



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE ENGINEERING SCIENCE N1

7 April 2021

This marking guideline consists of 10 pages.

SECTION A**QUESTION 1**

- 1.1 C
- 1.2 C
- 1.3 D
- 1.4 A
- 1.5 C

(5 × 1) **[5]**

QUESTION 2

- 2.1 True
- 2.2 False
- 2.3 False
- 2.4 False
- 2.5 True

(5 × 1) **[5]**

QUESTION 3

- 3.1 C
- 3.2 F
- 3.3 D
- 3.4 B
- 3.5 E

(5 × 1) **[5]**

QUESTION 4

- 4.1 Velocity ratio
- 4.2 Resultant
- 4.3 Displacement
- 4.4 Gas
- 4.5 Insulator

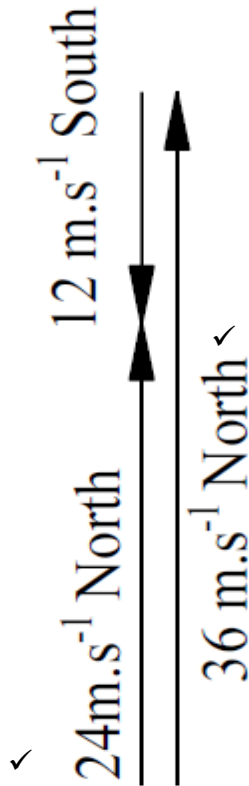
(5 × 1) **[5]**

TOTAL SECTION A: 20

SECTION B

QUESTION 5

5.1



(1 × 1 for correct drawing and 1 × 1 for correct answer) (2)

5.2 5.2.1

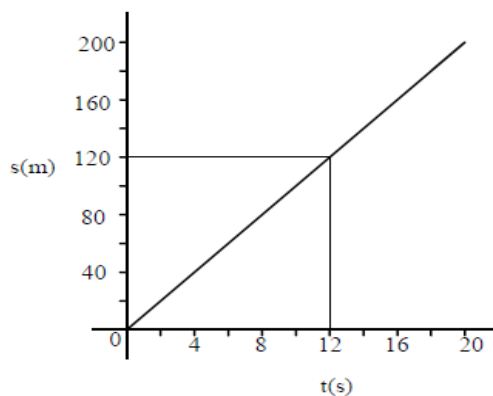
$$v = \frac{s}{t}$$

$$v = \frac{200}{20} \checkmark$$

$$\underline{\underline{v = 10m.s^{-1} \checkmark}}$$

(1 × 1 for replacement and 1 mark for correct answer and unit)
(-½ mark for incorrect unit.) (2)

5.2.2

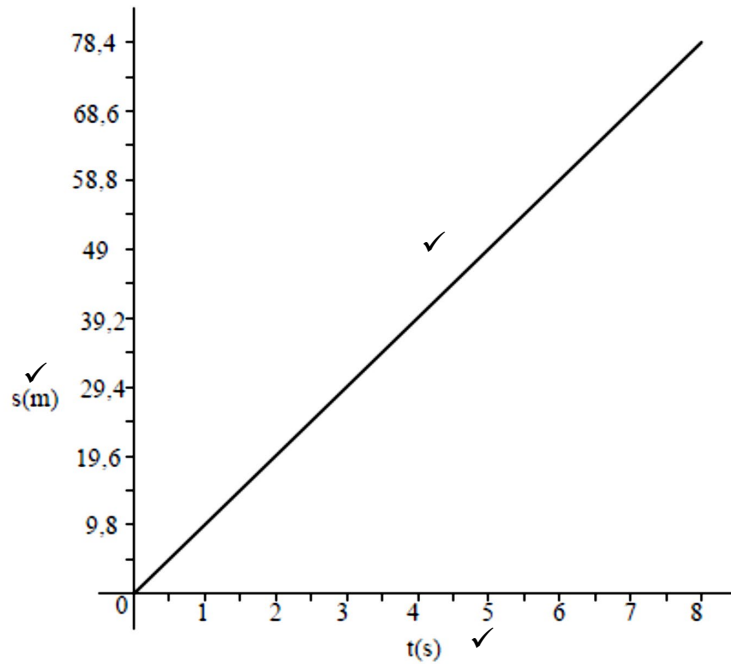


Read from graph

$$\underline{\underline{s = 120m}}$$

(1)

5.3 5.3.1



(3)

5.3.2

$$a = \frac{\Delta v}{\Delta t}$$

$$a = \frac{78,4 - 0}{8 - 0} \checkmark$$

$$\underline{\underline{a = 9,8 m \cdot s^{-2}}} \checkmark$$

(1 mark for replacement + 1 mark for correct answer and unit)
(-½ mark for incorrect unit)

(2)

$$\begin{aligned} 5.4 \quad F &= m \times g \\ &= 15,6 \times 9,8 \\ &= 152,88 \text{ N } \checkmark \end{aligned}$$

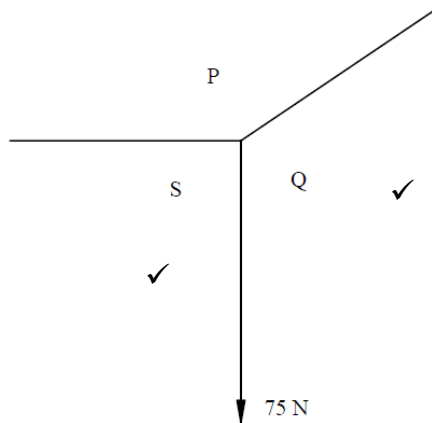
(One mark for correct answer and unit)
(-½ mark for incorrect unit)

(1)

[11]

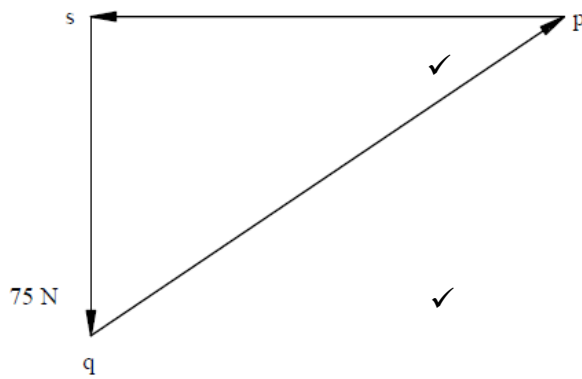
QUESTION 6

6.1 6.1.1



Scale not required

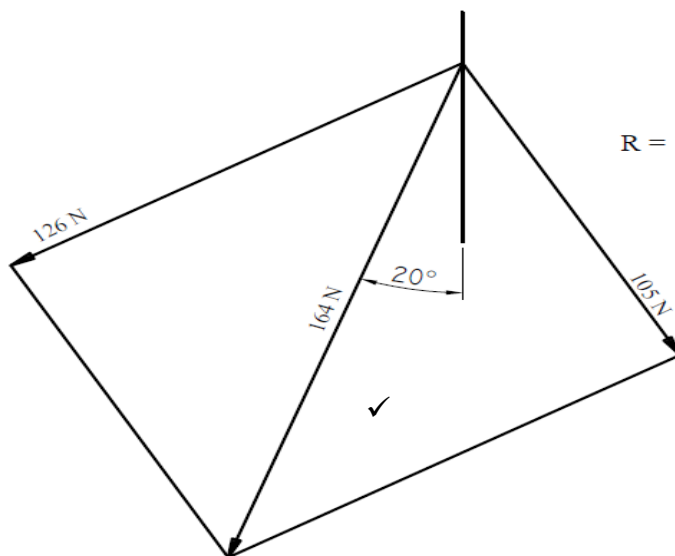
6.1.2



Scale not required

(2 × 2) (4)

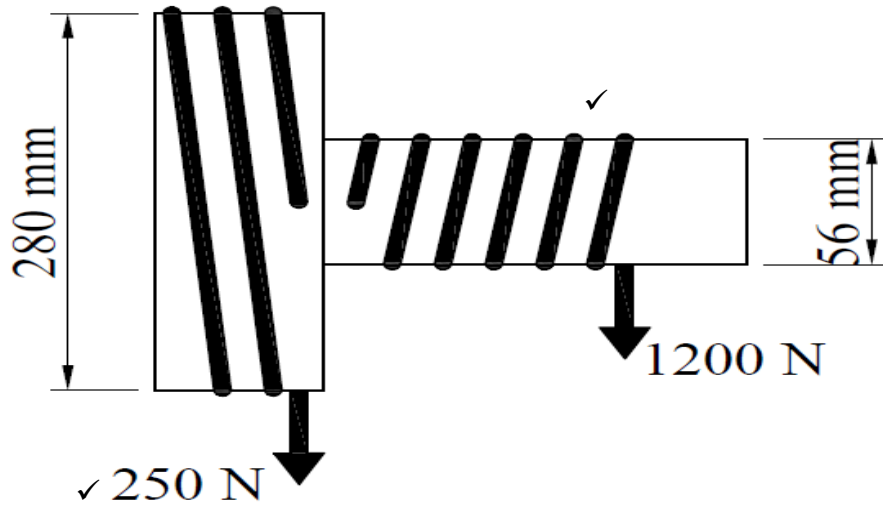
6.2



$R = 164 \text{ N, South } 20^\circ \text{ West}$

(1 mark for drawing + 1 mark for resultant) (2)

6.3 6.3.1



(2)

6.3.2

$$MA = \frac{W}{F}$$

$$MA = \frac{1200}{250}$$

$$MA = 4,8 \quad \checkmark$$

(1 mark for replacement + 1 mark for correct answer and unit)
(-½ mark for incorrect unit)

(1)

6.3.3

$$VR = \frac{D}{d}$$

$$VR = \frac{280}{56}$$

$$VR = 5 \quad \checkmark$$

(One mark for correct answer and unit)
(-½ mark for incorrect unit)

(1)

6.4 $M = F \times r$

$$r = \frac{M}{F}$$

$$r = \frac{375,5}{55} \quad \checkmark$$

$$r = 6,5m \quad \checkmark$$

(1 mark for replacement + 1 mark for correct answer and unit)
(-½ mark for incorrect unit)

(2)

- 6.5
- Tries to change position of body at rest
 - Changes position of body at rest
 - Tries to accelerate/decelerate body moving in straight line
 - Accelerates/Decelerates body moving in straight line
 - Tries to change direction of body moving in straight line
 - Changes direction of body moving in straight line

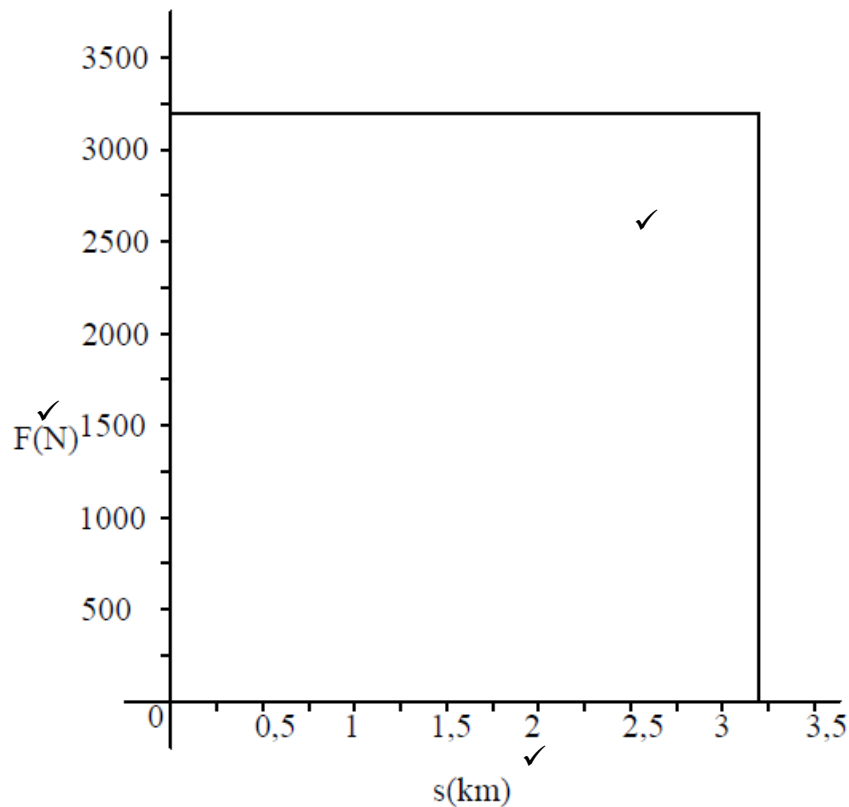
(Any 2 × 1)

(2)

[14]

QUESTION 7

7.1 7.1.1



(4)

$$7.1.2 \quad W = F \times s$$

$$W = 3200 \times 3200 \quad \checkmark$$

$$\underline{W = 10,24 MJ} \quad \checkmark$$

(2)

$$7.1.3 \quad P = F \cdot v$$

$$P = 3200 \times 16,667 \quad \checkmark$$

$$\underline{P = 53,333 kW} \quad \checkmark$$

(No marks for converting from km/h to m/s)

(2)

$$7.2 \quad P = F \times v$$

$$P = 265 \times 19,444 \quad \checkmark$$

$$P = 5152,778 W$$

$$\underline{P = 5,153 kW} \quad \checkmark$$

(No marks for converting from km/h to m/s)

(2)

[10]

QUESTION 8




- 8.1 Heat is a form of energy measured in Joule while temperature is an indication of the warmth or coldness of a body measured in Celsius, Fahrenheit and Kelvin. (2)
- 8.2 8.2.1 Conduction
8.2.2 Radiation (2 × 1) (2)
- 8.3 8.3.1 • Crude oil is heated – gas, petrol, diesel, paraffin is formed.
• Heating of carbon – combines with oxygen to form coal ash.
8.3.2 Heated ice changes phase to water, more heat changes phase to steam. (2 × 1) (2)
- 8.4 Amount of heat to raise temperature of 1 kg✓ of substance with 1 K or 1 °C✓ (2)
- 8.5 $Q = m.c.\Delta t$
 $m = \frac{Q}{c.\Delta t}$
 $m = \frac{356560}{385 \times (333 - 250)} \checkmark$
 $m = 11,158kg \checkmark$ (2)
- 8.6 8.6.1 $\Delta t = t_f - t_o$
 $\Delta t = 124,4 - (-3,6)$
 $\Delta t = 128^\circ C \checkmark$
8.6.2 $\Delta l = l_f - l_o$
 $\Delta l = 5,358 - 5,35$
 $\Delta l = 0,008m$
 $\Delta l = 8mm \checkmark$ (2 × 1) (2)
- 8.7 The metal ball will pass through the ring when both are the same temperature. If the ball is heated it will expand and will not pass through the ring. (2)
- 8.8 8.8.1 Iron rod
8.8.2 Water (2 × 1) (2)

[16]

QUESTION 9

9.1	9.1.1	Fast	(3 × 1)	(3)
	9.1.2	Slower than in gas, faster than in solids		
	9.1.3	Slow		
9.2	9.2.1	Smallest part of element.	(3 × 1)	(3)
	9.2.2	Molecule		
	9.2.3	Element		
9.3	9.3.1	Melt	(3 × 1)	(3)
	9.3.2	Evaporate		
	9.3.3	Condensate		

[9]**QUESTION 10**

10.1	10.1.1	Copper, silver, gold, et cetera		
	10.1.2	PVC, plastic, mica, et cetera	(2 × 1)	(2)
10.2	10.2.1	 ✓		
	10.2.2	 ✓		
	10.2.3	 ✓		
			(3 × 1)	(3)
10.3	Changing its direction from time to time which also causes varying voltage charge			(1)
10.4	$R = \frac{V}{I}$			
	$R = \frac{24}{6,4}$ ✓			
	<u>$R = 3,75\Omega$</u> ✓			(2)

10.5 $R_t = R_1 + R_2 + R_3$
 $R_t = 15 + 28 + 34 \quad \checkmark$
 $R_t = 77\Omega$ \checkmark (2)

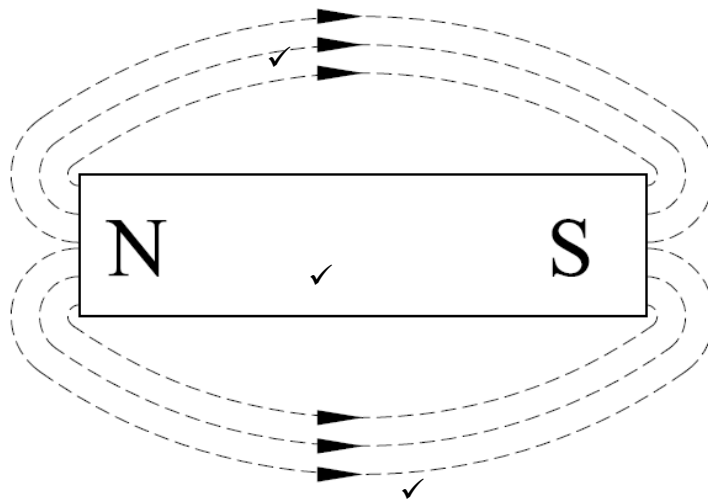
- 10.6
- Length
 - Cross-sectional area
 - Type
 - Temperature (Any 2 × 1) (2)

10.7 Resistance will be reduced (1)

10.8 10.8.1 $P = V.I$
 $I = \frac{P}{V}$
 $I = \frac{1000}{220} \quad \checkmark$
 $I = 4,545 A$ \checkmark (2)

10.8.2 $Q = V.I.t$
 $Q = 220 \times 4,545 \times (1,5 \times 60) \checkmark$
 $Q = 90000 J$
 $Q = 90 kJ$ \checkmark (2)

10.9



(3)
[20]

TOTAL SECTION B: 80
GRAND TOTAL: 100