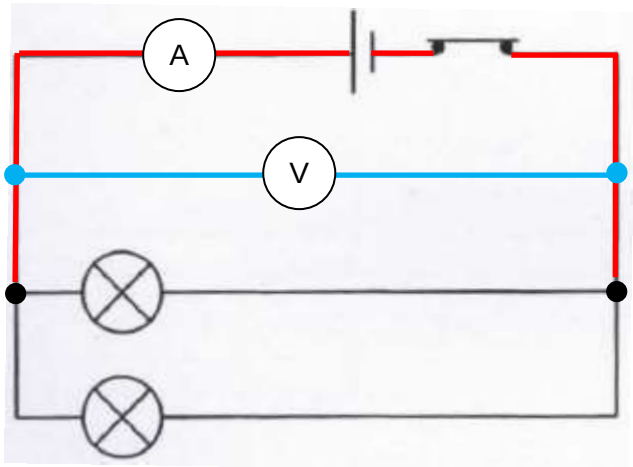
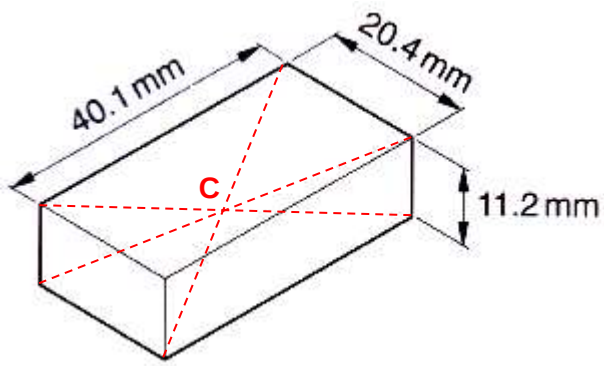
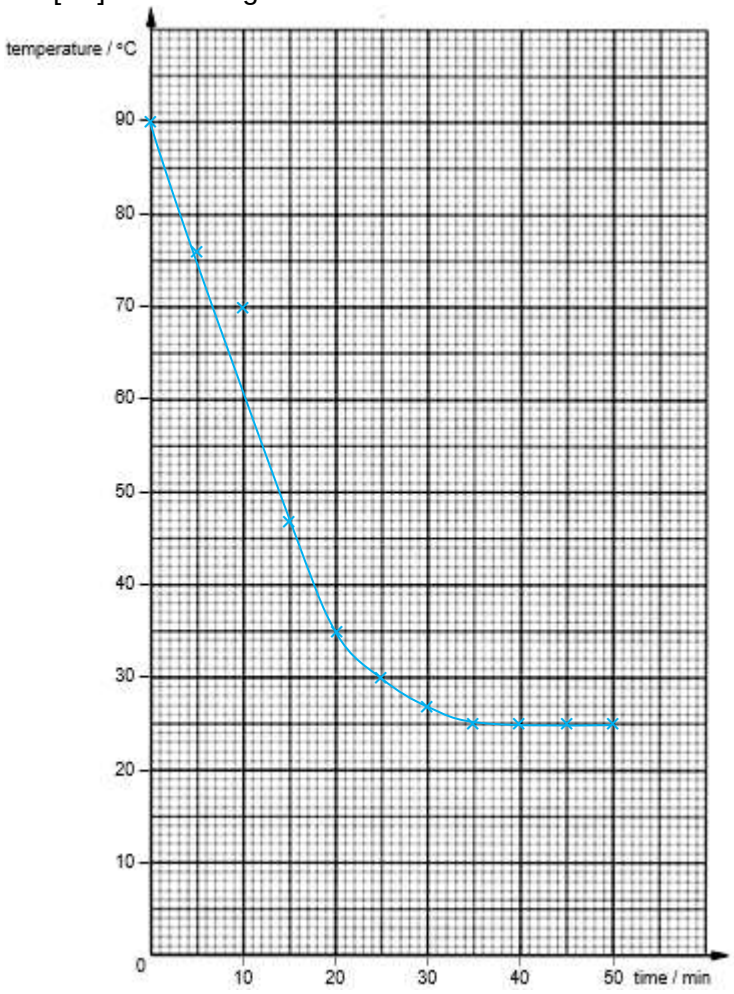
# GESS Preliminary Exam 2022 Science (Physics) 5105/02

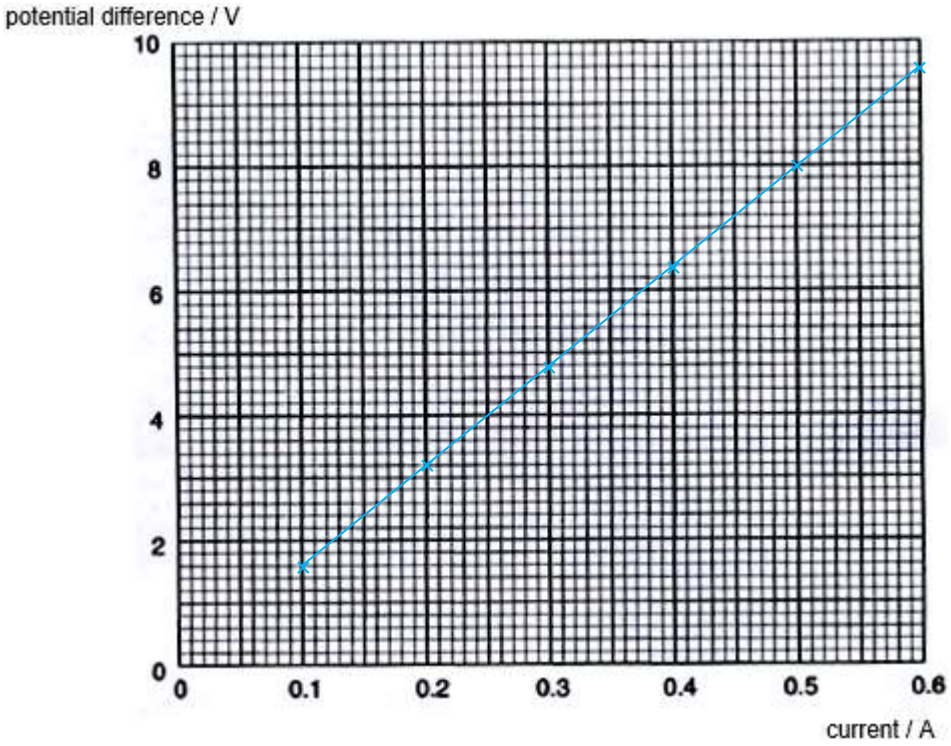
| Q | Marking Scheme | Marker's Comment |
|---|---|---|
| 1 | **(a)** **gravitational force / weight and force due to wind / air resistance** [B1] | |
| | **(b) (i)** Either At **A**, Shirley experienced **maximum acceleration due to gravity, 10 m/s$^2$**. [B1]<br>Or **As speed increases, air resistance also increases.** [B1]<br>As Shirley fell, she experienced **increasing air resistance**, the **resultant force acting on her decreased** and the acceleration decreases. [B1]<br><br>**(ii) C** [B1]<br><br>**(iii) EF** [B1] | |
| 2 | **(a)** $T$ = 0.01 s either [B1]<br>$f = 1 / T$<br>= 1 / 0.01 or [M1]<br>= **100** Hz and [A1] | |
| | **(b)** Either $\lambda = v / f$<br>= 340 / 100<br>= **3.4** m [B1]<br>Or $\lambda = vT$<br>= 340 × 0.01<br>= **3.4** m [B1] | |

| Q | Marking Scheme | Marker's Comment |
|---|---|---|
| 3 | **(a)**<br>  <br><br>[B1] for drawing ammeter symbol anywhere along the red path<br>[B1] for drawing voltmeter symbol across the lamps (in parallel) | |
| | **(b)** $I$ = 3.75 A, $V$ = 4.50 V<br>current through each lamp = 3.75 / 2 = 1.875 A either [B1]<br>**(i)** $R = V / I$<br>= 4.50 / 1.875 or [M1]<br>= **2.4** Ω and [A1]<br><br>**(ii)** $P = VI$<br>= 4.50 × 3.75 [M1]<br>= **16.9** W [A1] | |

| Q | Marking Scheme | Marker's Comment |
|---|---|---|
| 4 | **(a) <u>vernier calipers</u>** [B1] | |
| | **(b)**   | |
| | **(c) (i)** $g = W / m$<br>= 1.80 / (176.8/1000)<br>= **<u>10.2</u>** N/kg [B1]<br><br>**(ii)** $\rho = m / V$<br>= 176.8 / (4.01 × 2.04 × 1.12) [M1]<br>= **<u>19.3</u>** g/cm$^3$ [A1]<br><br>**(iii)** The bar is very likely to be **<u>pure gold</u>** as the calculated value is **<u>almost the same as</u>** the density of pure gold. [B1]<br><br>**(iv)** $P = F / A$<br>= 1.80 / (4.01 × 2.04) [M1]<br>= **<u>0.220</u>** N/cm$^2$ [A1] | |

| Q | Marking Scheme | Marker's Comment |
|---|---|---|
| 5 | **(a)** [B1] for plotting all the points correctly with × (allow one error in plotting point)<br>[B1] for drawing best-fit curve<br>  <br> | |

| Q | Marking Scheme | Marker's Comment |
|---|---|---|
| 5 | **(b) (i)** **<u>10</u>** min [B1]<br><br>**(ii)** **<u>25</u>**°C [B1]<br><br>**(iii) 1** **<u>Dull black</u>** surface [B1]<br><br>**2** Can **A** loses heat faster than can **B** as **<u>the temperature of water in can A decreases faster</u>** than can **B** [B1] as dull black surface is **<u>good emitter of heat radiation</u>**. [B1] | |
| | **(c)** **<u>Cover both cans with a lid / Wrap both cans with an insulating material</u>** [B1] | |

| Q | Marking Scheme | Marker's Comment |
|---|---|---|
| 6 | **(a) (i)** [B1] for plotting all the points correctly with × (allow one error in plotting point)<br>[B1] for drawing best-fit line<br>  <br><br>**(ii)** resistance = gradient of potential difference-current graph<br>= (9.6 – 1.6) / (0.6 – 0.1) [M1]<br>= **16** Ω [A1] | |

<table>
<tr><th>Q</th><th>Marking Scheme</th><th>Marker's Comment</th></tr>
<tr><td rowspan="2">6</td><td>(b)
<table>
<tr><th></th><th>property of wire</th><th>high resistance</th><th>low resistance</th></tr>
<tr><td rowspan="2">first experiment</td><td>1 m long</td><td>✓</td><td></td></tr>
<tr><td>2 cm long</td><td></td><td>✓</td></tr>
<tr><td rowspan="2">second experiment</td><td>2 mm thick</td><td>✓</td><td></td></tr>
<tr><td>1 cm thick</td><td></td><td>✓</td></tr>
</table>
[B1] for every two correct ticks</td><td></td></tr>
<tr><td>(c) Wire <u>X</u> [B1] is the live wire which is <u>connected to both switch and fuse</u> so that the <u>kettle can be isolated if there is excessive current or leakage of curren</u>t. [B1]</td><td></td></tr>
</table>