Pushing, pulling and braking

Forces and movement · Year 6–7 · ±14 min Medium

Name: ..... Date: .....



Today you learn: You know gravity, friction, spring force and air resistance, and you can explain what they do to movement.

Remember

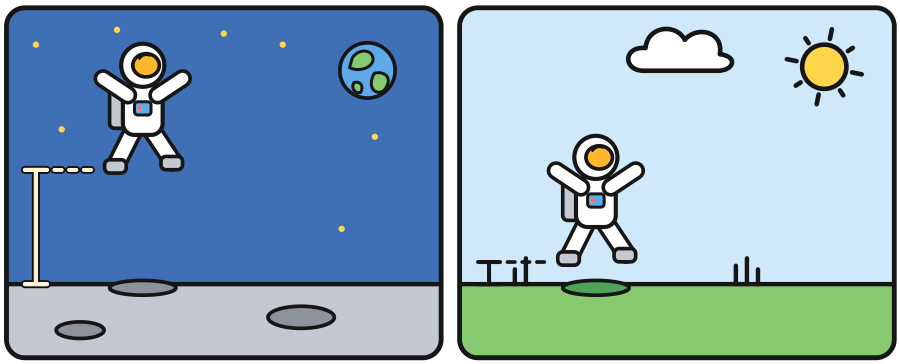
A force is a push or a pull. You measure force in newtons (N). Gravity pulls everything towards Earth. Friction slows down things that slide over each each other. Spring force makes something spring back. Air resistance slows down things that move through the air.

EXAMPLE

A ball of 1 kilogram is pulled down by Earth with a force of about 10 newtons.

1 Medium

Look at the picture. An astronaut jumps much higher on the Moon than on Earth. What is smaller on the Moon?

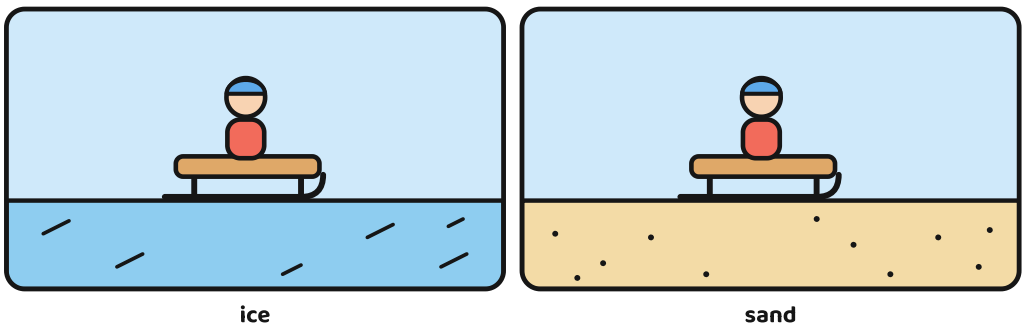


on the Moon on Earth

◯ gravity (P) ◯ the spring force in his legs (J) ◯ his muscle strength (T)

2 Medium

Look at the picture. A sledge slides more easily over ice than over sand. What is bigger on sand?

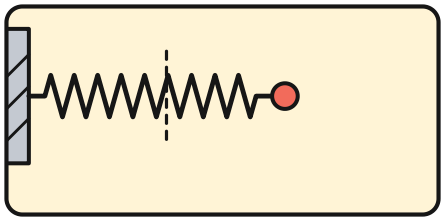


ice sand

◯ spring force (R) ◯ friction (U) ◯ gravity (A)

3 Medium

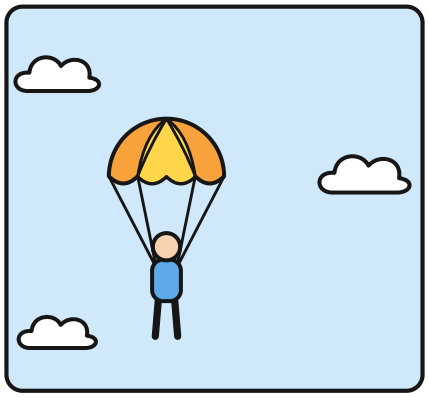
Look at the picture. Which force makes a stretched spring jump back again?



◯ spring force (L) ◯ gravity (F) ◯ air resistance (Z)

4 Medium

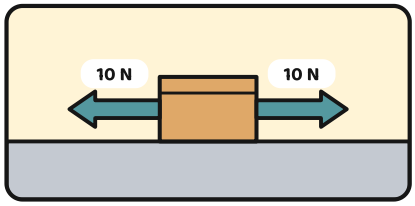
Look at the picture. A parachutist falls slowly. Which force slows the fall down?



◯ air resistance (L) ◯ spring force (P) ◯ gravity (U)

5 Hard

Look at the picture. Two forces on an object are equal in size and work in exactly opposite directions. What does the object do?



◯ it goes faster and faster (L) ◯ it always stops (F)

◯ it keeps moving as before, or stays still (S)

6 Medium

True or false? Tick one box.

	True	False
Friction slows down an object that slides over the ground.	☐	☐
Without gravity we would simply stay standing on Earth.	☐	☐
In a space with no air, a stone and a feather fall at the same speed.	☐	☐
The smoother the surface, the more friction there is.	☐	☐
A force can also change the shape of an object, for example squash a ball.	☐	☐
Forces only act on objects that are moving.	☐	☐

7 Medium

Which force is at work here? Write each example in the right column.

Choose from: 1. a trampoline | 2. rain falling | 3. brakes on a bicycle | 4. shoes that grip the ground | 5. rubbing your hands to warm them | 6. a stretched elastic band | 7. a drawn bow | 8. an apple falling from a tree | 9. a waterfall

Gravity	Friction	Spring force

8 Medium

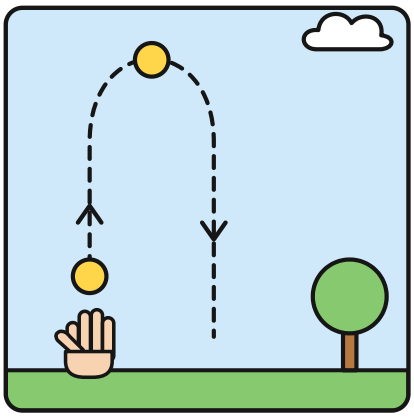
Fill in the words from the word bank.

A force is a push or a ..... . We measure force in ..... , with a ..... . A force can speed an object up, slow it down or change its ..... .

Choose from: newton meter | newtons | shape | pull

9 Medium

Look at the picture. You throw a ball straight up. What does gravity do to the ball, from the moment it leaves your hand until it is back down?



.....

.....

10 Medium

Give an example where you need friction and an example where you would rather have less friction.

.....

.....

11 Medium

Draw a box that is being pushed across the floor. Draw three arrows: the push, the friction and gravity. The bigger the force, the longer the arrow.

The secret word

Write the letter of each right answer in the box with the same number.

1	2	3	4	5

How did it go? ☺ 😐 ☹

✂ ---------- Stuck? Turn the sheet round and read the tip for your number. ----------

Help card

1. The astronaut's muscles have not changed. So what is different about the place where he jumps?

2. The sledge is just as heavy in both places. Where does the ground slow it down faster?

3. Think of a trampoline: what does the mat do after you have jumped on it?

4. Above him hangs a big canopy that catches a lot of air.

5. Think of a tug-of-war in which neither team moves forward.

6. A force can push, pull, slow down and change shape. Read each sentence with that list in mind.

7. For each example, ask yourself: what pulls down, what slows things down and what springs back?

8. You can find the first words in the Remember box. For the last gap: what happens to a ball when you squash it?

9. Gravity works while the ball is going up too. What does a force that works against the movement do?

10. Think of braking, and of things you make smoother with oil or soap.

11. An arrow points the way the force pushes or pulls. The box slides to the right. Which way does friction work compared with that movement?

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Answers: Pushing, pulling and braking

For the parent · Year 6–7 · Medium

Today you learn: You know gravity, friction, spring force and air resistance, and you can explain what they do to movement.

Check it together. When something is wrong, first ask: how did you work that out? Give the tip before the answer.

1. gravity

   Tip: The astronaut's muscles have not changed. So what is different about the place where he jumps?

2. friction

   Tip: The sledge is just as heavy in both places. Where does the ground slow it down faster?

3. spring force

   Tip: Think of a trampoline: what does the mat do after you have jumped on it?

4. air resistance

   Tip: Above him hangs a big canopy that catches a lot of air.

5. it keeps moving as before, or stays still

   Tip: Think of a tug-of-war in which neither team moves forward.

6. 1: True · 2: False · 3: True · 4: False · 5: True · 6: False

   Tip: A force can push, pull, slow down and change shape. Read each sentence with that list in mind.

7. **Gravity:** rain falling, an apple falling from a tree, a waterfall
   Friction: brakes on a bicycle, rubbing your hands to warm them, shoes that grip the ground
   Spring force: a trampoline, a drawn bow, a stretched elastic band

   Tip: For each example, ask yourself: what pulls down, what slows things down and what springs back?

8. pull · newtons · newton meter · shape

   Tip: You can find the first words in the Remember box. For the last gap: what happens to a ball when you squash it?

9. Gravity pulls down the whole time. The ball goes up, gets slower and slower, stops for a moment and then falls faster and faster.

   Tip: Gravity works while the ball is going up too. What does a force that works against the movement do?

10. Friction needed: braking, the grip of shoes or tyres, striking a match. Less friction wanted: a slide, a bicycle chain (oil), skates or skis.

    Tip: Think of braking, and of things you make smoother with oil or soap.

11. A box with an arrow for the push in the direction of movement, an arrow for friction against the movement and an arrow for gravity pointing straight down. Even better: an arrow pointing up for the force of the floor.

    Tip: An arrow points the way the force pushes or pulls. The box slides to the right. Which way does friction work compared with that movement?

The secret word: P U L L S

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