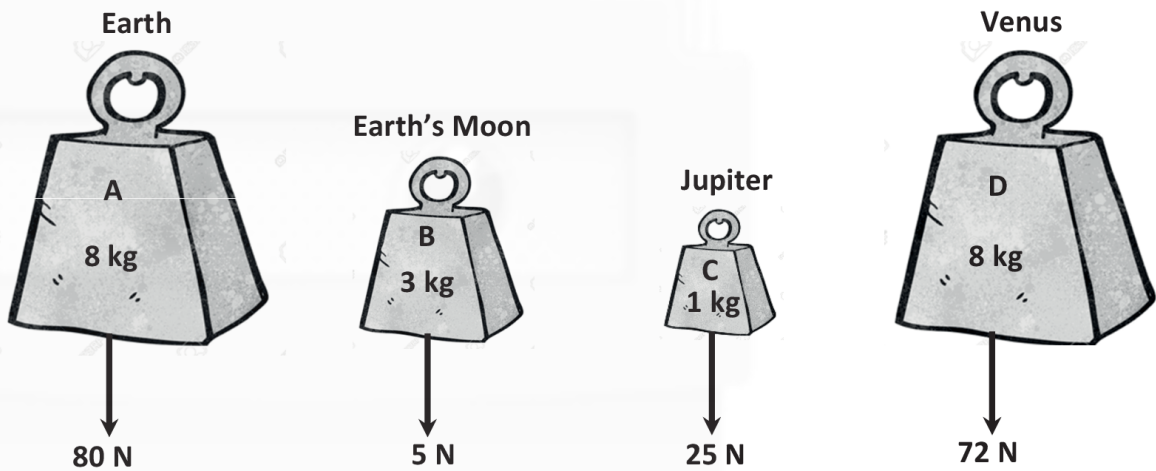


2019 marks the 50th anniversary of man's first landing on the Moon. Since then there have been a number of other missions to the Moon.



(f) The diagrams show the mass and weight of four objects (A, B, C and D) on the Earth, Earth's Moon, Jupiter and Venus.



Which object, A, B, C or D, has the smallest mass?

How can you tell that the force of gravity is less on Venus than it is on the Earth?

(g) During the Apollo 15 mission to the Moon in 1971, astronaut David Scott conducted the famous hammer and feather experiment.

The hammer and feather were dropped at the same time from the same height and hit the surface of the Moon at the same time.

A hammer falls much faster on Earth than it does on the Moon. Explain why.



(h) When one surface in contact with another surface moves, frictional forces arise. Friction makes movement more difficult. Sometimes friction is useful, other times it is unhelpful.

(i) Give one example where friction can be useful.

Example _____

(ii) Give one example where friction can be unhelpful.

Example _____

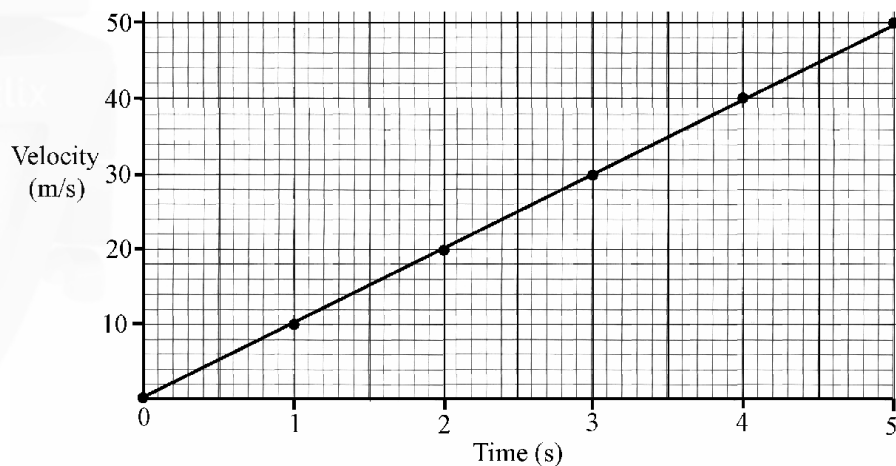
(iii) How can unhelpful friction be reduced?

How? _____

(iv) How can friction between air and a moving vehicle be reduced?

How? _____

(c) A stone was dropped from the top of a tall cliff. The stone's approximate velocity was measured each second as it fell. The data collected during this experiment is given in the graph.



(iii) Name the **force** that caused the stone to fall. (3)

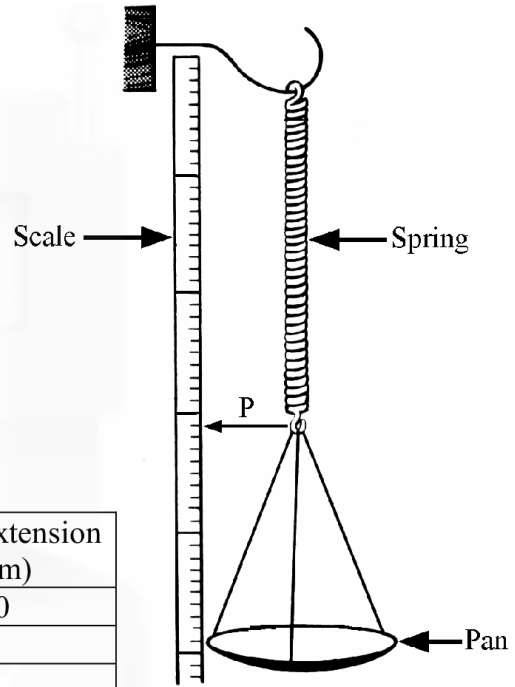
Name _____

(iv) The stone had a mass of 2 kg.
What was the **weight** of the stone on earth? Give the unit. (6)

EXAMINER
use only

(1) (2)

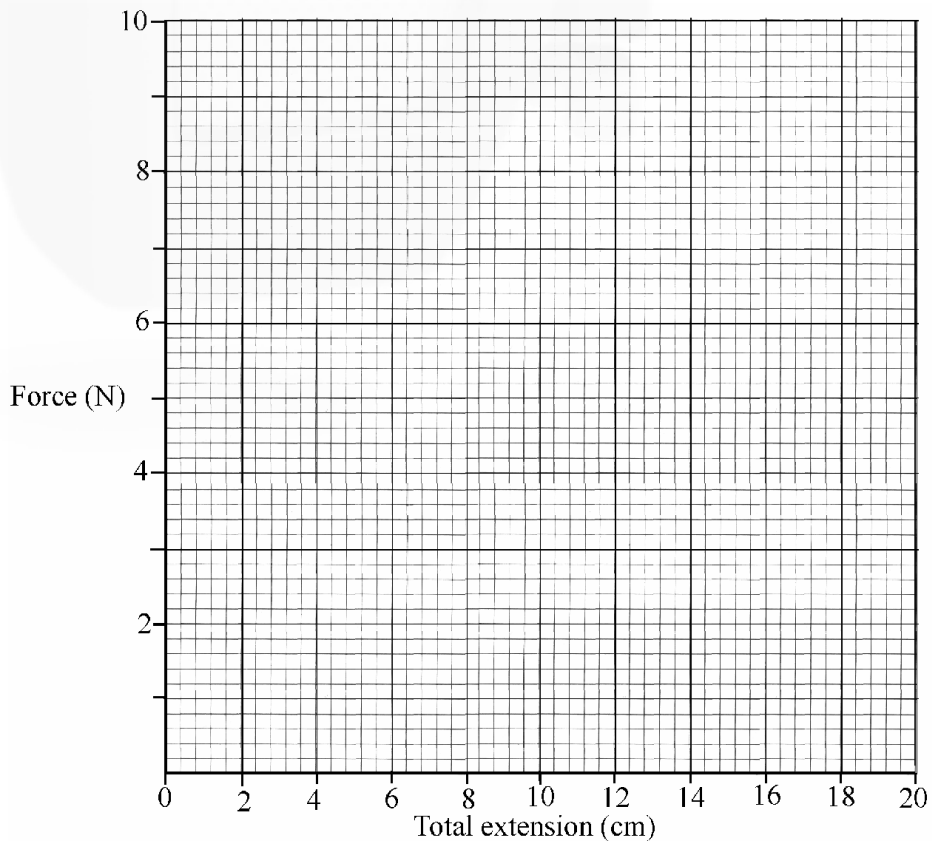
- (a) A pupil used the apparatus shown in the diagram to investigate the relationship between the force applied and the extension produced in the spring by that force. Pointer, P, was used to read the scale. Weights were added to the pan to apply forces to the spring. The data recorded is in the table.



- (i) Calculate the **total extension** for each force and enter them in the table. (6)

Force (N)	Scale reading (cm)	Total extension (cm)
0	31.0	0
2	35.0	
4	39.0	
6	43.0	
8	47.0	
10	51.0	

- (ii) Draw a **graph** of force against total extension in the grid below. (6)



(1) (2)



- (iii) What **conclusion** can be drawn from the graph regarding the relationship between the force applied to the spring and the extension produced by it? (6)

What? _____

- (iv) Use the graph to **determine the weight** of a stone that produced an extension of 14 cm in the spring. (3)

Use _____

use only

(1)	(2)
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