

Gr. 12 Physical Sciences Term 1 Test 2 (April 2021) Memo (50)

1.1 B✓✓

1.2 D✓✓

1.3 C✓✓

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

$$\begin{aligned}2.2 \quad \Sigma p_i &= \Sigma p_f \quad \checkmark \\ m_b v_b &= (m_b + m_{block})v_f \\ 0,02(300)\checkmark &= (7,02)v_f \checkmark \\ v_f &= 0,85 \text{ m} \cdot \text{s}^{-1} \text{ right} \quad \checkmark\end{aligned}$$

$$\begin{aligned}2.3 \quad \Sigma E_{ki} &= \frac{1}{2}mv^2 \quad \checkmark \\ &= \frac{1}{2}(0,02)(300)^2 \\ &= 900 \text{ J} \quad \checkmark\end{aligned}$$

$$\begin{aligned}\Sigma E_{kf} &= \frac{1}{2}mv^2 \\ &= \frac{1}{2}(7,02)(0,85)^2 \\ &= 2,54 \text{ J} \quad \checkmark\end{aligned}$$

LHS \neq RHS NOT elastic ✓

3.1 The motion of an object under the influence of gravity only. ✓✓

$$\begin{aligned}3.2 \quad \Delta y &= v_i \Delta t + \frac{1}{2}a \Delta t^2 \quad \checkmark \\ A: \Delta y &= 0x + \frac{1}{2}(9,8)x^2 \quad \checkmark \\ &= 4,9x^2\end{aligned}$$

$$\begin{aligned}B: \Delta y &= 40(x - 1) + \frac{1}{2}(9,8)x^2 \quad \checkmark \\ &= 4,9x^2 + 30,2x - 35,1\end{aligned}$$

$$\begin{aligned}\Delta y_A &= \Delta y_B \quad \checkmark \\ x &= 1,16 \text{ s} \\ \therefore \text{time is } &0,16 \text{ s} \quad \checkmark\end{aligned}$$

4.1 The work done on an object by a NET force is equal to the CHANGE IN the object's kinetic energy. ✓✓

4.2 $W_{nc} = \Delta E_k + \Delta E_p$

either ✓

$$f_k \cdot \Delta x \cdot \cos \theta = \left(\frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2 \right) + (mgh_f - mgh_i)$$

$$(25)(3)(\cos 180^\circ) \ddot{u} = \left[\left(\frac{1}{2} \right) (80)(v_f)^2 - \left(\frac{1}{2} \right) (80)(3)^2 \ddot{u} \right] + [0 - (80)(9,8)(1,5)] \checkmark$$

$$-75 = 40v_f^2 - 360 - 1176$$

$$v_f^2 = \frac{1461}{40} \quad (36,525)$$

$$v_f = 6,04 \text{ m} \cdot \text{s}^{-1} \checkmark$$

4.3 INCREASES. ✓

5.1 The minimum energy that an electron in the metal needs to be emitted from the metal surface. ✓✓

5.2 $7,38 \times 10^{-19} \text{ J}$ ✓

5.3 $E = W_0 + E_{k,max}$

either ✓

$$hf = W_0 + \frac{1}{2} m v_{max}^2$$

$$(6,63 \times 10^{-34})(1,5 \times 10^{15}) = (7,38 \times 10^{-19}) + \frac{1}{2} (9,11 \times 10^{-31})(v_{max})^2 \checkmark$$

$$v_{max} = 7,50 \times 10^5 \text{ m} \cdot \text{s}^{-1} \quad (750\,411,52 \text{ m} \cdot \text{s}^{-1}) \checkmark$$

5.4 REMAIN THE SAME. ✓

The energy of the photons (and therefore photoelectrons) depends only on the frequency of light. ✓5.4 REMAIN THE SAME. ✓

The energy of the photons (and therefore photoelectrons) depends only on the frequency of light. ✓

6.1 $f_{\text{rel}} = \frac{v \pm v_s}{v \pm v_o} f_s$ ✓
✓ $1076 = \frac{v + 0}{v - 30} (480)$ ✓
✓ $v = 336,25 \text{ m/s}$ ✓

6.2 Doppler flow meter ✓

7.1.1 Zn ✓

7.1.2 $E_{\text{cell}}^{\ominus} = E_{\text{cathode}}^{\ominus} - E_{\text{anode}}^{\ominus}$ ✓

$2,12 = E_{\text{cathode}} - (-0,76)$ ✓

$E_{\text{cathode}} = 1,36 \text{ (V)}$ ✓

P = Cl₂ gas ✓

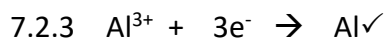
7.1.3 Zn is a stronger red agent than Cl₂, ✓ and will thus be oxidised. ✓

7.1.4 neutralise charges in the solutions ✓ / pathway for ions / completes the circuit

7.1.5 Zn / Zn²⁺ ✓ // ✓ Cl₂ / Cl⁻ / Pt ✓

7.2.1 A chemical change is brought about by an electrical current. ✓✓

7.2.2 Energy is added before any chemical reaction can take place / weak RA with weak OA ✓



7.2.4 Release of greenhouse gas CO₂ (burning of the anodes) ✓ or use of electricity requires generating electricity by burning coal, which releases CO₂ (a greenhouse gas)