



education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 10

TECHNICAL SCIENCES

JUNE 2024

MARKS: 100

TIME: 2 hours

This question paper consists of 10 pages and 2 data sheets.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of EIGHT (8) questions. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page in the ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Leave ONE line between two subquestions, e.g. between QUESTION 2.1 and QUESTION 2.2.
5. You may use a non-programmable calculator.
6. You may use appropriate mathematical instruments.
7. You are advised to use the attached DATA SHEETS.
8. Show ALL formulae and substitutions in ALL calculations.
9. Round off your FINAL numerical answers to a minimum of TWO decimal places.
10. Give brief motivations, discussions, etc. where required.
11. Write neatly and legibly.

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1 to 1.8) in the ANSWER BOOK, e.g. 1.9 D.

- 1.1 Which ONE of the following is a contact force?
- A Frictional force
 - B Magnetic force
 - C Gravitational force
 - D Electrostatic force (2)
- 1.2 What is the equilibrant of the two forces with the magnitude of 5 N RIGHT and 3 N LEFT?
- A 8 N, right
 - B 2 N, right
 - C 8 N, left
 - D 2 N, left (2)
- 1.3 Which ONE of the following is a vector quantity?
- A Mass
 - B Energy
 - C Velocity
 - D Current (2)
- 1.4 A school bus is driving at $60 \text{ km}\cdot\text{h}^{-1}$ East to drop off learners. Convert the $60 \text{ km}\cdot\text{h}^{-1}$ to $\text{m}\cdot\text{s}^{-1}$.
- A $16,67 \text{ m}\cdot\text{s}^{-1}$
 - B $216 \text{ m}\cdot\text{s}^{-1}$
 - C $22,22 \text{ m}\cdot\text{s}^{-1}$
 - D $288 \text{ m}\cdot\text{s}^{-1}$ (2)

1.5 A learner wants to pick up a wheelbarrow. What type of lever is the wheelbarrow classified as?

A Type 1

B Type 2

C Type 3

D Type 4

(2)

1.6 A pot plant falls from a balcony that is on the second floor. Ignore the effect of air resistance. What happens to the kinetic, gravitational potential, and mechanical energy?

	Kinetic energy	Gravitational potential energy	Mechanical energy
A	Increases	Increases	Remains constant
B	Increases	Decreases	Remains constant
C	Decreases	Increases	Increases
D	Decreases	Decreases	Decreases

(2)

1.7 Carbon dioxide has ... oxygen atoms.

A 2

B 3

C 4

D 1

(2)

1.8 Which ONE of the following formulae represents a compound?

A Zn

B Cl₂

C CaCO₃

D Si

(2)

[16]

QUESTION 2 (Start on a new page.)

- 2.1 Anne wants to swim in an Olympic swimming pool. She starts when the coach blows the whistle and swims 50 m, NORTH. She then turns around and swims 20 m, SOUTH.



2.1.1 Define the term *resultant* in words. (2)

2.1.2 Determine Anne's resultant displacement by using the tail-to-head method. **Scale 1 cm: 10 m** (3)

- 2.2 Watson likes to explore in the garden at home. He starts walking and follows a butterfly for 300 m to the RIGHT before he stops to watch a butterfly. He starts searching for a snail 400 m LEFT.

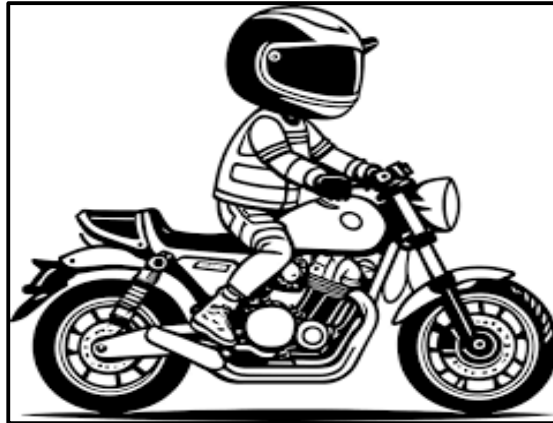


2.2.1 Define the term *distance* in words (2)

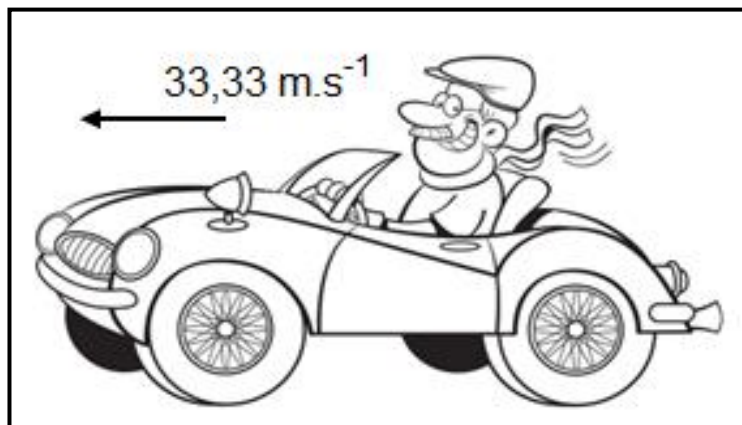
2.2.2 Calculate the magnitude to the total distance. (2)
[9]

QUESTION 3 (Start on a new page.)

- 3.1 Lucky is driving his motorbike on the N12 highway at a constant unknown velocity EAST. After 35 minutes he has travelled 67 km.



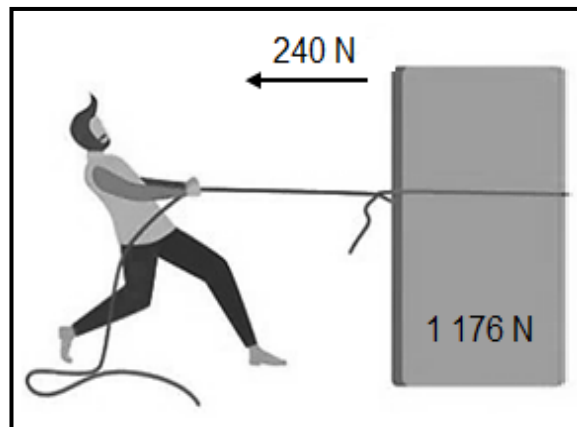
- 3.1.1 Define the term *velocity* in words. (2)
- 3.1.2 Convert the time and displacement to SI-unit. (2)
- 3.1.3 Calculate the magnitude and direction of Lucky's velocity on his motorbike in $\text{m}\cdot\text{s}^{-1}$. (3)
- 3.2 John is waiting in his motor vehicle at a traffic light to turn green. When the traffic light turns green, he starts driving WEST to reach a velocity of $33,33 \text{ m}\cdot\text{s}^{-1}$ after 10 s, as shown in the diagram below.



- 3.2.1 Define the term *acceleration* in words. (2)
- 3.2.2 Determine the magnitude and direction of John's acceleration after 10 s. (4)
- [13]**

QUESTION 4 (Start on a new page.)

A cupboard with a weight of 1 176 N is pulled with a force of 240 N to the LEFT, as shown in the diagram below. The frictional force experienced between the cupboard and the surface is 40 N.



- 4.1 Define the term *tension force* in words. (2)
- 4.2 Draw a free-body diagram of ALL the forces acting on the cupboard. (4)
- 4.3 Calculate the mass of the cupboard. (3)
- 4.4 Determine the magnitude and direction of the resulting force the cupboard will experience. (3)
- 4.5 Name ONE method in which friction can be reduced. (1)
- [13]**

QUESTION 5 (Start on a new page.)

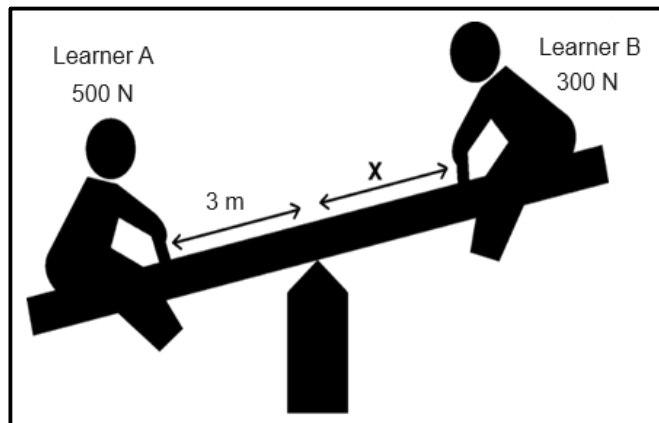
5.1 Tina is sweeping the class floor while she applies a force of 200 N on the broom. The broom has a weight of 196 N.



5.1.1 Define the term *mechanical advantage* in words. (2)

5.1.2 Calculate the mechanical advantage of the broom. (3)

5.2 Two learners are playing on a seesaw. Learner **A** is applying a force of 500 N on the seesaw, 3 m away from the fulcrum. Learner **B** is applying a force of 300 N on the seesaw, as indicated in the diagram below.



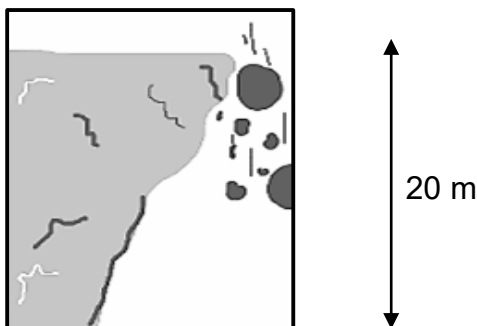
5.2.1 Define the term *moment of force* in words. (2)

5.2.2 Determine the moment of force exerted by learner **A**. (4)

[11]

QUESTION 6 (Start on a new page.)

A rock with a mass of 5 kg falls from a 20 m high mountain and reaches a velocity of $10 \text{ m}\cdot\text{s}^{-1}$ just before it hits the ground.



- 6.1 Define the term *kinetic energy* in words. (2)
- 6.2 Determine the gravitational potential energy at the top of the mountain. (3)
- 6.3 Calculate the kinetic energy just before the rock hits the ground. (3)
- 6.4 If the mass of the rock is DOUBLED, what will happen to the gravitational potential energy of the rock? Write down only INCREASE, DECREASE or STAY THE SAME? (1)
- 6.5 Explain the answer in QUESTION 6.4. (2)
- [11]**

QUESTION 7 (Start on a new page.)

- 7.1 Define the term *electrical conductivity* in words. (2)
- 7.2 Give TWO element that are examples of:
- 7.2.1 Electrical conductors (2)
- 7.2.2 Thermal insulators (2)
- 7.2.3 Electrical semi-conductors (2)
- 7.3 List TWO properties of ...
- 7.3.1 metals. (2)
- 7.3.2 non-metals. (2)
- [12]**

QUESTION 8 (Start on a new page.)

8.1 Define the term *pure substance* in words. (2)

8.2 Write down the MOLECULAR NAME of the compound that will form from the following reactions:

8.2.1 Carbon and oxygen (1)

8.2.2 Hydrogen and chlorine (1)

8.2.3 Sodium and nitrate (1)

8.3 Explain the difference between a *cation* and an *anion*. (4)

8.4 Write down the CHEMICAL FORMULA of the following compounds:

8.4.1 Sodium chloride (2)

8.4.2 Magnesium sulphate (2)

8.5 Write down a balance chemical equation for the equation below:



TOTAL: 100

GRADE 10: FORMULA SHEET

TABLE 1: PHYSICAL CONTENT

NAME	SYMBOL	VALUE
Acceleration due to gravity	g	9.8 m·s ⁻²
Change on electrons	e	-1,6 × 10 ⁻¹⁹

TABLE 2: FORMULAE

<p>MOTION</p> <p>Speed = distance / time</p> $\text{or } V_{\text{ave}} = \frac{D}{\Delta t}$ <p>Velocity = displacement / time</p> $\text{or } V_{\text{ave}} = \frac{\Delta x}{\Delta t}$ <p>Acceleration = change in velocity / time</p> $a = \frac{v_f - v_i}{\Delta t}$	<p>ENERGY</p> <p>$E_p = mgh$ or $U = mgh$</p> <p>$E_k = \frac{1}{2} mv^2$ or $K = \frac{1}{2} mv^2$</p> <p>$M_E = E_p + E_k$</p>
<p>FORCE</p> <p>$F_g = mg$</p> <p>$F_{\text{res}} = F_1 + F_2$</p>	<p>MOMENTS</p> <p>$\tau = F \times r_{\perp}$</p> <p>$\tau_{\text{cw}} = \tau_{\text{aw}}$</p>

<p>SIMPLE MACHINE</p> <p>Mechanical advantage = $\frac{\text{load}}{\text{effort}}$</p> <p>or $MA = \frac{L}{E}$</p> <p>OR</p> <p>Mechanical advantage = $\frac{\text{effort arm}}{\text{load arm}}$</p> <p>or $MA = \frac{e}{l}$</p>
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