higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

ENGINEERING SCIENCE N1

9 April 2020

This marking guideline consists of 10 pages.

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✓ = 1 mark
☑ = ½ mark

SECTION A

QUESTION 1

1.1 C
1.2 A
1.3 D
1.4 A
1.5 D

(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 E
3.3 A
3.4 B
3.5 D

(5 × 1) **[5]**

QUESTION 4

4.1 Resistance
4.2 Joule's law
4.3 Matter
4.4 Atom
4.5 Fleming's right-hand rule for conductors

(5 × 1) **[5]**

TOTAL SECTION A: 20

SECTION B

QUESTION 5

5.1 5.1.1 $s = 120 + 120$

$\underline{\underline{s = 240m}}$

OR

Distance covered 120 × 2 = 240 m✓ (1)

5.1.2 He walked 120 m one way and 120 m back again. He ended where he started, that is at home. So, his displacement is 0.✓ (1)

5.1.3 $Average_speed = \frac{dis\tan ce}{time}$

$Average_speed = \frac{240}{240}$ ✓

$\underline{\underline{Average_speed = 1m \cdot s^{-1}}}$ ✓

(ONE mark for replacement, ONE mark for correct answer and unit)
(-½ mark for incorrect unit) (2)

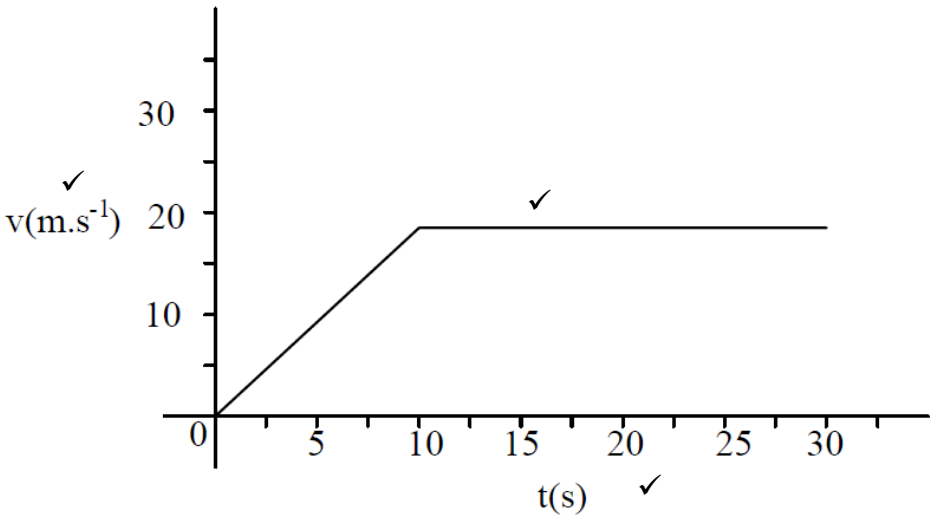
5.1.4 $Average_velocity = \frac{displacement}{time}$

$Average_velocity = \frac{0}{240}$ ✓

$\underline{\underline{Average_velocity = 0m \cdot s^{-1}}}$ ✓

One mark for replacement one mark for correct answer and unit.
-½ mark for incorrect unit. (2)

5.2 5.2.1



(3)

5.2.2

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

$$a = \frac{20}{10} \checkmark$$

$$\underline{\underline{a = 2m.s^{-2}}} \checkmark$$

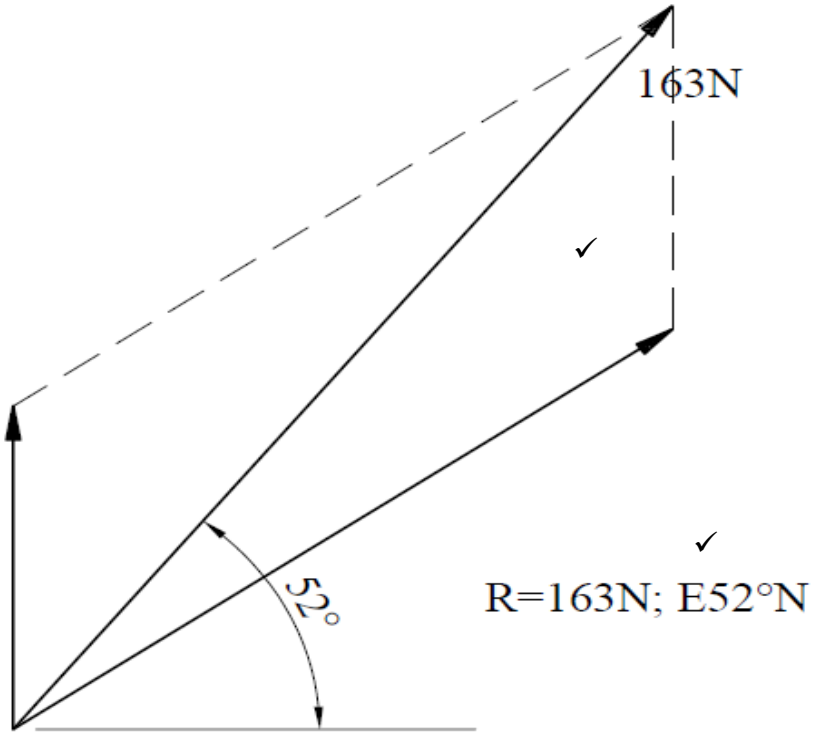
(ONE mark for replacement, ONE mark for correct answer and unit)
(-½ mark for incorrect unit) (2)
[11]

QUESTION 6

6.1 The force will:

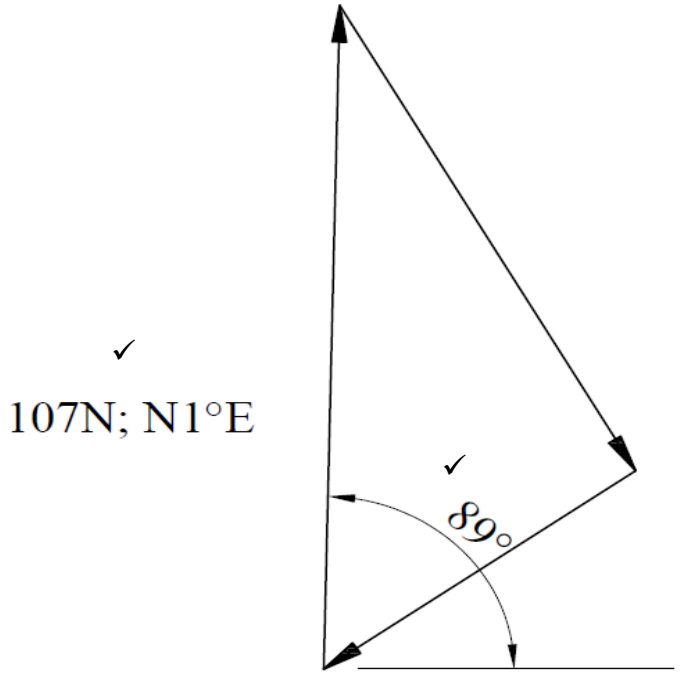
- Try to accelerate the body
- Accelerate the body
- Try to change the direction of the body
- Change the direction of the body (Any 2 correct answers) (2)

6.2



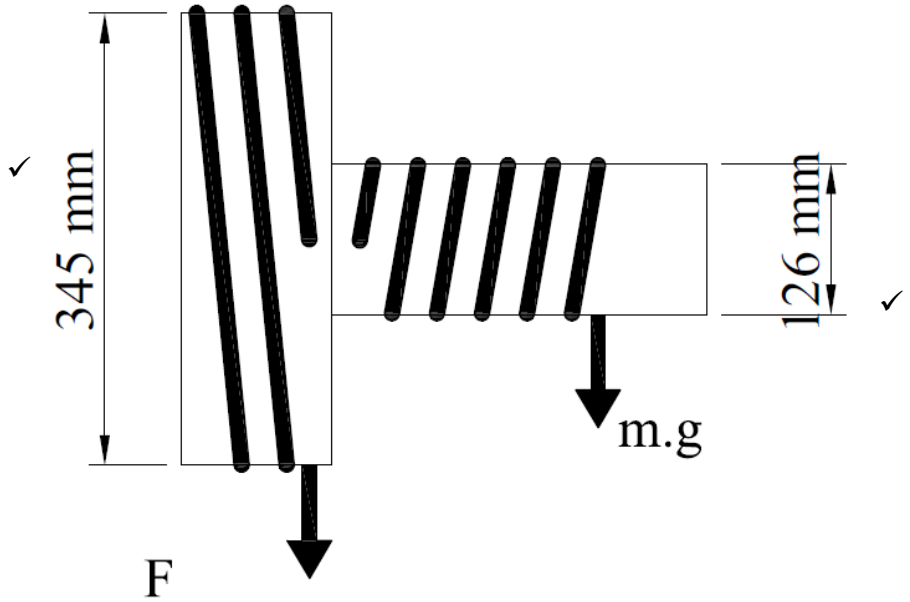
(ONE mark for the drawing)
(ONE mark for the resultant written out) (2)

6.3



(ONE mark for the drawing)
(ONE mark for the answer written out) (2)

6.4



(3)

6.5 $LM = RM$

$6m \times 15N = 5m \times B$

$B = \frac{90}{5}$ ✓

$\underline{\underline{B = 18N}}$ ✓

(2)

6.6 A force has direction✓ and magnitude.✓ (2)

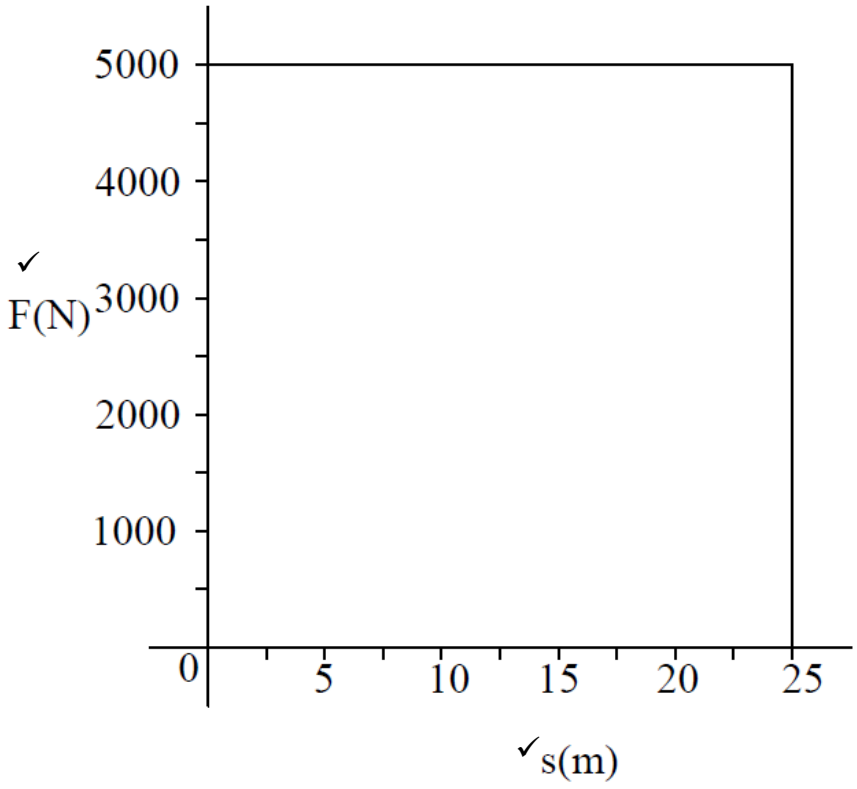
6.7
- Cantilever
- Spanner (Any applicable answer) (2)

[15]

QUESTION 7

7.1 7.1.1 Electric energy to kinetic energy
7.1.2 Potential energy to kinetic energy
(2 × 1) (2)

7.2 7.2.1



(2)

7.2.2 $P = \frac{F.s}{t}$

$= \frac{5\,000 \times 25✓}{6}$

$= 20{,}833$ kW✓ (2)

7.3 7.3.1

$$W = F \times s$$
$$W = 1000 \times 47$$
$$\underline{\underline{W = 47000J}}$$

(2)

7.3.2

$$P = \frac{W}{t}$$
$$P = \frac{47000}{2,5 \times 60} \checkmark$$
$$\underline{\underline{P = 313,333KW}} \checkmark$$

(2)
[10]

QUESTION 8

8.1
- Has a quick response to temperature changes.
- Does not stick to the sides of the glass tube.
- Has a high boiling point.
- Expands evenly.
- Good conductor of heat.

(Any applicable answer) (2 × 1) (2)

8.2 8.2.1 Conduction
8.2.2 Convection

(2 × 1) (2)

8.3 8.3.1 Change in colour
8.3.2 The origin of an electrical current.

(2 × 1) (2)

8.4

$$Q = m.c.\Delta t$$
$$Q = 4 \times 486 \times (36 - (-3)) \checkmark$$
$$Q = 75816J$$
$$Q = 75,816 \times 10^3 J$$
$$\underline{\underline{Q = 75,816kJ}} \checkmark$$

(2)

8.5 8.5.1

$$\Delta t = t_f - t_o$$
$$\Delta t = 89 - 2$$
$$\underline{\underline{\Delta t = 87°C}} \checkmark$$

8.5.2

$$\ell_f = \ell_o + \Delta\ell$$
$$\ell_f = 21,056 + 0,025$$
$$\underline{\underline{\ell_f = 21,081m}} \checkmark$$

(2 × 1) (2)

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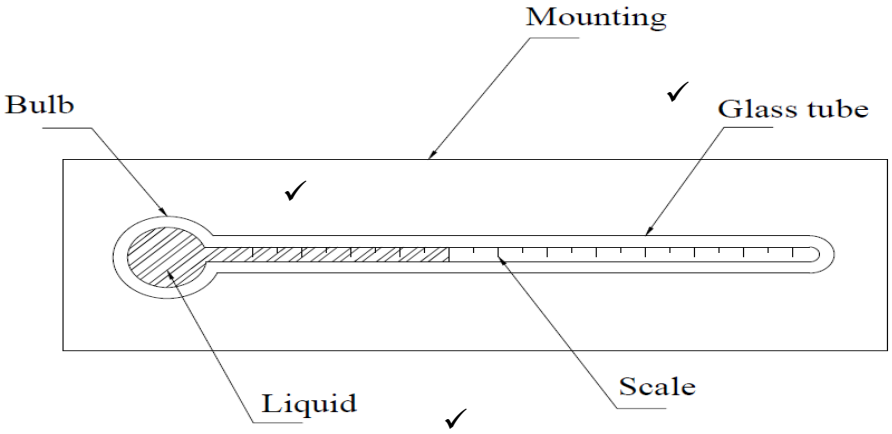
8.6



(3)

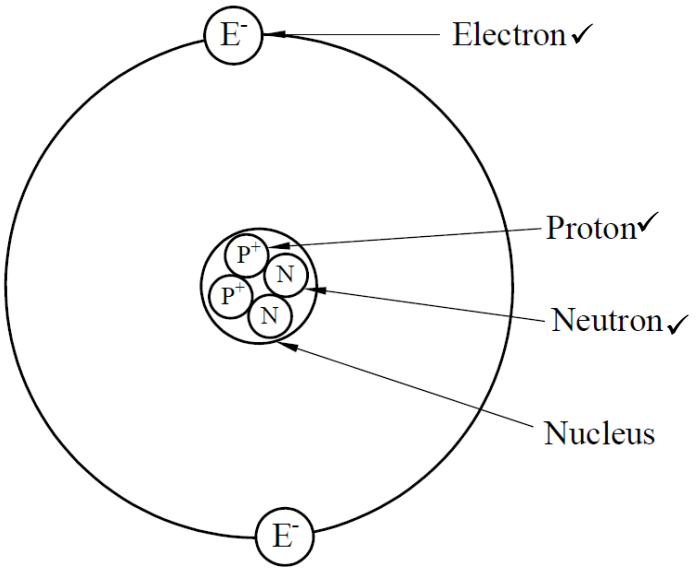
8.7 When different metals are connected at the one end and heated up✓ there will be a potential difference measured at the other end.✓ (2)

8.8 Heat is transferred from the cool drink to the ice cubes until they have the same temperature. (1)
[16]

QUESTION 9

9.1 9.1.1 Low energy
9.1.2 Weak attraction
9.1.3 More spaces than solid but less than gas
(3 × 1) (3)

9.2



(3)

9.3 Molecule (1)

9.4
- Ion
- Negative ion
- Cation

(Any ONE) (1)
[8]

QUESTION 10

10.1 10.1.1 Battery
10.1.2 Ammeter
10.1.3 Resistor

(3 × 1) (3)

10.2
$$I = \frac{V}{R}$$
$$I = \frac{220}{17} \checkmark$$
$$\underline{\underline{I = 12,941A}} \checkmark$$

(2)

10.3
$$R_T = R_1 + R_2 + R_3$$
$$R_T = 15 + 28 + 36 \checkmark$$
$$\underline{\underline{R_T = 79\Omega}} \checkmark$$

(2)

10.4
- Type of material (resistivity)
- Length of the conductor
- Cross-sectional area
- Temperature of the conductor

(Any applicable answer) (3 × 1) (3)

10.5 10.5.1 Resistance will increase
10.5.2 Resistance will stay the same

(2 × 1) (2)

10.6
$$Q = V.I.t$$
$$Q = 220 \times 12 \times (5 \times 60) \checkmark$$
$$Q = 792000J$$
$$\underline{\underline{Q = 792kJ}} \checkmark$$

(2)

10.7 10.7.1
$$P = V.I$$
$$I = \frac{P}{V}$$
$$I = \frac{200}{220} \checkmark$$
$$\underline{\underline{I = 0,909A}} \checkmark$$

10.7.2

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

$$R = \frac{220}{0,909}$$

$$\underline{\underline{R = 242,024\Omega}}$$

OR

$$P = \frac{V^2}{R}$$

$$R = \frac{V^2}{P}$$

$$R = \frac{220^2}{200}$$ ✓

$$\underline{\underline{R = 242\Omega}}$$ ✓

(2 × 2) (4)

10.8
- Relays
- Electric bells
- Electrical motors
- Loudspeakers

(Any applicable answer 2 × 1) (2)

[20]

TOTAL SECTION B: 80
GRAND TOTAL: 100

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