12 Science March 2020 Test MEMO

1.1   D

1.2   D

1.3   C

1.4   D

1.5   B

2.1   In an isolated system, total linear momentum is
conserved.   ✓✓

2.2
$$\Sigma p_i = \Sigma p_F \left. \right\} ✓$$

$$m_1 V_{i1} + m_2 V_{i2} = (m_1 + m_2) V_F$$
$$10(5) + (+0.05)(-250) = (10.05) V_F \quad ✓$$
$$V_F = 3.73 \ m.s^{-1} \ left \quad ✓$$

$\leftarrow \oplus$

2.3 E_k before: $E_k = \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2$

$$= \frac{1}{2}(0.05)(-250)^2 + \frac{1}{2}(10)(5)^2$$

$$= 1687.5 \ J \quad ✓$$

E_k after: $E_k = \frac{1}{2} mv^2$
$$= \frac{1}{2}(10.05)(3.73)^2 \quad ✓$$
$$= 69.91 \ J \quad ✓$$

E_k before $\neq E_k$ after $\therefore$ inelastic ✓

3.   Gift: $\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓
$$\Delta y = 9.5(x) + \frac{1}{2}(-9.8) x^2$$
$$= 9.5(x) - 4.9x^2 \quad ✓$$

Keys: $\Delta y_k = 0x + \frac{1}{2}(-9.8)x^2$
$$-10 + \Delta y = -4.9x^2$$
$$\therefore \Delta y = 10 - 4.9x^2 \quad ✓$$

$$9.5x - 4.9x^2 = 10 - 4.9x^2 \quad ✓$$
$$9.5x = 10$$
$$x = 1.05 \ s \quad ✓$$

$$\therefore \Delta y = 4.57 \ m \quad ✓$$

$\therefore$ 4.57 m above the ground

4.1 The net work done (by a net force) is equal to the change in kinetic energy. ✓✓ (2 or 0)

4.2.1
$$W_{net} = \Delta E_k$$
$$F_{net} \cdot \Delta x \cdot \cos\theta = \tfrac{1}{2}mv_f^2 - \tfrac{1}{2}mv_i^2 \quad \text{(either)} ✓$$
$$(147)(2)(\cos 180°) = \tfrac{1}{2}(75)(v_f^2) - \tfrac{1}{2}(75)(7)^2 ✓$$
$$\therefore v_f = 6,42 \text{ m.s}^{-1} ✓$$

⊕ - marking

4.2.2
$$W_{net} = \Delta E_k$$
$$F_{net} \cdot \Delta x \cdot \cos\theta = \tfrac{1}{2}mv_f^2 - \tfrac{1}{2}mv_i^2 \quad \text{(either)} ✓$$
$$[(75)(9,8)(\sin 40°) + 147](x)(\cos 180°) = \tfrac{1}{2}(75)(0)^2 - \tfrac{1}{2}(75)(6,42)^2 ✓$$
$$\therefore x = 2,50 \text{ m} ✓$$

$\{F_{net} = F_{g_{\parallel}} + f_k\}$

5.1 The apparent change in the frequency of a wave as observed by an observer, because of relative motion between the source of the wave and the observer.

5.2 $f_L = \dfrac{v \pm v_L}{v \pm v_s} f_s$ ✓

$$f_L = \dfrac{340 + (340-310)}{340} \; 280 ✓$$ ✓

$$= 304,71 \text{ Hz} ✓$$

6.1 Ag^+ is a stronger oxidizing agent than Cu^{2+} and will be reduced to Ag ✓✓

OR Cu is a stronger reducing agent than Ag and will be oxidized to Cu^{2+} (✓one mark only)

6.2.1 Chemical to electrical ✓

6.2.2 neutralise the charge imbalance in the solutions✓

Or pathway for ions

OR completes the circuit

6.2.3 $E^\theta_{cell} = E^\theta_{cathode} - E^\theta_{anode}$ ✓

$1,8$✓ $= 1,36 - E^\ominus_{anode}$✓

$E^\ominus_{anode} = -0,44V$

Thus X = Fe ✓

6.2.4 X or iron or Fe ✓

6.3.1 copper sulphate or $CuSO_4$✓

6.3.2 $Cu \rightarrow Cu^{2+} + 2e^-$ ✓✓