

Prior Knowledge Review

Answer the following questions:

1. State the definition of a force.

A push, pull or twist that can change the shape, speed or direction of an object.

2. State the SI unit for force.

Newton's (N).

3. Explain the difference between contact and non-contact forces.

Contact forces need objects to be physically touching in order to act, non-contact forces act over a distance.

4. Explain the difference between balanced and unbalanced forces.

Balanced forces are equal in size and opposite in direction, whereas unbalanced forces are not. Balanced forces do not cause a change in motion whereas unbalanced forces can change the shape, speed or direction of an object.

5. State the definition of speed.

The distance covered per unit time.



Prior Knowledge Review

P3.1.1

Science
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➤ P3.1.1 Prior Knowledge Review

P3.1.2 Scalars and Vectors

P3.1.3 Resultant Vectors

P3.1.4 Resolving Vectors

P3.1.5 Newton's Third Law

P3.1.6 Newton's First Law

P3.1.7 Acceleration

P3.1.8 Acceleration Investigation

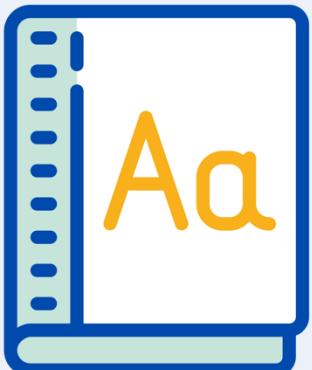
Maths in Science Lesson 17
P3.1.9 Velocity-Time Graphs
P3.1.10 Velocity-Time Graphs 2
P3.1.11 Acceleration Problems



Following this lesson, students will be able to:

- Define and calculate resultant force
- Interpret distance-time graphs
- Describe the effects of unbalanced forces

Key Words:



force

contact

non-contact

resultant

speed

acceleration

The Big Idea: Forces Predict Motion

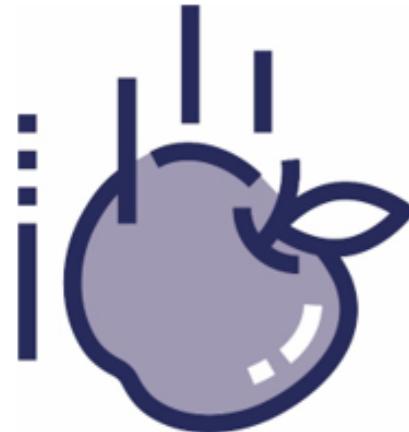


Science
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Acceleration

Why does a space rocket need so much force to lift off? Can humans keep getting faster at the 100 m sprint? What would happen if you jumped through a hole through the centre of the Earth?

The ways in which objects move depends on the forces acting on them. If the forces acting on an object are unbalanced, the object will change its speed, direction or shape. The behaviour of objects in motion follow mathematical laws that can be used to make predictions about speed, distance travelled, the time taken and acceleration.



This is the **third** unit we are studying as part of the big idea: **Forces Predict Motion**

In this unit we will learn the effect of forces on the motion of objects, learning about Isaac Newton's First Law. We will also review the effects of balanced and unbalanced forces. We will also look at Newton's Third Law and learn how to describe forces in terms of action-reaction pairs. We will learn about the differences between scalar and vector quantities and examples of each, comparing speed and velocity; distance and displacement. By the end of this unit we will be able to describe the forces acting on an object based on its motion.

We will develop our mathematical skills in this unit by learning how to do some complex calculations to find the resultant force of an object using a graph. We will also learn how

This is the fix-it portion of the lesson

The **fix-it** is an opportunity to respond to gaps in knowledge, especially those identified by the previous lesson's exit ticket.

- The teacher should customise this slide as needed, to facilitate
 - **reteach, explanation, demonstration or modelling** of ideas and concepts that students have not yet grasped or have misunderstood.
 - **practise** answering specific questions or of key skills.
 - **redrafting** or **improving** previous work.

Forces and Motion Review

Draw a free-body diagram to show the following forces acting on a box that is being pulled along a table:

- 15 N Weight
- 15 N Normal force
- 20 N Pulling force (to the right)
- 10 N Friction

Calculate the resultant force in this scenario.

Quick Quiz:

1. What are the SI units of mass and weight?

The SI unit for mass is kilograms (kg) and the SI unit for weight is Newtons (N).

2. State the definition of resultant force.

The net force acting on an object (the overall effect of all the forces acting on an object).

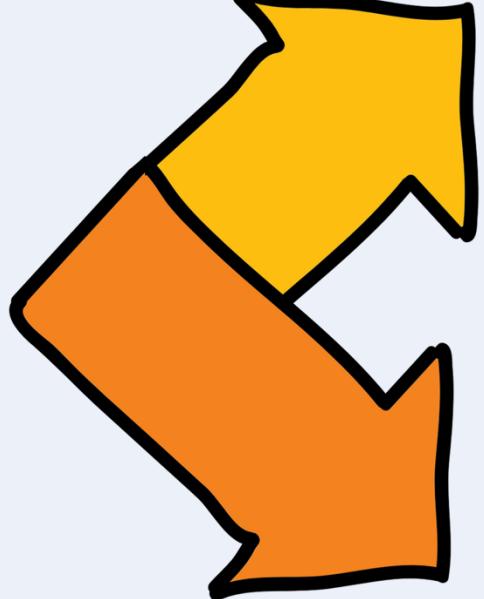
3. State 2 non-contact forces.

Gravity, electrostatic force, magnetism.

4. What is the resultant force acting on an object when the forces are balanced?

Resultant force = 0 N

Can you explain the difference between these two words?



Mass

Weight

What is the definition of each?

What are the units?

Which would change if you went to the Moon?

How can you use one to calculate the other?

Answer the questions below.

1. Which is the best definition of resultant force?

- A. When the forces acting on an object cancel each other out
- B. An interaction between two objects
- C. The net force acting on an object

2. The speed of a car that travels 100 metres in 5 seconds is...

- A. 20 m/s
- B. 0.05 m/s
- C. 500 m/s

3. A horizontal line on a distance-time graph represents...

- A. An object moving at constant speed
- B. An object accelerating
- C. A stationary object

Lesson P3.1.1

What was good about this lesson?

What can we do to improve this lesson?

[Send us your feedback by clicking this link. Thank you!](#)