ICHTHUS SCHOOL

ICHTHUS SCHOOL SCHOOL YEAR 2026-2027 SEMESTER 1 – TERM 1 GRADE 9 - PHYSICS		
TOPIC:	**MASS AND WEIGHT**	**DIGITAL HANDOUT No. 2**

Name:	*Zoevie Ethany Zhuang*
Class:	*Grade 9 Gentleness*
Date:	*04/09/26*

INQUIRY CHALLENGE: How can the same object keep the same mass but have a different weight on the Moon, Earth and Jupiter?

A. Learning Objectives

- State what mass and weight mean and identify their correct SI units.
- Describe weight as the effect of a gravitational field on a mass.
- Use W = mg and rearrange the equation when required.
- Explain why mass stays constant while weight changes between locations.

B. Before You Begin

IMPORTANT: This is a self-guided individual task. Mr Rhey will not be in the classroom. Read every numbered instruction carefully and continue independently; do not wait for a content explanation.
Refer to this link for explanation: https://canva.link/igcse-physics-ppt-c03-pptx

You need:

- a device connected to the internet and your assigned Google Classroom document;
- a calculator; and

- two browser tabs: one for this handout and one for the PhET simulation.

C. 30-Minute Working Plan

Time	Section	What you must complete
0-4 min	Quick check	Answer the four concept questions.
4-15 min	PhET investigation	Follow the setup steps, compare three locations and record evidence.
15-25 min	Analysis + calculations	Explain the pattern and show all calculation steps.
25-30 min	Exit + submit	Complete the final explanation, check the file and click Turn in.

D. Digital Submission Rules

- Type only in the yellow response cells. Do not delete the questions or change the page layout.
- Work individually. Use your own observations, calculations and explanations.
- Show equation, substitution, working and final answer with unit for every calculation.
- Insert one screenshot from the simulation unless the technical backup procedure is used.
- Submit the assigned file by clicking Turn in before the end of the lesson.

E. Quick Concept Check - 4 marks

Complete this section before opening the simulation.

Question	Your response - type in the shaded cell
1. Define mass and state its SI unit. [1]	*Mass is the quantity of matter in an object. Its SI unit is kilogram (KG) and gram (G).*
2. Define weight and state its SI unit. [1]	*Weight is the gravitational force on an object that has mass. Its SI unit is Newton (N).*
3. Write the equation linking weight, mass and gravitational field strength. State what each symbol means. [1]	*W = m x g W = Weight, m = mass, g = Gravitational field strength.*
4. Predict where the same object will weigh the most: Moon, Earth or Jupiter. Give one reason. [1]	*Jupiter Jupiter is the biggest planet in our solar system which means more mass, and gravity is directly proportional to mass*

F. PhET Investigation Instructions

Simulation link: Open PhET Masses and Springs: Basics - Lab

- Open the link in a second tab. Select Lab if it does not open automatically.
- Choose one labelled mass. Record the mass in grams, then convert it to kilograms by dividing by 1000.
- Use the same mass and the same spring for the whole investigation. Do not change the spring strength between locations.
- Set the location to Earth. Attach the mass, allow it to settle, and observe how far the spring stretches.
- Repeat the observation on the Moon and then on Jupiter. Change only the location/gravity setting.
- For each location, calculate weight using W = mg and the g value given in Section G.
- Rank the spring extension as least, medium or greatest, and paste one screenshot into the evidence box.

Mass selected in the simulation	*Type here: 100 g*
Converted mass	*Type here: 0.1 kg*
Spring setting	*Type here: kept unchanged*
Variable deliberately changed	*Type here: Gravity*

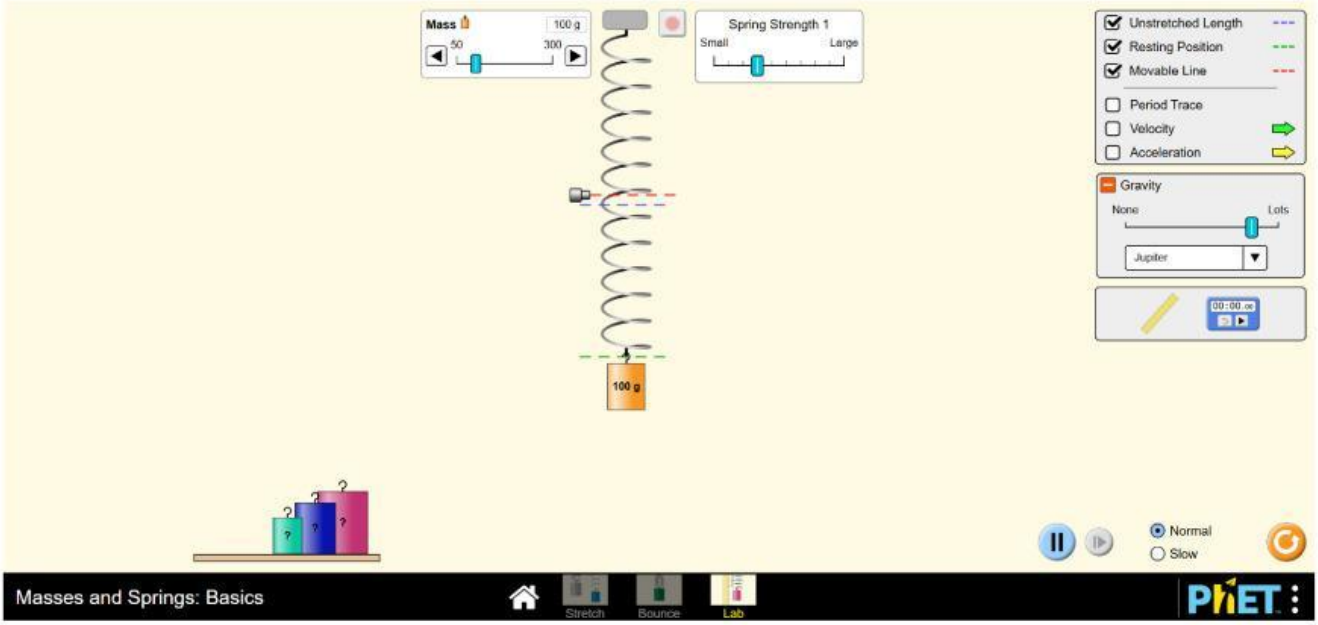
TECHNICAL BACKUP: If PhET does not load, refresh once and reopen the link. If it still fails, write 'Backup data used' in the screenshot box and continue using the g values and expected extension ranking in Section G. Do not stop working.

G. Record and Calculate - 5 marks

Keep the same mass for all three rows. Calculate weight using W = mg. For extension, use least, medium or greatest.

Location	g / N kg^{-1}	Mass used / kg	Calculated weight W / N	Observed spring extension
Moon	1.6	*0.1*	*0.1 x 1.6 = 0.16N*	*Backup: least*
Earth	9.8	*0.1*	*0.1 x 9.8 = 0.98N*	*Backup: medium*
Jupiter	24.8	*0.1*	*0.1 x 24.8 = 2.48N*	*Backup: greatest*

Screenshot evidence [1]



WORKED EXAMPLE - METHOD ONLY: For m = 0.20 kg and g = 5.0 N/kg: W = mg = 0.20 x 5.0 = 1.0 N. Use your own selected mass and the correct g value for each row above.

H. Analyse Your Results - 3 marks

Question	Your response - type in the shaded cell
5. Did the mass change when the location changed? Use evidence from your table. [1]	*No, the mass did not change. In the table, the object remained 100g whether it was on the Moon, Earth, or Jupiter.*
6. Which location produced the greatest weight and spring extension? Explain using gravitational field strength. [1]	*Jupiter produced the greatest weight and spring extension. This is because Jupiter has the largest field strength, resulting in a higher weight and stretching the spring the most.*
7. Describe the relationship between g, weight and spring extension when mass and spring strength are kept constant. [1]	*As gravitational field strength increases, weight and spring extension also increases, because weight is directly proportional to g.*

I. Apply the Equation - 6 marks

CALCULATION STANDARD: For each question, show the equation, substitute the numbers, calculate, and include the correct unit. A correct final number without working may not receive full marks.

Problem	Working	Final answer
8. Calculate the weight of a 2.0 kg object on Earth, where g = 9.8 N/kg. [2]	*W = m x g* *W = 2.0kg x 9.8N/kg* *2.0 X 9.8N = 19.6N*	*19.6N*
9. Calculate the weight of a 6.0 kg object on the Moon, where g = 1.6 N/kg. [2]	*W = m x g* *W = 6.0kg x 1.6N/kg* *6.0kg x 1.6N/kg = 9.6N*	*9.6N*
10. An object weighs 49 N on Earth, where g = 9.8 N/kg. Calculate its mass. [2]	*W = m x g* *m = W/g* *M= 49N ÷ 9.8N/kg* *49N ÷ 9.8N/kg = 5.0kg*	*5.0kg*

J. Final Explanation / Exit Ticket - 2 marks

A student with a mass of 50 kg travels from Earth to the Moon. In 2-3 complete sentences, explain what happens to the student's mass and weight and why. Use the terms mass, weight and gravitational field strength.

The student's mass does not change because mass stays constant everywhere. However, their weight will decrease because the moon has a weaker gravitational field strength than earth.

K. Submission Checklist

[ ] I entered my full name, class and date.
[ ] I answered every question and completed all three observation rows.
[ ] I showed equation, substitution, answer and unit for every calculation.
[ ] I inserted one PhET screenshot or clearly wrote 'Backup data used'.
[ ] I checked my explanations, then clicked Turn in in Google Classroom.

FINAL REMINDER: Saving or closing the document is not the same as submitting it. Return to Google Classroom and click Turn in before the lesson ends.