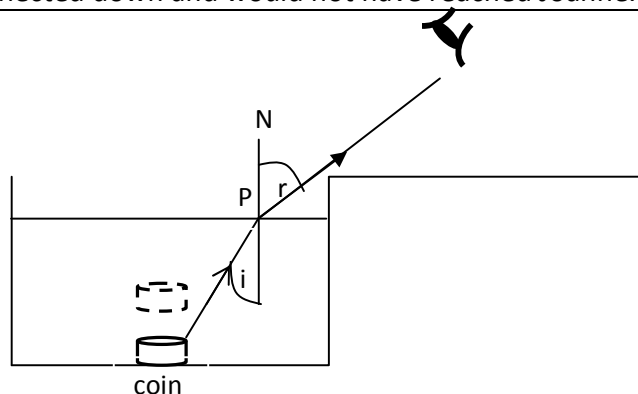


### Marking scheme Paper 1: Sample SEC papers

|         | Answer  | Mark   |
|---------|---|--------|
| 1. (a)  | Refraction of light   | 1 mark |
| (b) (i) | Ray drawn refracted away from the normal*   | 1 mark |
| (ii)    | Correct labelling of normal (N)   | 1 mark |
|         | Correct labelling of Angle of Incidence (i)   | 1 mark |
|         | Correct labelling of Angle of Refraction (r)  | 1 mark |
| (c)     | $n = \text{real depth}/\text{apparent depth} = 2/1.5$   | 1 mark |
|         | $n = 1.33$ (correct value)  | 1 mark |
| (d)     | $n = \text{vel}(\text{air})/\text{vel}(\text{medium}) = 3 \times 10^8 / v(\text{medium}) = 1.33$  | 1 mark |
|         | $v(\text{medium}) = 2.2 \times 10^8 \text{ m/s}$  | 1 mark |
| (e)     | Otherwise there is total internal reflection on the surface. The rays would have been reflected down and would not have reached Joanne. | 1 mark |

\*



|         |                                  |        |
|---------|----------------------------------|--------|
| 2. (a)  | Solid                            | 1 mark |
|         | Gas                              | 1 mark |
|         | Solid                            | 1 mark |
|         | Liquid                           | 1 mark |
| (b) (i) | Decrease in mass of gas          | 1 mark |
| (ii)    | Decrease in density              | 1 mark |
| (iii)   | No change                        | 1 mark |
| (iv)    | Decrease in number of collisions | 1 mark |
| (c) (i) | Decrease in pressure             | 1 mark |
| (ii)    | Balloon will become rounder      | 1 mark |

|        |   |          |
|--------|---|----------|
|        |   |          |
| 3. (a) | Bulb  | 1 mark   |
|        | Resistor/resistance   | 1 mark   |
|        | Switch  | 1 mark   |
| (b)    | Ammeter for Current   | 1 mark   |
|        | Voltmeter for potential difference (p.d.)   | 1 mark   |
| (c)    | Ammeter connected in series   | 1 mark   |
|        | Voltmeter connected in parallel across C  | 1 mark   |
| (d)    | Resistance across D & E<br>$1/R = 1/5 + 1/5 = 2/5$<br>$R = 2.5 \Omega$  | 1 mark   |
|        | Total resistance = $2.5 + 12 = 14.5 \Omega$   | 1 mark   |
|        | $I = V/R = 24/14.5 = 1.66 \text{ A}$  | 1 mark   |
|        |   |          |
| 4. (a) | $0 \rightarrow A$ constant/uniform acceleration   | 1 mark   |
|        | $A \rightarrow B$ constant/uniform velocity   | 1 mark   |
|        | $B \rightarrow C$ constant/uniform deceleration   | 1 mark   |
| (b)    | Area under Graph gives distance travelled   | 1 mark   |
| (c)    | <b>Method 1:</b><br>Area of trapezium = $\frac{1}{2}(OC+AB) \times 8 = \frac{1}{2}(240 + 120) \times 8$   | 1 mark   |
|        | $360 \times 8 = 1440 \text{ m}$<br>Correct value as answer  | 1 mark   |
|        | <b>Method 2:</b><br>Area = area $\Delta$ + area $\square$ + area $\Delta$<br>$= (\frac{1}{2} \times 90 \times 8) + (8 \times 120) + (\frac{1}{2} \times 30 \times 8)$ | (1 mark) |
|        | $= 360 + 960 + 120 = 1440 \text{ m}$<br>Correct value as answer   | (1 mark) |
| (d)    | Distance for OA is three times distance for BC<br>Or<br>Distance covered during BC is one third distance covered across OA.   | 1 mark   |

|            |  |                  |
|------------|--|------------------|
|            | Area under OA is 3 times that under BC<br>Or<br>Time under OA is three times longer than under BC                              | 1 mark           |
| (e)        | Av. Speed = tot dist./tot time = 1440/240<br>Correct values  | 1 mark           |
|            | = 6 m/s<br>Correct value   | 1 mark           |
|            |  |                  |
| 5. (a)     | B  | 1 mark           |
| (b)        | correct axes   | 1 mark           |
|            | correct points marked  | 1 mark           |
|            | correct scale  | 2 mark           |
| (c) (i)    | 15.0 V   | 1 mark           |
| (ii)       | 16.0 V   | 1 mark           |
| (d) (i)    | 6.0 V  | 1 mark           |
| (ii)       | $N_1/N_2 = V_1/V_2$<br>$N_2 = 400$ turns   | 1 mark<br>1 mark |
|            |  |                  |
| 6. (a) (i) | Acceleration due the gravity downwards is the same for both apples<br>Or<br>Acceleration downwards does not depend on the mass | 1 mark           |
| (ii)       | $10 \text{ m/s}^2$   | 1 mark           |
| (b) (i)    | Total momentum before collision = total momentum after collision   |                  |
|            | $m_1v_1 + m_2v_2 = (m_1+m_2)v$<br>$(0.5 \times 0.25) + (0.45 \times 0) = (0.5 + 0.45)v$  | 1 mark           |
|            | $0.125 + 0 = 0.95v$<br>$v = 0.125/0.95 = 0.13 \text{ m/s}$ Correct Value   | 1 mark           |
|            | Conservation of momentum   | 1 mark           |
| (ii)       | Total K.E. = $\frac{1}{2} mv^2$ ( $\frac{1}{2} \times 0.5 \times 0.25^2$ )   | 1 mark           |
|            | = 0.016 J  | 1 mark           |
| (iii)      | Total K.E. after = $\frac{1}{2} \times 0.95 \times 0.13^2$   | 1 mark           |

|         |  |                  |
|---------|--|------------------|
|         | = 0.008 J  | 1 mark           |
| (iv)    | Some of the KE before collision was changed to heat and sound energy   | 1 mark           |
|         |  |                  |
| 7. (a)  | Renewable sources are types of energy that can be used again   | 1 mark           |
|         | Non-renewable sources of energy are fuels which once used up cannot be reused again  | 1 mark           |
| (b)     | They produce less pollution<br>Thus the air quality is better /<br>There will be an improvement in climate change and global warming<br>(Or any other plausible reason)                              | 1 mark<br>1 mark |
| (c)     | 1. Switch off when not necessary<br>2. Use personal transport less, but walk, use bikes, car sharing etc.<br>3. Use air conditioner less although it is cold/hot<br>(or any other acceptable action) | 1 mark<br>1 mark |
| (d)     | Solar –<br>Malta is a sunny country with long spells of sun – and it does not pollute  | 1 mark<br>1 mark |
|         | Wind –<br>Malta is a windy country and it does not pollute   | 1 mark<br>1 mark |
|         | In this question: 1 mark for every plausible type of renewable energy identified & 1 mark for a plausible reason put forward.  |                  |
|         |  |                  |
| 8. (a)  | Centre of Gravity is the point at which the weight/gravity appears to act on an object   | 1 mark           |
| (b) (i) | 550 N  | 1 mark           |
| (ii)    | Force acting at the correct point and acting downwards   | 1 mark           |
| (c) (i) | Correct force of cliff on Luke's Foot<br>Correct force rope exerts on Luke   | 1 mark<br>1 mark |
| (ii)    | Correct tension in the rope  | 1 mark           |
| (d)     | Strength<br>So that it can withstand impacts of a large force  | 1 mark<br>1 mark |
|         | Crushable  | 1 mark           |

|            |  |        |
|------------|--|--------|
|            | So that large force of impact is absorbed by crushing /<br>When it is crushed time of impact is longer and force on head is less   | 1 mark |
|            |  |        |
| 9. (a) (i) | To check for fractured bones / To look inside the human body for swellings / In radiography (Any other plausible reason)   | 1 mark |
| (ii)       | They pass through human tissue but not through bones. / They blacken a photographic film / plates and images are produced  | 1 mark |
| (iii)      | scanning of luggage at airports / fine art photography / inspection of welding in industry / in detecting the atomic structures of crystals / any other plausible answer | 1 mark |
| (b) (i)    | Gamma Radiation  | 1 mark |
|            | Gamma Radiation passes through the human body and can be traced while alpha particles are stopped by tissue and cannot be traced.  | 1 mark |
| (ii)       | Short Half – life  | 1 mark |
|            | So that radioactivity inside the person’s body is present for only a short time as otherwise it will be dangerous to health  | 1 mark |
| (iii)      | Left kidney  | 1 mark |
|            | The radioactive count continues to grow showing that the kidney is not allowing flow of liquid and so is blocked   | 1 mark |
|            |  | 1 mark |
|            |  |        |
| 10. (a)(i) | Steel  | 1 mark |
| (ii)       | A and B have unlike/different poles  | 1 mark |
| (iii)      | A = North  | 1 mark |
|            | B = South  | 1 mark |
| (iv)       | Correct pattern of magnetic field  | 1 mark |
|            | Correct direction (from North to South)  | 1 mark |
| (b)(i)     | A current carrying conductor is placed between two poles of a magnet.<br>When current flows through the conductor, it is observed to give a kick in one direction        | 1 mark |
|            |  | 1 mark |
| (ii)       | magnet strength  | 1 mark |
|            | size of current  | 1 mark |