



A soft landing

Space technology

time

60 minutes

learning outcomes

To:

- know what speed is
- know how you calculate speed
- know that spacecraft need to make a soft landing

end product

- a landing craft for an egg

materials needed

- photograph of Mars Lander (Appendix)
- 12 containers
- 12 pencils
- 12 erasers

- 12 stopwatches
- 12 eggs (raw)
- A4 paper
- drinking straws
- sandwich bags
- wooden skewers
- string
- tape
- elastic bands
- scissors
- sticky tape
- plasticine
- cotton wool
- aluminium foil
- optional: prize for the competition

Preparation

For the activity **To brake or not?** you will need the photograph of the Mars Lander from the Appendix. Place the following items into each of 12 containers: A4 paper, straws, sandwich bags, wooden skewers, string, tape, elastic bands, scissors, sticky tape, cotton wool, aluminium foil and plasticine.



To brake or not? 10 min.

Organise the children into pairs. Give each pair a pencil and an eraser. The children drop these from a height of one metre above their table. What happens? Ask the children what causes the pencil and eraser to fall. Explain that this is because of gravity. Ask the question: 'How could you make sure the pencil and the eraser have a soft landing?'

Explain that space vehicles land on other planets to carry out research. The Mars Lander is one of these vehicles. Show the photograph of the Mars Lander. Ask the children how the Mars Lander got to Mars. Explain that it was important for the Mars Lander to make a soft landing, so it was fitted with parachutes and a type of airbags. Explain that the children are going to make their own landing craft. Not a Mars Lander, but one to land an egg. What can they do to make sure their egg doesn't break?

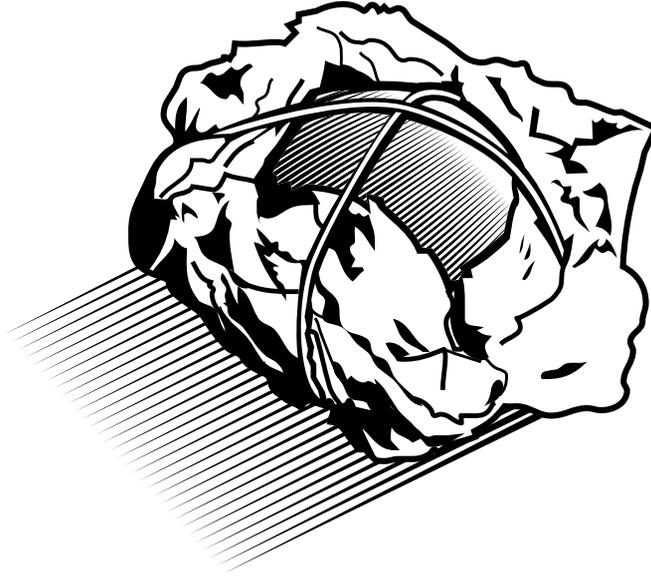


The children make a landing craft for an egg.



Land your egg! 40 min.

Ask the children how they think they could safely land an egg falling from one metre above their table. Write their ideas on the board. Hand out the containers with the items they will need and encourage the children to examine the contents. Then discuss the conditions which the landing craft should fulfil, as described on the worksheet. The children draw their design in the box at Task 1 on the worksheet. Help the children to make their designs. They may like to make something that resembles the drawing below.



Tip. Finish the lesson with a competition. Who built the best landing craft? Who managed to land their egg without breaking it? The children drop their landing craft from an increasingly greater height. Which landing craft landed the egg safely from the greatest height? How high was that?



The children make their landing craft according to their designs. Explain that they may not start to build until their design has been approved.



The children start by testing their landing craft using a ball of plasticine before using the real egg. Is the plasticine dented after landing? Why? Discuss the results with the children. Which pair's landing craft worked the best? Look at their design. What made it special? Encourage the children to look at each other's designs and test them with the plasticine, so they can learn from each other. When they have finished, they can make any necessary improvements to their design.



What is the average speed? 10 min.

Explain that the egg fell from a height of one metre. Now the children calculate the speed of their egg during its fall. The children complete Task 2 on the worksheet. Explain that if you know the distance an object travelled and the time it took to travel this distance, you can calculate the average speed of the object.

Tip. If it proves difficult to measure the average speed at this distance, you may choose to replace the egg with the plasticine and encourage the children to drop their craft from a greater height.



A soft landing



You are going to make a landing craft for an egg.

1 Land your egg!



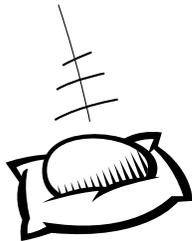
1 Design a landing craft.

Examine the items in the container. You do not need to use everything.

Take the following conditions into account:

- your landing craft must be able to stand upright unaided
- you may not fix your landing craft to the ground
- your landing craft must land without breaking your egg

You can see some examples in the following drawings.



draw
your
design
HERE



2 Build your landing craft!

3 Test your landing craft! Carry out a test using a ball of plasticine before



using your real egg.

4 Improve your design if necessary.

2 What is the average speed?



What do you need?

• egg

• stopwatch

What do you need to do?

1 Carry out this experiment in pairs. One of you holds the egg landing craft, the other holds the stopwatch.

2 Drop the landing craft from a height of one metre and start the stopwatch at the same time.

3 Stop the stopwatch as soon as the egg reaches the ground.

a What distance did the egg travel? _____ metres

write your answer
HERE

b How long did your egg take to travel this distance? _____ seconds

c Write the information in the spaces provided.

Our egg took _____ seconds to travel _____ meters.

The average speed of our egg was

_____ meters-: _____ seconds = _____ meters per second.

