| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 3 (a) (i) | 8.2 (m/s) ; | | 1 |
| (ii) | any TWO from:<br><br>MP1. reference to weight and drag;<br><br>MP2. weight greater than drag;<br>MP3. resultant force causes acceleration;<br><br>MP4. drag increases with speed;<br><br>PLUS<br><br>weight = drag at terminal velocity/eq; | ignore reference to upthrust<br><br>accept water friction or water resistance for "drag"<br>accept 'gravitational force' for 'weight'<br><br>"F=ma" is insufficient by itself | 3 |
| (b) (i) | pressure difference = height × density × g ; | accept depth for height<br>accept accepted symbols e.g. p, h, d (for height), d or ρ (for density),<br>accept any correct rearrangement<br><br>reject 'gravity' for 'g' | 1 |
| (ii) | substitution;<br><br>evaluation;<br><br>correct answer: 250 000 (Pa)<br><br>e.g. pressure difference = height × density × g<br>pressure difference = 25 × 1000 × 10<br>pressure difference = 250 000 (Pa) | accept use of 9.8(1) for 'g' giving 245 000 (Pa)<br><br><br>POT error gives −1 except if no evidence of use of 'g' | 2 |
| (iii) | addition of $1.0 \times 10^5$ to candidate's answer to (ii);<br>correct answer: $3.5 \times 10^5$ (Pa) | accept answer not given in standard form | 1 |
| (iv) | substitution into given equation;<br><br>rearrangement;<br>correct evaluation;<br>correct answer: 0.13(14) ($m^3$)<br><br><br>e.g. $p_1 \times V_1 = p_2 \times V_2$<br>$1.0 \times 10^5 \times 0.46 = 3.5 \times 10^5 \times V_2$<br>$V_2 = (1.0 \times 10^5 \times 0.46) \div (3.5 \times 10^5)$<br>$V_2 = 0.1314$ ($m^3$) | subs and rearrange can be in either order;<br><br><br>condone use of $2.5 \times 10^5$ Pa giving V = 0.18… ($m^3$) for 2 marks<br><br>condone use of $2.45 \times 10^5$ Pa giving V = 0.188… (m3) for 2 marks | 3 |

Total for Question 3 = 11 marks

| Question number | Answer | Notes | Marks |
|---|---|---|---|
| 6 (a) | any THREE from:<br>MP1. correct reference to convection;<br>MP2. fan aids convection;<br>MP3. reference to conduction not being the main method;<br>MP4. (since) {plastic/air} is a poor conductor/good insulator;<br>MP5. white (materials) are poor at emitting /eq; | allow idea of heat reflecting back / not absorbing well from this interior white surface | 3 |
| (b) | any THREE from:<br>MP1. correct reference to conduction;<br>MP2. since {metals/aluminium} conducts well;<br>MP3. reference to convection not being the main method;<br>MP4. as hot air particles can't circulate (from inside to outside);<br>MP5. black (materials) are good at emitting/eq; | allow idea of heat being absorbed well from the interior black surface | 3 |
| (c) (i) | power = voltage × current; | accept 'P = IV'<br>accept any correct rearrangement | 1 |
| (ii) | substitution;<br>evaluation;<br>watt or W as the unit;<br><br>correct answer: 15 watts<br><br>e.g. power = voltage × current<br>power = 5.1 × 2.9<br>power = 14.8 watts | <br><br><br><br>accept 14.8,14.79 W | 3 |

Total for Question 6 = 10 marks