How far can you jump?
Gravity

48

time
65 minutes.

learning outcomes
To:
- know what gravity is
- discover that a small jump on Earth is a much bigger jump on the Moon
- discover that a small jump on Earth is a much smaller jump on the Sun
- know that different celestial bodies have different levels of gravity
- know that the stronger the gravity of a celestial body, the smaller their jump will be

materials needed
- colouring pencils
- long rope
- measuring tape at least 3 metres long
- gym mats

Preparation

Part of this lesson should take place in the gym. (The children will be doing the long jump.) Make sure the gym is available.
For the activity **Jumping on the Moon and the Sun** you will need two long ropes.
For the activity **How far can you jump?** you will need the measuring tape and the gym mats.

Falling apple 15 min.

Tell the following story.

It's a lovely summer's day when Isaac wakes up. He's on holiday. Isaac hasn't made any plans for the day. First of all he eats his breakfast, then he decides to go for a bike ride. He cycles through the woods and fields. After a while he comes to a park. His legs are tired from cycling so he stops for a rest under an old apple tree. Isaac is lying in the grass enjoying a nap when all of a sudden an apple falls out of the tree and hits him on the head! He wakes up, and begins to wonder why the apple fell down. Why doesn't an apple fall up?

Ask the children why they think an apple doesn't fall upwards.
Explain that this is because of gravity. The force of gravity pulls people, animals, and objects towards the Earth. Encourage the children to feel this for themselves by jumping in the air. After they jump up they always land back on the ground.
After this look together at the illustration at Task 1 on the worksheet.
Encourage the children to circle the activities that have to do with gravity.
Discuss their answers.

The children investigate how far they would be able to jump on celestial bodies that have a different gravity.

Jumping on the Moon and the Sun 10 min.

Take the children to the gym. Line up the children next to each other along the wall of the gym. Lay a rope on the ground one metre from where they are standing. Encourage them to jump over the rope. They have now jumped one metre. Ask if it was a difficult jump. Explain that if they were to use the same amount of energy to jump on the Moon, they would go much further. Ask the children to return to their position at the wall. Now lay the rope on the ground six metres from where the children are standing. Can they jump over the rope now? They can't do it here on Earth, but on the Moon they could. If the children wanted to do the same jump on the Sun, they would only be able to jump 3 centimetres.

Differences in gravity 10 min.

Sit in a circle with the children. Discuss Task 1. The children made a one-metre long jump on Earth. If they were to use the same energy to jump on the Moon, they would land six metres away! If they were to use the same energy to jump on the Sun, they would only move three centimetres! Explain that gravity on the Sun is so strong that it would be very difficult to even get off the ground. On the Sun the invisible force of gravity pulls you very strongly towards the centre of the Sun. The gravity on the Moon pulls less strongly than the gravity on Earth. The astronauts who landed on the Moon discovered this for themselves. At every step they took they were launched into the air as if they were on a trampoline. Explain to the children that they would not really be able to walk on the Sun because it is far too hot.

Good to know. The strength of the gravity of a celestial body is determined by its mass, not its size. For example, Saturn is much bigger than Neptune, but Neptune's gravity is much stronger than Saturn's.

How far can you jump? 10 min.

It is not only the Sun and the Moon that have a different gravity from Earth. The other planets also have different gravity.
Position the gym mats so that the children can jump safely. Encourage the children to jump as far as they can. Measure the distance they jumped. Invite each child to make three jumps. The children can use the result of their best jump for Task 2 on the worksheet. Round up the distance they jumped to the next whole metre and write this down.

Return to the classroom. Ask the children to compare the distance they jumped on Earth with the distance they would have travelled if they made the same jump on the other planets. The children complete Task 2 on the worksheet. Read through the task with the children before they begin, and discuss the answers when they have finished.

Good to know. The different gravity on the various planets means that on the other planets the same amount of energy would enable you to jump a different distance. However, one metre on Earth is the same length as one metre on another planet.

The influence of gravity 10 min.

The children have coloured in the measuring tapes for Task 2. Finish the lesson by completing Task 3. Discuss why the children would not be able to jump so far on Jupiter, Saturn, Uranus, and the Sun. This is because the force of gravity on these planets and the Sun is much stronger.

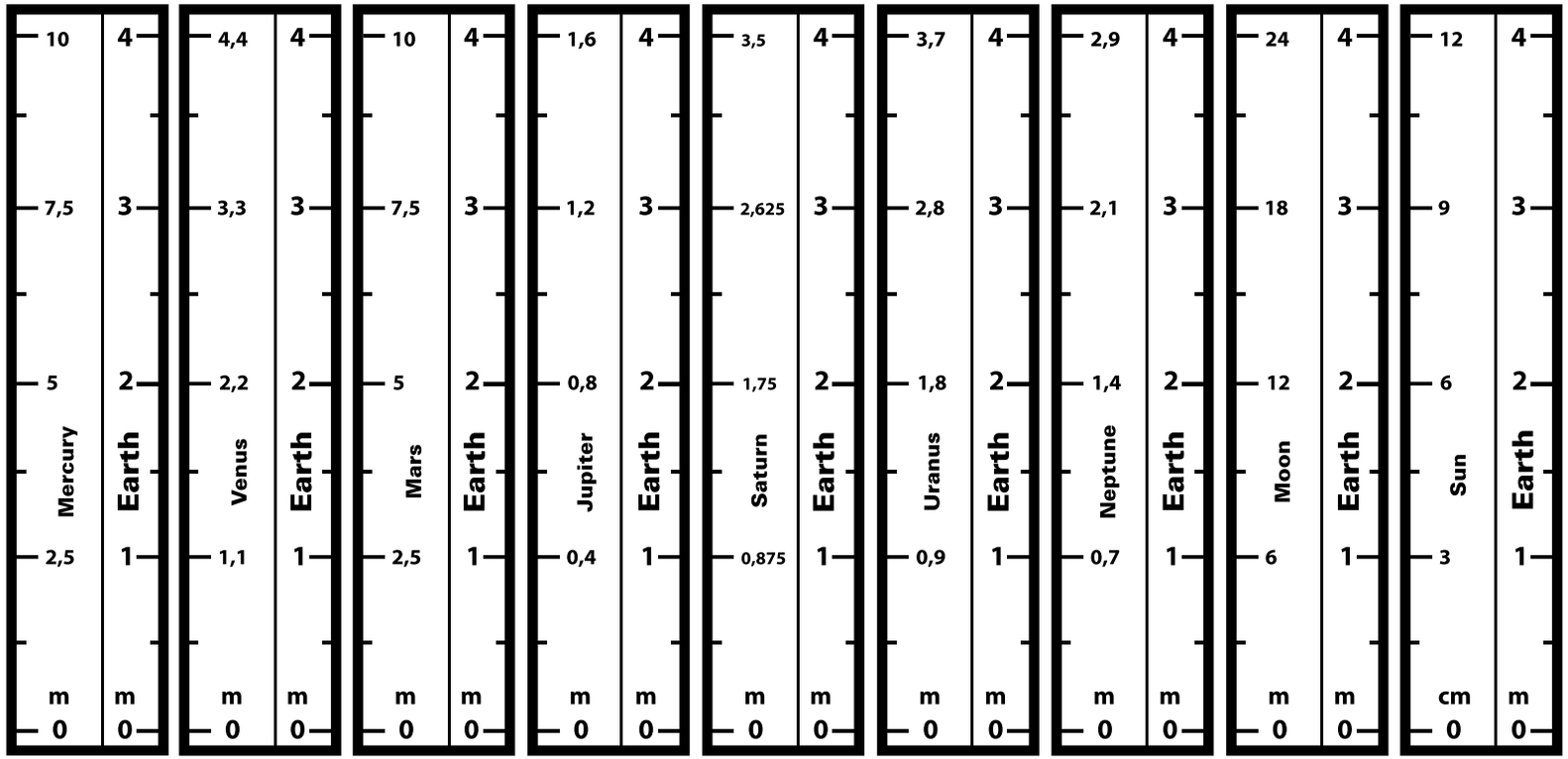
How far can you jump?

1 Falling apple

a Circle the activities that have to do with gravity.

2 How far can you jump?

You have just done your best to jump as far as possible. How far would you have jumped on the other planets? Look closely at the right-hand side of the measuring tapes on the next page. Draw a line at the distance you jumped. On the left side of the measuring tape you can find the distance you would have jumped on the other planet. Mark your distance in each of the measuring tapes and colour them in up to the distance you jumped.



LOOK closely at the right-hand side of the measuring tape.

DRAW a line at the distance you jumped.

On the left side of the measuring tape you can find the distance you would have jumped on the other planet.

MARK your distance in each of the measuring tapes and colour them in up to the distance you jumped.

3 The influence of gravity

a Now you have coloured in all your measuring tapes. What can you see? Can you jump the same distance on all the planets?

b Circle the celestial planets where you can jump further than on Earth.

CIRCLE the correct answer

Mercury / Venus / Mars / Jupiter / Saturn / Uranus / Neptune / the Moon / the Sun

b Circle the celestial planets where you cannot jump as far as on Earth.

CIRCLE the correct answer

Mercury / Venus / Mars / Jupiter / Saturn / Uranus / Neptune / the Moon / the Sun

d The gravity on Jupiter, Saturn, Uranus, Neptune, and the Sun is stronger than the gravity on Earth. Circle the correct answers.

On these celestial bodies I can jump

CIRCLE the correct answer

further / not as far as on Earth.

The gravity on these celestial bodies is

CIRCLE the correct answer

stronger / weaker than on Earth.

The stronger the gravity, the

CIRCLE the correct answer

further / less far you can jump.