nanogirl's LAB

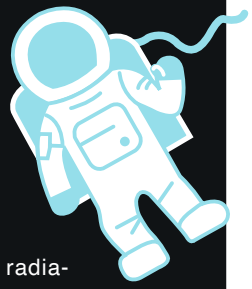
SUPER POWER: Space Suits!

SPACE SUIT TESTING MACHINE

LAB NOTES...

BUILD TIME 25 MINS

SPACE SUITS protect astronauts and let them breathe while they are outside the spaceship. Space suits can have up to 14 different layers with each layer doing a different job. The suits needs to protect the astronauts from space.



The outer layer of a space suit is very tough, and has a special name - the Thermal Micrometeoroid Garment. It stops micrometeoroids (tiny pieces of flying rock) and solar radiation from harming the astronaut.

In your experiment, you investigated why space suits need to have so many layers. The outer layer by itself is not very good at stopping tiny projectiles, but many thin layers together have the power to absorb the energy of the flying ball of blue tack, which means that the projectile loses energy and can't rip through to the underneath layers.

TO MAKE YOUR SPACE SUIT...

1. Watch the video of Nanogirl testing her space suit!
2. If you are using a tissue box, cut a piece of card big enough to cover the hole in the top, and tape it in place over the hole.
3. On your box, cut a large flap in the top close to the edge. Leave one edge attached as a hinge.
4. Place your cardboard tube in the middle of one of the ends of the box, draw around it, and cut out a circle which fits the tube tightly.
5. Push the tube halfway through the hole and tape in place to secure.
6. Halfway along the length of the box, draw a line that goes all the way around the outside.
7. On the sides of the box, measure 1 cm up from the bottom and make a mark on the line you drew. Now make a mark 1 cm down from the top. Do the same on the other side.
8. Measure 4 mm either side of each mark you made, and make a small dot.
9. Using the pointy end of a skewer, pierce the box through the small dots so you have 8 holes.
10. Slide the skewers through the holes, 2 at the top, 2 at the bottom and secure in place with blu-tack.
11. Draw around the end of your box on a spare piece of card, and cut out two pieces which are slightly narrower than the end of your box.
12. Cut out their middles leaving 1cm around the edges so they look like a frame.
13. Tape the bottom of the frames together to make a hinge.
14. Investigate your tissue. It may be 2 ply meaning there are 2 sheets together, so separate them first then slide in-between frame cutting to size.
15. Scure the tissue sample in place with the paper clips
16. Slide the tissue and card frame into the box in between the two rows of wooden skewers.
17. Take your balloon, and cut across the neck. Stretch the end of the balloon over the card tube sticking out from one end of the box. Use tape or an elastic band to keep it in place.
18. Roll a small lump of bluetack into a ball or use a dried pea or lentil and drop it into the tube so that it rests against the balloon.
19. Close the hinge lid of the box making sure that the tissue and frame are secure
20. Grab the bluetack through the balloon, pull it back and fire it at the tissue!
21. Add more layers of tissue until the back layer is not marked by the blue tack.

YOU WILL NEED

- **A cardboard box** ..... ◯
  like a tissue box or shoe box
- **Elastic band** (optional)..... ◯
- **2 x paperclips** ..... ◯
- **4 x Wooden skewers or sticks** ◯
  (equal length)
- **Blue tack** ..... ◯
- **Ruler**..... ◯
- **Tape**..... ◯
- **Scissors** ..... ◯
- **Pencil** ..... ◯
- **Tissues**..... ◯
- **1 x Balloon** ..... ◯
- **Spare card** e.g. cereal box card ..... ◯
- **Cardboard tube** e.g. kitchen roll..... ◯
  or toilet roll inner tube (or make your own!)

How many layers of tissue does it take before the impact can't be seen on the back layer?

What happens if you use something else instead of blue tack? You could try small beads, frozen peas, small stones or raisins.

Try moving the tissue paper closer to or farther away from the tube. Does this affect how many layers your projectile can pierce?

What materials other than tissue could you use in your spacesuit layers?