

GRAVITY GURUS

LEVEL

Level 7 – Level 8

ACTIVITY DESCRIPTION

Students identify and explore the effects of applying different forces to familiar objects. They explore how gravity affects objects and make their own Newton Meter, to measure force. They investigate situations where forces are balanced and unbalanced and use scientific language to draw conclusions.

THEME

- Force
- Gravity

MATERIALS REQUIRED

- Pens
- “What is Gravity?” worksheet
- “Make your own Newton Meter” worksheet

To make a Newton Meter each student requires the following materials

- 1 clipboard
- 1 x small paperclip
- 2 x large paperclips
- 1 x thick rubber band
- 1 x String – 30 cm
- 1 x black finer liner or pencil
- 100gram weight and 200gram weight to calibrate the scale
- Different objects to weigh such as ruler, batteries, keys, scissors

INSTRUCTIONS

STEP 1.

Introduce the concept of force to the students and discuss forces in everyday life. Discuss push and pull forces, balanced and unbalanced forces.

STEP 2.

Introduce the concept of gravity. Distribute the “What is gravity?” worksheet for students to complete either individually or in pairs.

Investigate Newtons theory on gravity by discussing the following with the students.

“Newton said gravity is a force that exists between all masses in the universe and is proportional to the size of their mass and inversely proportional to the square of the distance between them. He also said that $F=ma$ (Force = mass x acceleration), so any experiment that measures acceleration of a mass will be able to determine the size of the force”.

STEP 3.

Introduce the Newton meter activity to measure force with everyday objects. As a whole group discuss the steps required to create the Newton meter. Students gather materials and undertake the activity. They measure everyday objects with their Newton scale and discuss their findings with the class.

SUGGESTIONS FOR ASSESSMENT

Completion of “What is gravity” worksheet. Ability to construct a Newton Meter and successfully discuss findings with others. Ability to use scientific language when responding to questions and draw conclusions.

BACKGROUND INFORMATION

The force (pull) of gravity is always acting downwards on an object, regardless of whether it is travelling up, down, sideways, or is stationary.

Different forces acting on objects can result in “balanced” forces. The object will remain stationary, such as a cup sitting on a table or the object will be moving at a constant speed, such as a person falling with a parachute.

Objects of ‘unbalanced’ forces will accelerate (get faster), such as a ball dropping towards the Earth, or decelerate (get slower) such as when a basketballer is jumping up.

CURRICULUM LINKS

Change to an object’s motion is caused by unbalanced forces acting on the object; Earth’s gravity pulls objects towards the centre of Earth ([VCSSU103](#))

WORKSHEET: WHAT IS GRAVITY?

DISCUSSION QUESTIONS:

Why does a ball fall when it is dropped? Complete the table and explore a range of falling objects.

	DRAW A DIAGRAM AND ARROWS TO SHOW ALL PUSHES OR PULLS (FORCES) IN DIFFERENT SITUATIONS.	DESCRIBE THE FORCES (PUSH, PULL, BALANCED, UNBALANCED)
A basketballer		
jumping towards the hoop to score		
Passengers standing in a carriage of a moving train		

WHAT IS GRAVITY? WORKSHEET

DISCUSSION QUESTIONS:

Why does a ball fall when it is dropped? Complete the table and explore a range of falling objects.

	DRAW A DIAGRAM AND ARROWS TO SHOW ALL PUSHES OR PULLS (FORCES) IN DIFFERENT SITUATION.	DESCRIBE THE FORCES (PUSH, PULL, BALANCED, UNBALANCED)
A golf ball being hit from a tee.		
A coffee mug sitting on a table		
A parachutist moving through the air		

Does the Earth always pull (exert a force) on an object?

Explain what balanced and unbalanced means in relation to force?

MAKE YOUR OWN NEWTON METER

ACTIVITY DESCRIPTION

In this activity, students make a simple spring-like scale using a rubber band instead of a spring and calibrate the scale in newtons (N). Students will gain an understanding of, and familiarity with, the newton as a unit of force, and use the scale to weigh common objects.

BACKGROUND INFORMATION

Force is measured in newtons. The abbreviation for newton is N. One newton is roughly equal to 100grams in our everyday measuring system.

NEWTON METER DIAGRAM

MATERIALS REQUIRED

- 1 clipboard
- 1 x small paperclip
- 2 x large paperclips
- 1 x thick rubber band
- 1 x String – 30 cm
- 1 x black fine liner or pencil
- Different objects to weigh such as ruler, batteries, keys, scissors
- You need to calibrate the scale by measuring 0 when its neutral and nothing has been added. Mark this spot with a finer liner (0 N). Then add a 100gram weight and mark the spot with a (1 N) with the finer liner. Add a 200gram weight and mark the spot with a finer liner (2 N).



Once students have made their Newton Meter, they can measure everyday objects from around the classroom and record their results in Newtons. As a whole class, discuss students results and findings.