nanogirl's LAB

SUPER POWER: Doppler Effect!

BUzZZzING BEE

LAB NOTES...

WHAT AM I HEARING?

When we hear a real bee buzzing, it's caused by the sound of their wings hitting against each other every time they beat their wings. That's why we only hear buzzing when a bee is flying, not while they are resting.

Bees can beat their wings up to 200 times per second.

In your buzzing device, the sound is made from the vibrations created when the elastic band hits the sides of the card as it moves quickly from the force of the air passing by as you spin it. You might also notice that the sound changes in its pitch as you spin it - with it getting higher every time it gets closer to your head and lower when it's further away. We call this the **Doppler Effect** and it's the same principle you hear when a vehicle with a siren like an ambulance drives past. It's caused because more sound waves reach your ears per second as the noise-making thing moves closer to you compared to when it's moving away. The number of waves that reach you every second is called the 'frequency' of the sound wave and scientists measure it using a unit called 'hertz' (Hz).

TO MAKE A BUZZZZING BEE...

WATCH & BUILD 20 MINS

1. Watch Nanogirl build her buzzing bee!
2. Draw and cut out two identical cardboard rectangles 6 cm wide and 9 cm long.
3. Draw and cut out another rectangle 15 cm long and 3 cm wide. Fold in half to create a long, thin rectangle.
4. Place your long, thin rectangle on top of one of your other pieces of card, at the bottom edge, making sure that the card is in the centre. Tape it in place.
5. Do the same with the other piece of card so that you've got something that looks like a butterflies body with two wings sticking up.
6. Decorate your bee by colouring in the cardboard wings!
7. Wrap a small elastic band around each end of the narrow rectangle just past where the wings of the bee end.
8. Take your scissors and make a small snip into each sticky-out end along the fold, then fold the flaps that you made down towards the centre.
9. Measure and cut a piece of string as long as your arm, and tie one end around one side of the bee close to an elastic band.
10. Take a wide, flat elastic band and stretch it around the bee, on top of the folded-back sticky-out bits. Make sure there's a small gap between the elastic band and the wings of the bee.
11. Find a clear, open space
12. Hold the long end of the string and swing the bee around really fast in a circle. Listen to the sound that it makes.

YOU WILL NEED

- Card
- Tape
- Scissors
- String
- Pencil
- Ruler
- 2 x small elastic bands
- 1 x wide, flat elastic band
- Colouring supplies

Can you hear the Doppler effect? Does it change if you make your string longer or shorter?

What happens to the sound if you change the shape or size of the flat rubber band? Why do you think a flat rubber band is better for making a noise than a skinny one?

Does the sound change if you change the speed that you spin your noise maker? Is it louder or quieter, higher or lower pitched? Why do you think that is?

Do you think bees will be attracted to your buzzing device?

If they were - what would you try to get the bees to do?