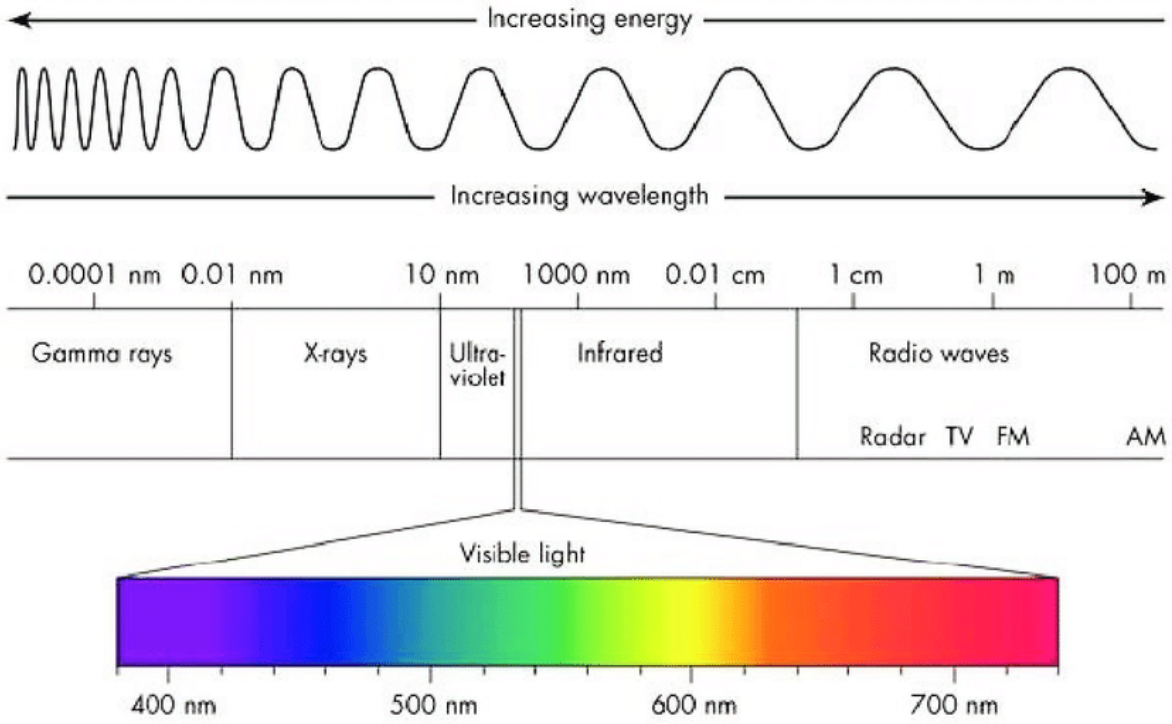
The location of the rainbow that you see depends on the angle between your eyes, the sun, and the water drops. When you moved, your eyes (hopefully) moved along with you - and therefore, so did your rainbow. Someone standing in a different spot in your back yard won't see the rainbow in the same place you do - they might not even see it at all!

When you see a rainbow in the sky, it's probably just been raining, which means there are usually many more water drops in the sky than you can make with your hose. This is why lots of people can see it at the same time. However, everyone will see it in a slightly different place depending on where they are. And unfortunately, this means that it's impossible to visit the end of a rainbow. (Sorry.)

Check your understanding

1. What are the six colours of the rainbow that our eyes see? Could you see them all?
2. Would this experiment work on a cloudy day? What about at night time? Why/why not?
3. Where else have you seen a rainbow?

Extra: The electromagnetic spectrum



Although we see light as a spectrum of six colours (red, orange, yellow, green, blue, violet), this visible light exists within a much larger spectrum of waves, called the **electromagnetic spectrum**.

Light is a type of energy, or radiation, that travels in waves. The distance between two 'peaks' of a wave is known as its wavelength. The waves on the electromagnetic spectrum have wavelengths that vary from a few trillionths of a metre, right up to hundreds of metres long.

We use several other types of electromagnetic radiation in our daily lives. For example, radio waves are used to transmit programs from radio stations into your home. Microwaves, which have a wavelength between radio waves and infrared, are used for cooking and also in mobile phone communications. Infrared radiation is used in night vision cameras, and ultraviolet light can be used to kill bacteria and sterilise equipment in hospitals.