Q1.

Question Number	Answer	Mark
	The only correct answer is B: work done= force x distance moved in direction of force **A is incorrect** because the equation would be dimensionally inconsistent **C is incorrect** because the equation would be dimensionally inconsistent **D is incorrect** because the direction of the distance moved is incorrect	(1)

Q2.

Question number	Answer	Additional guidance	Mark
	Explanation linking **two** from: choice of distance (1) 6.3 m (calculations of work done need) the distance moved in the direction of the force (1) (friction acts) along the slope / hypotenuse (1)	 accept pushed up the slope	**(2)** **AO3**

Q3.

Question Number:	Answer	Additional guidance	Mark
	recall and substitution (1) 1600 = force x 28 rearrangement (1) (force) = $\frac{1600}{28}$ evaluation (1) 57 (N)	substitution and rearrangement in either order accept f, F or ? for force accept values that round down to 57 e.g. 57.14 award full marks for correct answer without working award 1 mark for answers of 44800 or 0.0175 **and** a correct expression relating work, force and distance	**(3)** AO 2 1

Q4.

Question number	Answer	Additional guidance	Mark
(i)	rearrangement of work = force × distance (1) d = W ÷ F substitution and evaluation (1) 18 (m)	d = 2700 ÷ 150 Award full marks for correct answer without working	**(2)**

Q5.

Question	Answer	Additional guidance	Mark
(i)	substitution (1) (work done =) 1200 × 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**

Q6.

Question number	Answer	Additional guidance	Mark
(a)(ii)	rearrange (1) force = work done ÷ distance answer (1) (force) = 15 (N)	accept rearrangement with values subst., i.e. (force) = 1200 ÷ 80 award full marks for correct numerical answer without working	(2)

Question number	Answer	Additional guidance	Mark
(b)	An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark): • the work done is the same for walking and running (1) • because work done depends on force and distance only, not time (1)	allow energy for work done because work done ÷ time is power	(2)

Q7.

	Answer	Acceptable answers	Mark
	substitution: 0.6 × 20 (1) evaluation 12 (1) J (1)	give 2 marks for correct answer no working unit is an independent mark joules, Nm, kgm^2/s^2, Ws	(3)

Q8.

Question Number	Answer	Acceptable answers	Mark
(a)	**D** driving for a long time without taking a break		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	substitution 1200 x 8(.0) (1) evaluation 9600 (J) OR 9.6×10^3 (J) (1)	Give full marks for correct answer with no working. 9.6 x any other power of 10 = 1 mark	**(2)**

Q9.

Question number	**Answer**	**Additional guidance**	**Mark**
(ii)	recall (1) work done = force x distance substitution and evaluation (1) (work done =) 14,000 (J)	(work done) = 700 x 20 award full marks for the correct answer without working	**(2)** **AO1**