

Preface

LOWER SECONDARY SCIENCE TOPIC BY TOPIC ASSESSMENTS is a series that is written to help enhance students' understanding of scientific concepts and is closely based on the latest Lower Secondary Science Syllabus implemented by the Ministry of Education, Singapore, in 2021.

Each topical assessment offers a wealth of examination-type questions of varying difficulty levels, and is made up of the following three sections:

- Section A Multiple-Choice Questions
- Section B Short-Answer Questions
- Section C Free Response Questions

Comprehensive explanations of answers are provided at the end of this book to greatly enhance the understanding of key concepts tested by the questions.

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INTERACTIONS THROUGH FORCES

UNIT

1

Section A Multiple-Choice Questions

Each question is followed by four options (A, B, C or D). Choose the best option for each question and write your answer in the brackets provided.

Answer questions 1 and 2 based on the information given below.

A car moved off from a parked position and travelled 5 km in 3 minutes. It then picked up speed and travelled a further 15 km in 15 minutes. It came to a stop for 1 minute and then travelled for another 5 minutes, covering a distance of 6 km.

1. What is the average speed of the car?
(A) 70 km/h (B) 65 km/h
(C) 62 km/h (D) 67 km/h []
2. What is the average speed of the car in m/s?
(A) 19 m/s (B) 18 m/s
(C) 18.06 m/s (D) 17.8 m/s []
3. Many instruments can be used to measure time. Which of the following is the most accurate?
(A) Quartz watch (B) Pendulum clock
(C) Atomic clock (D) Stopwatch []

23. Louise stood on a weighing scale to measure her weight. She first stood on the scale with both feet. She then stood on the scale with just one foot. If Louise weighs 46 kg and the area of each foot in contact with the scale is 100 cm², which of the following statements is true?

- (A) The pressure exerted on the scale by one foot and both feet is the same.
- (B) The pressure exerted on the scale by one foot is twice the pressure exerted by both feet.
- (C) The pressure exerted doubles when both feet are placed on the scale.
- (D) The pressure exerted on the scale is equivalent to her weight. []

24. Which of the following instruments is **not** used to measure force?

- (A) Beam balance
- (B) Compression spring balance
- (C) Force metre
- (D) Weighing scale []

25. When astronauts travel from the Earth to the Moon, how do their weight and mass change?

- (A) Weight increases; mass decreases
- (B) Weight decreases; mass remains the same
- (C) Weight remains the same; mass decreases
- (D) Weight decreases; mass decreases []

26. Which of the formulae shown below is/are correct?

- I Pressure = Force × Area
- II Area = $\frac{\text{Pressure}}{\text{Force}}$
- III Force = Pressure × Area
- IV Area = $\frac{\text{Force}}{\text{Pressure}}$
- (A) III only
- (B) II and IV only
- (C) III and IV only
- (D) I, III and IV only []

27. Which of the following classifications of forces is correct?

	Non-contact force	Contact force
(A)	Frictional force	Gravitational force
(B)	Frictional force	Magnetic force
(C)	Gravitational force	Magnetic force
(D)	Magnetic force	Frictional force

[]

Section B**Short-Answer Questions**

Answer all the questions in the spaces provided.

1. Let the symbol for work = W , distance = D and mass of object in kilograms = M .
(1 kg = 10 N)

(a) Using the symbols, W , D and M , write an equation to calculate work done.

- (b) Study at the equations that describe the relationships between work done (W), distance (D) and force (F) below. State whether each equation is "Correct" or "Incorrect".

(i) $W = \frac{F}{D}$ _____

(ii) $D = F \times W$ _____

(iii) $D = \frac{W}{F}$ _____

(iv) $F = W \times D$ _____

(v) $F = \frac{W}{D}$ _____

2. Ricky attended a weight-lifting competition. There were four competitors of different heights and they lifted different weights, as shown in the table below.

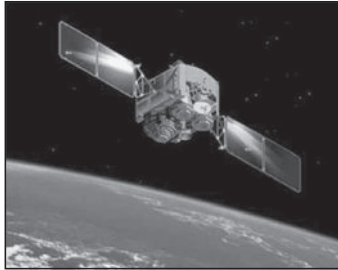
Competitor	Weight lifted (kg)	Height of competitor (m)
A	100	1.70
B	110	1.73
C	115	1.79
D	120	1.65

- (a) Ricky feels that competitor D has done the most work, as he lifted the heaviest weight despite being the shortest. Do you agree with Ricky? Explain your answer.

Section C Free Response Questions

Answer the following questions in the spaces provided.

1. (a) The picture below shows a satellite orbiting in space. Is any work done on the orbiting satellite by gravitational force from the Earth? Explain your answer.



- (b) The figure below shows a boy holding a box and walking in a horizontal direction. Is there any work done on the box? Explain your answer.

