

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Mark Schemes

Q1.

Question	Answer	Additional guidance	Mark
(i)	substitution (1) (work done =) $1200 \times 8(.0)$ evaluation (1) (work done =) 9600 unit (1) J	award two marks for the correct answer without working independent mark accept j OR joule(s) OR N m ignore n m (lower case n) accept 9.6 kJ (kilojoules) for three marks	(3) AO2.1

Question	Answer	Additional guidance	Mark
(ii)	A description to include two from: kinetic (energy store) (1) (kinetic energy store is) transferred to thermal (energy store) (1) energy of the surroundings increases	ignore references to GPE KE accept heat for thermal thermal (energy store) increases accept arrow for 'transferred to'	(2) AO2.1
	(1) OR energy is dissipated (to surroundings) (1)	energy is transferred to the air/ground/surroundings	

Question	Answer	Additional guidance	Mark
(i)	substitution (1) $(P =) \frac{130\,000}{87}$ evaluation (1) $(P =) 1494$ (W) value to 2sf (1) 1500 (W)	award two marks for the correct answer without working independent mark for any number to 2sf	(3) AO2.1

Question	Answer	Additional guidance	Mark
(ii)	substitution (1) $(\text{efficiency} =) \frac{96\,000}{130\,000}$ evaluation (1) $(\text{efficiency} =) 0.74$	accept values that round to 0.74 e.g. 0.7385 accept 74 % for 2 marks allow 74 without % sign for 1 mark only allow 0.73 or 73% for 1 mark award full marks for the correct answer without working	(2) AO2.1

Q3.

Question Number	Answer	Additional guidance	Mark
(i)	(In every second), distance moved by chain around large gear = distance moved by chain around small gear (1) $2 \times 48 = \text{turns} \times 12$ rearrangement and evaluation (1) 8 (turns each second)	accept use of gear ratio seen or implied e.g. 4:1 or 4/1 or 48:12 or 48/12 or converse e.g. 1:4 award full marks for the correct answer without working	(2)

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation linking reduces friction/amount of thermal energy transferred (1) extra useful energy is available/less input energy is required (1) efficiency = useful energy transferred (by the bicycle) ÷ total energy supplied (to the bicycle) (1)	(oil provides) lubrication less energy wasted allow for the last two mark points; either less input energy is required to produce the same output for 2 marks or more output energy is available for the same input energy for 2 marks	(3)

Q4.

Question number	Answer	Additional guidance	Mark
	substitution (1) (mean speed) $= \frac{1.31 + 1.27 + 1.16}{3}$ evaluation (1) speed = 1.25 (m/s)	$\frac{3.74}{3}$ any number that rounds to 1.25 (m/s) e.g. 1.247 accept 1.2 or 1.3 allow 1.24 award full marks for the correct answer without working	(2) AO2

Q5.

Question number	Answer	Additional guidance	Mark
	substitution (1) $KE = \frac{1}{2} \times 58 (\times 10^{-3}) \times 28^2$ conversion (1) uses 58×10^{-3} or 0.058 evaluation (1) 23 (J)	do not penalise p.o.t.e. at this stage award full marks for any answer that rounds to 23 (e.g. 22.736) (J) award max two marks for any answer that rounds to 2.3 to any other power of 10 consolation mark for not squaring 28 (8.1(2) to any p.o.t.) (maximum 1 mark)	(3) AO2