Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic : 4_Materials

Name of the Student:____

Max. Marks : 19 Marks **Time : 19 Minutes**

Mark Schemes

Q1.

Question Number	Acceptable answers		Additional guidance	Mark
(b)	An explanation that makes reference to the following points: • Weight of blanket decreases as it dries • Tension in line decreases • So stress decreases and Young modulus is constant so strain decreases • extension decreases **Or** line gets shorter • height of the blanket from the ground increases	(1) (1) (1) (1) (1)	Allow mass for weight MP4 dependent on MP3 MP5 dependent on MP4	5

Q2.

Question Number	Acceptable Answers	Additional guidance	Mark
	• Comment that a straight line graph through the origin (up to 5 N) is consistent with Hookes law / $F \propto x$ (1) • Comment that indicates that the max extended length 400 mm is not covered by the student's results (1) • Use of $\Delta E_{el} = \frac{1}{2}F\Delta x$ **and** $F = k\Delta x$ with $\Delta x = 0.4$ m **Or** Use of $\Delta E_{el} = \frac{1}{2}F\Delta x$ using extrapolated readings from graph (1) • Candidate's calculated energy value compared with 1.6 J and valid conclusion given (1) **Either** • Use of %U to determine the range in k (manufacturer's) (1) • Comparison of values for k with conclusion consistent with candidates calculated value (1) **Or** • Calculates % difference between candidate's calculated value for k and 21 N m^{-1} (1) • Comparison of calculated % difference with 5% and conclusion made (1)	Example of calculation $k = 21 \pm 1.05 = 19.95 - 22.05$ N m^{-1} $F = k\Delta x = 20$ N m^{-1} $\times$ 0.4 m = 8.0 N $\Delta E_{el}(\text{max}) = \frac{1}{2} \times 8.0$ N $\times$ 0.4 m = 1.6 J	6

Q3.

Question Number	Acceptable answers		Additional guidance	Mark
(a)	• use of $\rho = m/V$ and $W = mg$ to calculate upthrust • use of downward force of lid = upthrust – weight of diver • downward force of lid = 0.021 (N)	(1) (1) (1)	Example of calculation $m_{displaced} = 1.0 \times 10^3$ kg m^{-3} $\times 8.0 \times 10^{-6}$ m^{-3} $= 8.0 \times 10^{-3}$ kg $U = 8.0 \times 10^{-3}$ kg $\times$ 9.81 N kg^{-1} = 0.0785 N W = 0.0059 kg $\times$ 9.81 N kg^{-1} = 0.0579 N Lid force = 0.0785 N - 0.0579 N = 0.0206 N	3

Question Number	Acceptable answers		Additional guidance	Mark
(b)	**Either** • use of force of lid = $V\rho g$ • volume of air = 8.0×10^{-6} m^{-3} - their value • volume of air = 5.9×10^{-6} (m^3) **Or** • use of upthrust on diver = weight of diver • use of upthrust = $V\rho g$ • volume of air = 5.9×10^{-6} (m^3)	 (1) (1) (1) (1) (1) (1)	Example of calculation volume = 0.0206 N ÷ 9.81 N kg^{-1} ÷ 1.0×10^3 kg m^{-3} $= 2.1 \times 10^{-6}$ m^{-3} new volume of air = 8.0×10^{-6} m^{-3} - 2.1×10^{-6} m^{-3} $= 5.9 \times 10^{-6}$ m^3	3

Question Number	Acceptable answers		Additional guidance	Mark
(c)	• use of pV = constant • $p = 1.4 \times 10^5$ Pa	(1) (1)	Example of calculation $p_1 \times V_1 = p_2 \times V_2$ $p_2 = 1.01 \times 10^5$ N m^{-2} $\times$ 8.0×10^{-6} m^{-3} / 5.9×10^{-6} m^3 $p = 1.37 \times 10^5$ Pa	2