



# education

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Department:  
Education  
North West Provincial Government  
**REPUBLIC OF SOUTH AFRICA**

**PROVINCIAL ASSESSMENT**

**GRADE 10**

**TECHNICAL SCIENCES**

**JUNE 2024**

**MARKING GUIDELINES**

**MARKS: 100**

**These marking guidelines consist of 7 pages.**

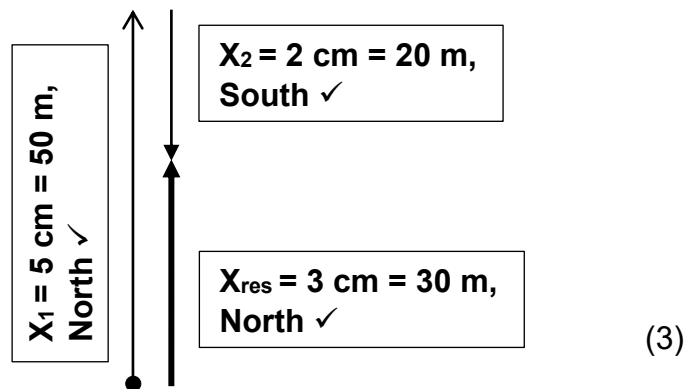
**QUESTION 1**

- 1.1 A ✓✓ (2)
  - 1.2 D ✓✓ (2)
  - 1.3 C ✓✓ (2)
  - 1.4 A ✓✓ (2)
  - 1.5 B ✓✓ (2)
  - 1.6 B ✓✓ (2)
  - 1.7 A ✓✓ (2)
  - 1.8 C ✓✓ (2)
- [16]**

**QUESTION 2 (Start on a new page.)**

2.1 2.1.1 Resultant is defined as a single vector which has the same effect as two or more vectors together/ combined. ✓✓ (2)

2.1.2



2.2 2.2.1 The actual path length between two points. ✓✓ (2)

2.2.2 Total distance =  $D_1 + D_2$   
 $= 300 + 400$  ✓  
 $= 700$  m ✓ (2)

**[9]**

**QUESTION 3 (Start on n new page.)**

3.1 3.1.1 The rate of change of displacement. ✓✓ (2)

3.1.2 Time = 35 x 60 = 2100 s ✓  
Displacement = 67 x 1000 = 67 000 m ✓ (2)

<p>3.1.3 <b><u>Option 1: take east as +</u></b></p> $v_{ave} = \frac{\Delta x}{\Delta t} \quad \checkmark \text{ (or formulae in words)}$ $= \frac{67\,000}{2\,100} \checkmark$ <p><math>v_{ave} = 31,90 \text{ m}\cdot\text{s}^{-1}, \text{ East } \checkmark</math></p>	<p><b><u>Option 2: take west as +</u></b></p> $v_{ave} = \frac{\Delta x}{\Delta t} \quad \checkmark \text{ (or formulae in words)}$ $= \frac{-67\,000}{2\,100} \checkmark$ <p><math>v_{ave} = 31,90 \text{ m}\cdot\text{s}^{-1}, \text{ East } \checkmark</math></p>
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(3)

3.2 3.2.1 The rate of change of velocity. ✓✓ (2)

<p>3.2.2 <b><u>Option 1: take west as +</u></b></p> <p>Acceleration = change in velocity ÷ time</p> $a = \frac{v_f - v_i}{\Delta t}$ $a = \frac{\Delta v}{\Delta t}$ $= \frac{33,33 - 0}{10} \checkmark$ <p><math>a = 3,33 \text{ m}\cdot\text{s}^{-2} \checkmark \text{ West } \checkmark</math></p>	<p><b>ANY ONE ✓</b></p>
<p><b><u>Option 2: take east as +</u></b></p> <p>Acceleration = change in velocity ÷ time</p> $a = \frac{v_f - v_i}{\Delta t}$ $a = \frac{\Delta v}{\Delta t}$ $= \frac{-33,33 - 0}{10} \checkmark$ <p><math>a = 3,33 \text{ m}\cdot\text{s}^{-2} \checkmark \text{ West } \checkmark</math></p>	<p><b>ANY ONE ✓</b></p>

(4)

**[13]**

**QUESTION 4**

4.1 A force acting in a string or rope. ✓✓ (2)

4.2

	<p><b>Note:</b> Allocate mark for arrow and label.</p> <p><b>Penalise if:</b></p> <ul style="list-style-type: none"> <li>• Force diagram (-1)</li> <li>• No arrow (-1)</li> <li>• Gaps between the line and dot (-1)</li> <li>• Additional force (-1)</li> </ul>
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(4)

4.3

$w = m \cdot g$ $F_g = m \cdot g$	}	<b>ANY ONE</b> ✓
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1 176 = (m)(9,8) ✓

m = 120 kg ✓ (3)

4.4

<u>Option 1: Left as +</u>	<u>Option 2: Right as +</u>
$F_{res} = F_1 + F_2$ ✓	$F_{res} = F_1 + F_2$ ✓
$= (+240) + (-40)$ ✓	$= (-240) + (+40)$ ✓
$F_{res} = + 100 \text{ N}$	$F_{res} = - 100 \text{ N}$
$F_{res} = 100 \text{ N, left}$ ✓	$F_{res} = 100 \text{ N, left}$ ✓

(3)

4.5 Polishing ✓  
 Lubriaction  
 Change type of surface that make contact  
 Wheel bearings  
 Balls or wheels  
 Shape  
 Pull versus Push

**ACCEPT ANY ONE** (1)  
**[13]**

**QUESTION 5**

5.1 5.1.1 Mechanical advantage is defined as ratio of the load to the effort. ✓✓ (2)

$$\begin{aligned}
 5.1.2 \quad MA &= \frac{L}{E} \\
 MA &= \frac{\textit{load}}{\textit{effort}} \quad \left. \vphantom{\frac{\textit{load}}{\textit{effort}}} \right\} \quad \checkmark \text{ ANY ONE} \\
 &= \frac{196}{200} \quad \checkmark
 \end{aligned}$$

MA = 0,98 ✓ (no unit) (3)

5.2 5.2.1 Moment of force is defined as the turning effect of the force about that point. ✓✓ (2)

$$\begin{aligned}
 5.2.2 \quad \tau &= F \cdot r_{\perp} \quad \checkmark \\
 &= (500) (3) \quad \checkmark \\
 &= 1\,500 \text{ N}\cdot\text{m}^{-1} \quad \checkmark \text{ clockwise} \quad \checkmark
 \end{aligned}$$

(4)  
**[11]**

**QUESTION 6**

6.1 Kinetic energy is defined as the energy an object has due to its motion. ✓✓ (2)

$$\begin{aligned}
 6.2 \quad E_p &= mgh \quad \checkmark \\
 &= (5) (9,8) (20) \quad \checkmark \\
 E_p &= 980 \text{ J} \quad \checkmark
 \end{aligned}$$

(3)

$$\begin{aligned}
 6.3 \quad E_k &= \frac{1}{2} mv^2 \quad \checkmark \\
 &= \frac{1}{2}(5)(10)^2 \quad \checkmark \\
 &= 250 \text{ J} \quad \checkmark
 \end{aligned}$$

(3)

6.4 INCREASE ✓ (1)

6.5 The mass is directly proportional to the gravitation potential energy. ✓✓  
**OR**  
If the mass double ✓, the gravitational potential energy will also double. ✓ (2)  
**[11]**

**QUESTION 7**

7.1 Electrical conductivity is defined as the ability of a substance/ material to conduct electricity. ✓✓ (2)

7.2 7.2.1 Copper ✓ ; aluminium ✓ ; iron

**Accept ANY relevant answer.** (2)

7.2.2 Sulphur ✓, Oxygen ✓, Chlorine

**Accept ANY relevant answer.** (2)

7.2.3 Silicon ✓, Germanium ✓ Gallium, Boron (2)

7.3 7.3.1 **PROPERTIES OF METALS**

- They are shiny ✓
- Good conductor of heat and electricity ✓
- They can bend without breaking.
- They are gray in colour (except for Cu and Au)
- They have high densities.
- Malleable and ductile

(2)

**Accept any TWO properties of metals.**

7.3.2 **PROPERTIES OF NON-METALS**

- Dull surface ✓
- Poor conduct of heat and electricity ✓
- They are brittle i.e. they break when force is exerted on them.
- They vary in colour.
- They have low densities.

**Accept any TWO properties of non-metals.** (2)

**[12]**

**QUESTION 8**

- 8.1 Define a pure substance as a single type of material (elements or compounds). ✓✓ (2)
- 8.2 8.2.1 Carbon oxide ✓ (1)
- 8.2.2 Hydrogen chloride ✓ (1)
- 8.2.3 Sodium nitrate ✓ (1)
- 8.3 Anion is a negatively charged atom or molecules ✓✓, whereas a cation is a positively charged atoms or molecules. ✓✓ (4)
- 8.4 8.4.1 NaCl ✓✓ (2)
- 8.4.2 MgSO<sub>4</sub> ✓✓ (2)
- 8.5 2SO<sub>2</sub> + O<sub>2</sub> ✓ → 2SO<sub>3</sub> ✓ (2)

**[15]****TOTAL: 100**