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.

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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

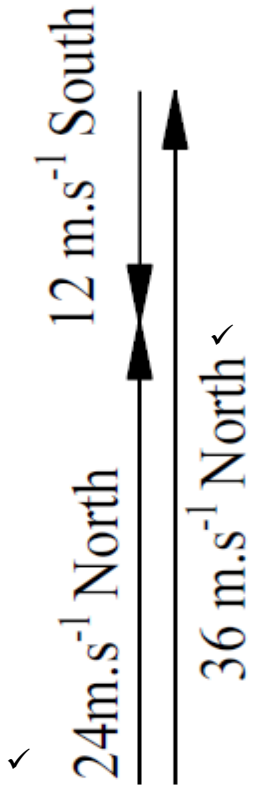
(5 × 1) **[5]**

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

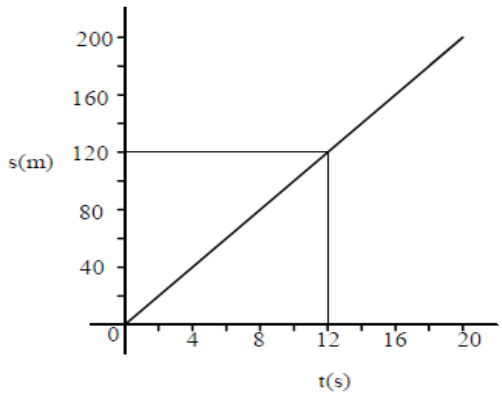
$$v = \frac{s}{t}$$

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

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

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

5.2.2

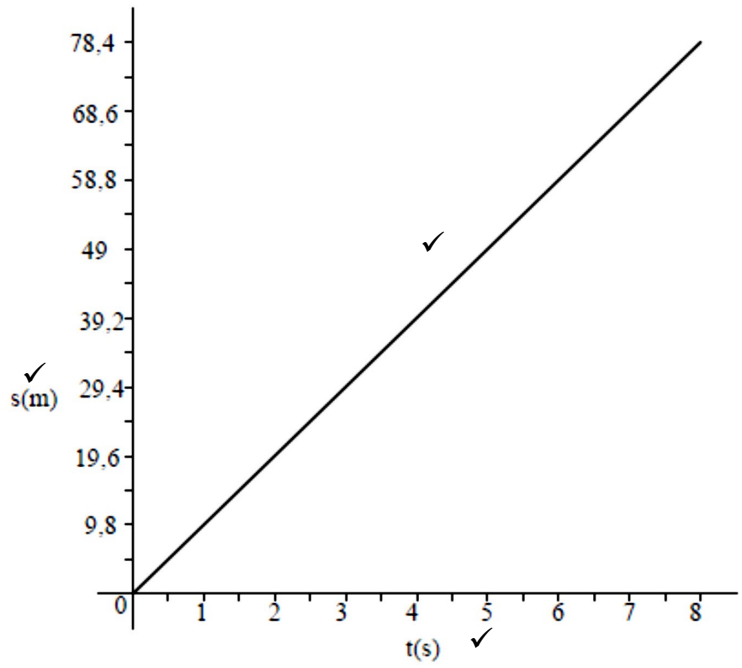


Read from graph

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

(1)

5.3 5.3.1



(3)

5.3.2

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

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

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

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

5.4 $F = m \times g$

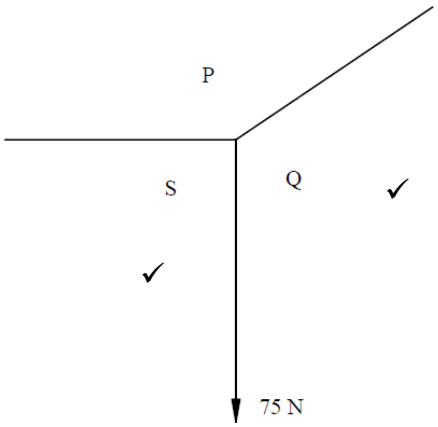
$= 15,6 \times 9,8$

$= 152,88\ N$ ✓

(One mark for correct answer and unit)
(-½ mark for incorrect unit) (1)
[11]

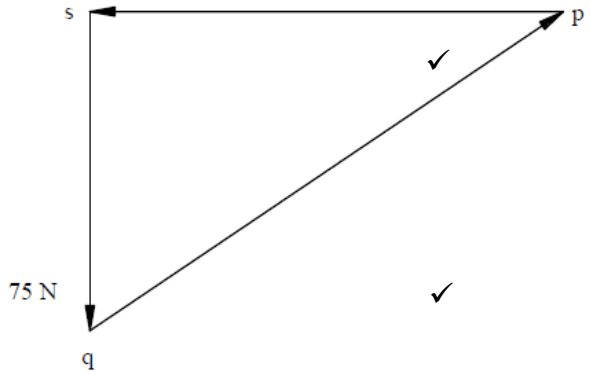
QUESTION 6

6.1 6.1.1



Scale not required

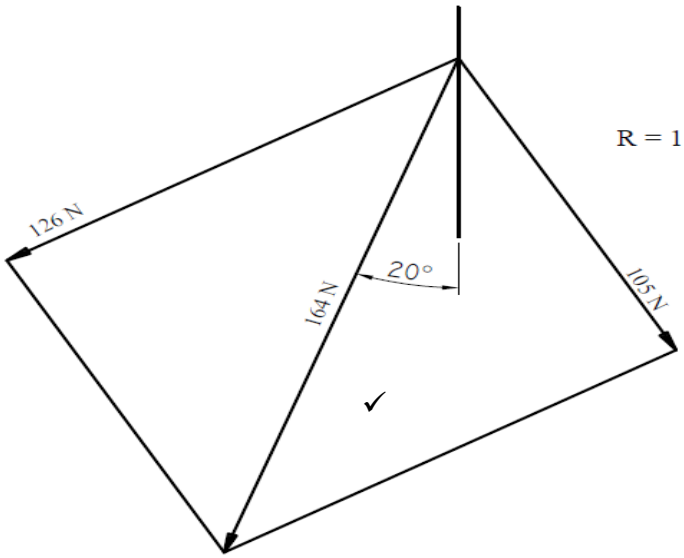
6.1.2



Scale not required

(2 × 2) (4)

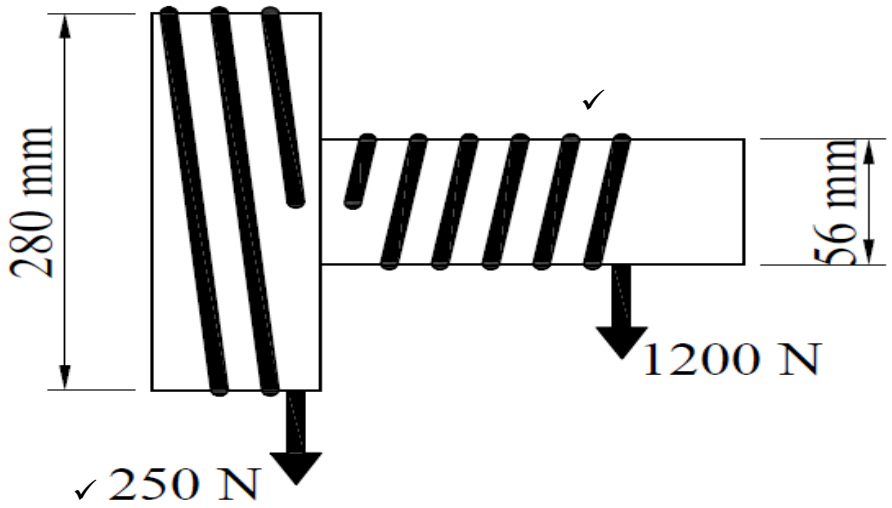
6.2



R = 164 N, South 20° West

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

6.3 6.3.1



(2)

6.3.2

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

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

$$\underline{\underline{MA = 4,8}} \quad ✓$$

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

6.3.3

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

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

$$\underline{\underline{VR = 5}} \quad ✓$$

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

6.4

$$M = F \times r$$

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

$$r = \frac{375,5}{55} \quad ✓$$

$$\underline{\underline{r = 6,5m}} \quad ✓$$

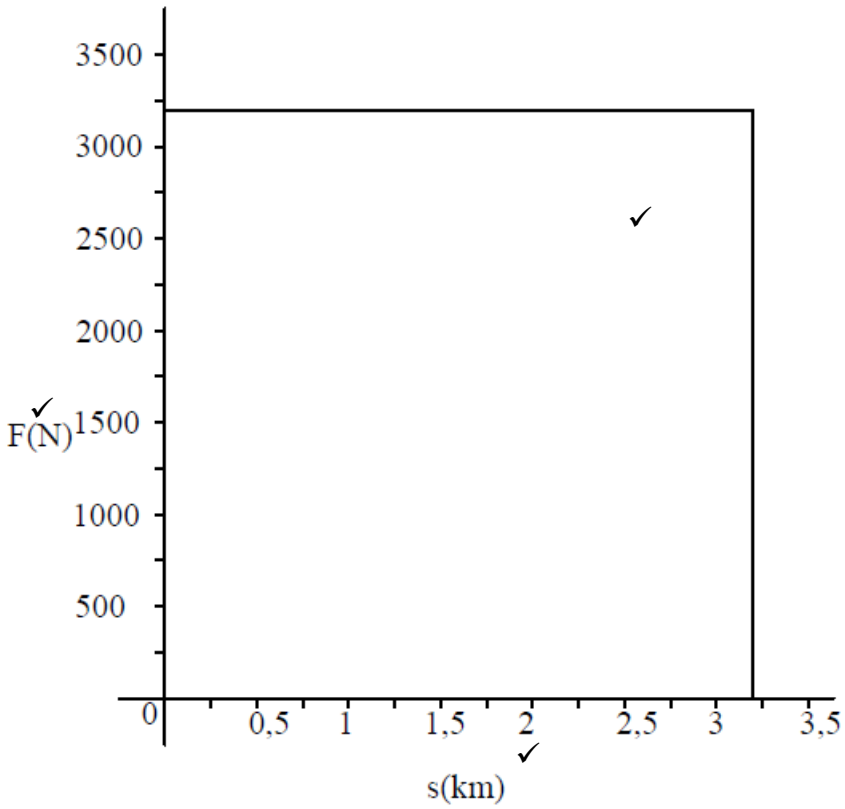
(1 mark for replacement + 1mark for correct answer and unit)
(-½ mark for incorrect unit) (2)

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 $W = F \times s$

$W = 3200 \times 3200$ ✓

$\underline{W = 10,24MJ}$ ✓ (2)

7.1.3 $P = F.v$

$P = 3200 \times 16,667$ ✓

$\underline{P = 53,333kW}$ ✓

(No marks for converting from km/h to m/s) (2)

7.2 $P = F \times v$

$P = 265 \times 19,444$ ✓

$P = 5152,778W$

$\underline{P = 5,153kW}$ ✓

(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 warmness 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
$$Q = m.c.\Delta t$$
$$m = \frac{Q}{c.\Delta t}$$
$$m = \frac{356560}{385 \times (333 - 250)} \checkmark$$
$$\underline{m = 11{,}158kg} \checkmark$$
(2)

8.6 8.6.1
$$\Delta t = t_f - t_o$$
$$\Delta t = 124{,}4 - (-3{,}6)$$
$$\underline{\Delta t = 128°C} \checkmark$$

8.6.2
$$\Delta l = l_f - l_o$$
$$\Delta l = 5{,}358 - 5{,}35$$
$$\Delta l = 0{,}008m$$
$$\underline{\Delta l = 8mm} \checkmark$$
(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
9.1.2 Slower than in gas, faster than in solids
9.1.3 Slow
(3 × 1) (3)

9.2 9.2.1 Smallest part of element.
9.2.2 Molecule
9.2.3 Element
(3 × 1) (3)

9.3 9.3.1 Melt
9.3.2 Evaporate
9.3.3 Condensate
(3 × 1) (3)
[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 $R = \frac{V}{I}$

$R = \frac{24}{6,4}$ ✓

$\underline{R = 3,75\Omega}$ ✓ (2)

10.5 $R_t = R_1 + R_2 + R_3$

$R_t = 15 + 28 + 34$ ✓

$\underline{R_t = 77\Omega}$ ✓ (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 $P = V.I$

$I = \frac{P}{V}$

$I = \frac{1000}{220}$ ✓

$\underline{I = 4,545A}$ ✓ (2)

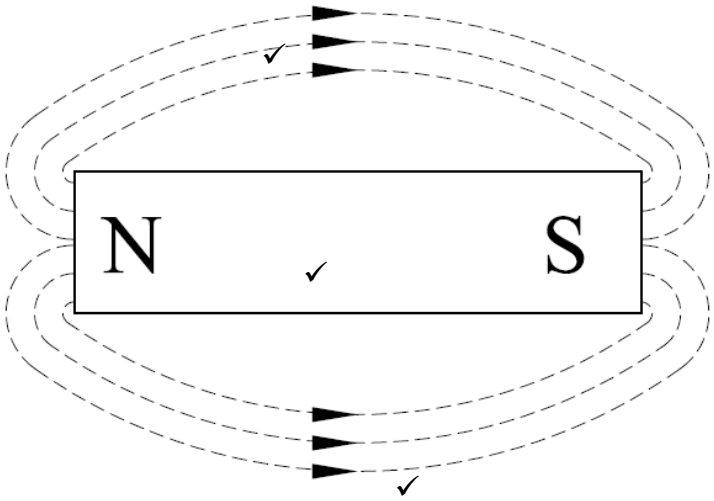
10.8.2 $Q = V.I.t$

$Q = 220 \times 4,545 \times (1,5 \times 60)$ ✓

$Q = 90000J$

$\underline{Q = 90kJ}$ ✓ (2)

10.9



(3)
[20]

TOTAL SECTION B: 80
GRAND TOTAL: 100

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