Test

Teaching note. Invisible to students.

Lesson purpose: Summative assessment for the core content of the unit.

Timing: approx. 45–60 minutes

Note: There may be more than one correct answer to the multiple-choice questions below.

What is a force?

Question 1 (1 mark)

What is a force?

Choose only one answer.

- [ ] A movement
- [ ] A push or a pull
- [x] A push, a pull or a twist

Well done! A force is a push, pull or a twist. We apply many forces as part of our everyday life, but there are also lots of forces that are just part of how nature works, such as gravity.

- [ ] Something created by living organisms

Question 2 (1 mark)

Which of these are examples of applying a force?

- [x] Pressing a button on your phone

Well done! Pushing a button on your phone is a pushing force.

- [ ] Charging your phone
- [ ] Thinking about your mobile phone
- [ ] Watching your phone turn on

Question 3 (1 mark)

Forces are measured in:

- [ ] kilometres per hour
- [ ] kilograms
- [x] newtons

Well done! The unit used to describe the size of a force is newtons (N).

- [ ] degrees

Question 4 (2 marks)

What can a force do?

- [x] Change the way an object is moving

Well done! Forces can speed up an object, slow down an object, start an object moving or stop an object moving. They can even change the direction an object is travelling.

- [x] Change the shape of an object

Correct! Forces can act to change the shape of an object. For example, forces act when you scrunch a flat piece of paper into a ball.

- [ ] Change the way you feel
- [ ] Change the colour of an object

Question 5 (1 mark)

A force is applied when you squeeze a tube of toothpaste.

The effect of the force is to:

- [ ] stop the tube of toothpaste from moving
- [x] change the shape of the tube of toothpaste

Well done! Squeezing the tube of toothpaste uses an applied force to change its shape.

- [ ] change the direction of the tube of toothpaste
- [ ] slow down the tube of toothpaste

Question 6 (1 mark)

A force is applied when you throw a frisbee to a friend.

The effect of the force is to:

- [ ] slow down the movement of the frisbee
- [ ] stop the frisbee from moving
- [ ] change the shape of the frisbee
- [x] cause the frisbee to start moving

Well done! By throwing the frisbee the force you are applying will cause it to start moving.

Question 7 (1 mark)

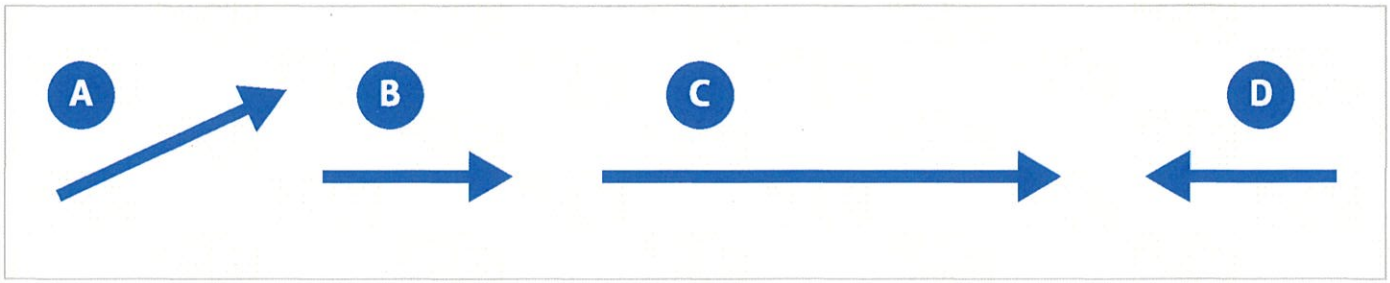
All forces:

- [x] have a strength and direction

Well done! All forces have a strength or size which is measured in newtons and they all travel in a particular direction.

- [ ] make objects change direction
- [ ] consist of a strong downwards component
- [ ] speed up the movement of objects
- [ ] make objects move downwards

Use the following diagram to answer **Questions 8** and **9**.



Question 8 (1 mark)

Which of the arrows shows a *large* force acting horizontally?

- [ ] A
- [ ] B
- [x] C

Well done! Forces B, C and D are all moving horizontally. The longest arrow is C, which represents the largest force.

- [ ] D

Question 9 (1 mark)

Which arrows indicate forces of equal strength?

- [ ] B and C
- [ ] B, C and D
- [ ] A and B
- [x] B and D

Well done! B and D are the same length which means that they are of equal strength, even though they are moving in opposite directions.

Question 10 (4 marks)

Name and give brief descriptions of four different types of forces in the world around you.

Forces mentioned in the lesson listed below:

- Air resistance: a type of force that resists an object's motion through air
- Applied: a type of force exerted by a person, animal or machine
- Elastic: a force that occurs when an object is either squashed or stretched and springs back to return to its original shape
- Friction: a type of contact force that resists an object's motion across a solid surface
- Gravity: an attractive force between objects that have mass; on Earth it pulls objects to the ground, in space it keeps objects in orbit
- Magnetism: a type of non-contact force that arises from certain materials (e.g. iron) and electric currents
- Tension: a type of force that pulls inward when a solid object is stretched

Word count: 7

Types of forces

Question 11 (3 marks)

Which of the following are types of forces?

- [ ] Spinning
- [x] Gravity

Well done! Gravity is an attractive force between all objects that have mass.

- [ ] A rolling ball
- [x] Friction

Great job! Friction is a force that acts to oppose an objects motion.

- [x] Magnetism

Correct! Magnetism is an attractive force that arises from certain materials such as iron and nickel.

Question 12 (1 mark)

A car is towing a trailer. What type of force allows it to do this?

- [ ] Air resistance
- [ ] Gravity
- [ ] Tension
- [x] Applied

Well done! The pull of the car on the trailer is an applied force from the car.

Question 13 (1 mark)

In a tug-of-war, which of the following best describes the *tension* in the rope?

- [ ] The force of gravity as it applies to the rope
- [ ] The pulling forces on either end of the rope
- [x] The forces that stop the rope from pulling apart

Well done! Tension is a force that pulls inwards when an object such as a rope is stretched to prevent it from breaking.

- [ ] The forces that pull the rope apart

Question 14 (1 mark)

A cat is sitting on a brick wall. When it jumps off it falls to the ground because:

- [ ] it is acted on by the downward force of air resistance
- [x] it is acted on by the downward force of gravity

Well done! The pull of gravity from the Earth pulls all objects downwards.

- [ ] there are no longer any forces acting on it, so it falls to a new resting place

Question 15 (4 marks)

Explain the difference between contact and non-contact forces. Give an example of each.

A contact force can only occur when objects are touching (1 mark), while a non-contact force doesn't need two objects to be touching to have an effect (1 mark).

An example of a contact force is friction (1 mark).

An example of a non-contact force is gravity. (1 mark)

Word count: 49

Balanced and unbalanced forces

Question 16 (1 mark)

When the forces acting on an object are equal in size and act in opposite directions the forces are said to be:

- [x] balanced

Well done! As the forces are equal in size and opposite in direction they balance one another. Balanced forces work on objects that are stationary or moving at a constant speed.

- [ ] unbalanced
- [ ] net forces

Question 17 (1 mark)

An aeroplane slows down as it prepares to land. The forces acting on it must be:

- [ ] balanced
- [ ] equal and opposite
- [x] unbalanced

Well done! Any time an object changes how it is moving then an unbalanced force is acting. If the aeroplane is slowing down, then air resistance must be greater than the forwards push from the plane.

Question 18 (1 mark)

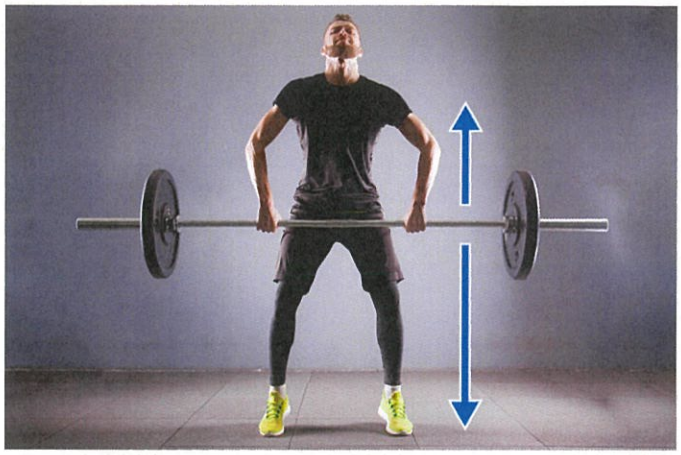
A spider is hanging motionless from a thread. What can you infer about the forces acting on it?

- [ ] There are no forces
- [ ] The forces are equal in size and acting in the same direction
- [ ] The forces are unbalanced
- [x] The forces are balanced

Well done! Because the spider is not moving the forces acting on it must be balanced. The downwards pull of gravity on the spider is equal to the upwards pull of tension from the thread.

Question 19 (1 mark)

The arrows in the image represent forces that are:



- [ ] balanced
- [x] unbalanced

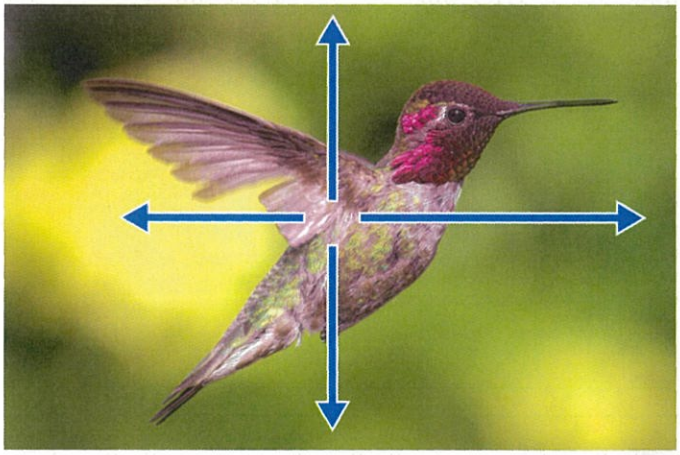
Well done! The downwards force is much stronger than the upwards force. The weights will move downwards.

- [ ] net force

Question 20 (1 mark)

The bird in the image on the right shows four forces acting on it.

As a result of these forces it will:



- [x] speed up to the right

Well done! The greatest force acting on the bird is to the right, representing the bird speeding up in this direction.

- [ ] move up
- [ ] slow down
- [ ] move down

Net force

Question 21 (1 mark)

The *net force* acting on an object is:

- [x] The overall force acting on an object

Well done! The net force determines the overall force acting on an object. If forces move in opposite directions they cancel one another out, while if forces move in the same direction they add together to create a larger net force.

- [ ] the strongest force
- [ ] the weakest force
- [ ] the downward force

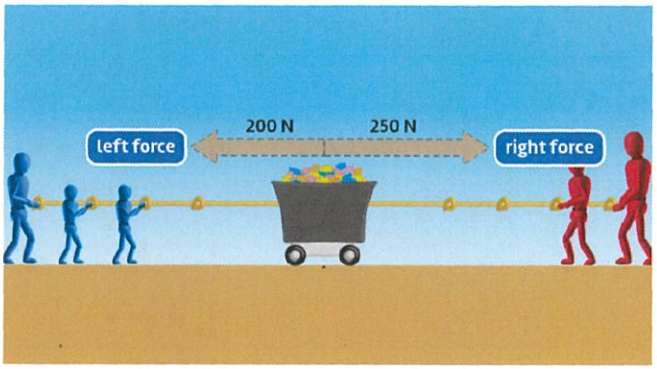
Question 22 (1 mark)

Balanced forces have a net force of:

- [x] 0 N

Well done! The opposite and equal forces cancel one another out and the result is a net force of 0 newtons acting on the object.

- [ ] 50 N
- [ ] 100 N
- [ ] It is impossible to calculate
- [ ] It depends on the scenario



Question 23 (1 mark)

In the tug of war shown on the left, the net force is:

- [ ] 0 N
- [x] 50 N to the right

Well done! The forces are acting in opposite directions, therefore the forces work to cancel one another out. To calculate the net force you would subtract the smaller 200 N left from the larger 250 N right. 250 – 200 = 50 N overall. The larger force is to the right, therefore the net force is 50 N to the right.

- [ ] 200 N to the left
- [ ] 250 N to the right
- [ ] 450 N to the right

Total available marks: 32