

Section A

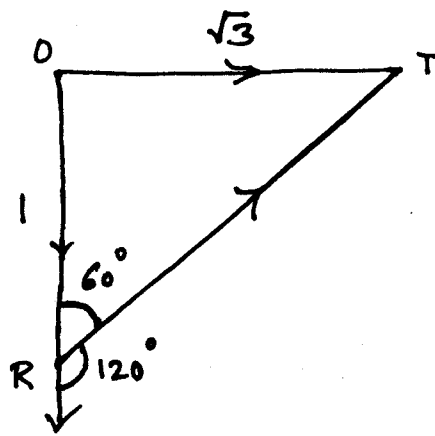
| Q.No. | (a) | (b) | (c) | (d) | Q.No. | (a) | (b) | (c) | (d) |
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Section A (continued)

| Q.No. | (a) | (b) | (c) | (d) | Q.No. | (a) | (b) | (c) | (d) |
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Q.No.61 (Section B)

A.)



1 mark

Magnitude is $(\sqrt{3+1}) \text{ km hr}^{-1} = 2 \text{ km hr}^{-1}$

0.5 mark

Direction is 60° (or 120°), i.e. $\arctan(\sqrt{3})$
with respect to the rabbit's path.

0.5 mark

B.) $F = 4 + 12t$; $F \sin \theta = mg$ 1 mark

$$\sin 30^\circ = \frac{1}{2} \quad \text{and} \quad (4 + 12t) \sin 30^\circ = mg$$

$$\therefore t = 3 \text{ sec}$$

0.5 mark

Use this page if you need additional space for any question in Section B.
Mention the question number clearly.

61. B.

$$F = 4 + 12t$$

This force has a constant part and a variable part. The horizontal component of the acceleration due to the constant part is.

$$\frac{4 \cos \theta}{m} \cdot \left[\cos 30^\circ = \frac{\sqrt{3}}{2} \right]$$

$$= \sqrt{3} \text{ ms}^{-2} \quad \left[\because m = 2 \text{ kg} \right]$$

The average acceleration along the horizontal direction, due to the variable part is

$$\frac{1}{2} \cdot (12t) \frac{\cos 30^\circ}{m} = 3 \frac{\sqrt{3}}{2} t \text{ ms}^{-2}$$

Full average acceleration is,

$$\bar{a} = \left(\sqrt{3} + \frac{3\sqrt{3}}{2} t \right) \text{ ms}^{-2}$$

1 mark

$$\text{velocity} = \bar{a} t = \left(\sqrt{3}t + \frac{3\sqrt{3}}{2} t^2 \right) \text{ ms}^{-1}$$

$$= \frac{33}{2} \sqrt{3} \text{ ms}^{-1} \quad \left[\because t = 3 \text{ sec} \right]$$

$$\approx 28.58 \text{ ms}^{-1}$$

0.5 mark

Q.No.62 (Section B)

$$m = 0.25 \text{ kg}, \quad u = 5 \text{ ms}^{-1}, \quad v = -40 \text{ ms}^{-1}$$

1 mark

$$\Delta p = m(v - u) = -11.25 \text{ kg ms}^{-1}$$

1 mark

$$\text{Average force} = \frac{\Delta p}{\Delta t} = -75 \text{ N}$$

1 mark

Average change in momentum, Δp , is the area under the triangle.

$$\Rightarrow \frac{1}{2} \times t \times F_{\max} = \Delta p$$

0.5 mark

$$\therefore F_{\max} = 2 \frac{\Delta p}{t} = 150 \text{ N}$$

0.5 mark

For the second harder ball, time of contact is 0.125 s.

$$\therefore F_{\max} = 180 \text{ N}$$

1 mark

Q.No.63 (Section B)

PART I : b.) 801°C to 1465°C ———

PART II : a.) AB and CD ———

PART III : c.) CD ———

Q.No.64 (Section B) CALCULATION STEPS ARE VERY IMPORTANT
APPROXIMATE RESULTS ARE FINE

✓ Total energy of the products is

$$6 \times [-393.5 - 285.8] \text{ kJ} = -4075.8 \text{ kJ}$$

Total energy of the reactants is -1273.3 kJ

Net energy produced for 1 mole of glucose oxidation is

$$[-1273.3 - (-4075.8)] \text{ kJ} = -2802.5 \text{ kJ} \approx -2800 \text{ kJ}$$

→ [0.5 mark]

2/ 1 mole of glucose has $= [(6 \times 12) + (16 \times 6) + (1 \times 12)] \text{ gm}$
 $= 180 \text{ gm}$

∴ 10 gm is equivalent of $\frac{1}{18}$ mole.

Given the reaction equation, no. of moles needed to oxidize 10 gm of glucose is $\frac{6}{18} = \frac{1}{3}$ mole.

→ [1 mark]

$$PV = nRT \quad \therefore V = \frac{1}{3} \times R \times 298 = \frac{1}{3} \times 0.0821 \times 298$$

$$= 8.16 \text{ litres} \approx 8 \text{ litres}$$

is the volume of oxygen needed. → [0.5 mark]

$$\text{Volume of air need} = \frac{8.16}{20\%} = 40.8 \approx 41 \text{ litres (40 litres)}$$

→ [0.5 marks]

Use this page if you need additional space for any question in Section B.
Mention the question number clearly.

Question 59: (contd.)

3/ 1 mole of glucose (180 gm) produces
6 moles of CO_2 .

$\therefore \frac{1}{18}$ mole of glucose will produce $\frac{1}{3}$ mole of CO_2 .

—————→ 1 mark

$$PV = nRT, \quad P = 1 \text{ atm.}$$

$$\therefore V = \frac{1}{3} \times R \times 310 = \frac{1}{3} \times 0.0821 \times 310 \text{ litres} \\ \approx 8.5 \text{ litres.}$$

\therefore 8.5 litres of dry CO_2 will be produced on
Combustion of 10 gm of glucose

—————→ 1 mark

Q.No.65 (Section B)

a.) c. (oxygen uptake) \longrightarrow b.) a (oxygen test) \longrightarrow c.) a or d \longrightarrow d.) a \longrightarrow e.) b \longrightarrow f.) c \longrightarrow

Q.No.66 (Section B)

A. ~~No.~~ No. of dots is $n+2$

1 mark

No. of triangles is $\frac{n(n+1)}{2}$

2 marks

B. $V = xyz$

0.5 mark

$$S = 2(xy + yz + zx)$$

0.5 mark

$$\frac{1}{S} = \frac{1}{2xyz \left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right)}$$

$$\Rightarrow \frac{1}{S} = \frac{1}{2V \left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right)}$$

1 mark

Q.No.67 (Section B)

i.) WOMAN ——— B & E ——— 0.5 mark
MAN ——— C & F ——— 0.5 mark

ii.) B & D 1 mark

iii.) MOTHER ——— B 1 mark
FATHER ——— C

iv.) B 1 mark

v.) A 1 mark

Q.No.68 (Section B)

$$R = 1 + 1/R$$

2 marks

$$R = 1 + \left(\frac{1}{2} + \frac{1}{R} \right) = 1 + \frac{R+2}{R+2}$$

$$\Rightarrow R^2 + \cancel{1}R = \cancel{R} + 1^2 + R + 2$$

1 mark

$$\therefore R^2 - 2R - 1^2 = 0$$

1 mark

$$R = \frac{-(-2) \pm \sqrt{2^2 - 4 \cdot 1 \cdot (-1^2)}}{2}$$

0.5 mark

$$= \frac{2 + \sqrt{2^2 + 4 \cdot 1^2}}{2}$$

$$= \frac{2}{2} (1 + \sqrt{5})$$

0.5 mark