1(a)(i)	pressure = force / area or force per unit area symbols need to be defined allow weight	B1
(ii)	force times distance moved / displacement in the direction of the force	M1 A1
(iii)	power = work done or energy / time	B1
(b)(i)	force = pressure x area / 150 x 8 = 1200 (N)	C1 A1
(ii)	power = F x v = 1200 x 16 ecf = 19200 (W)	C1 C1 A1
(iii)	(force greater as) air resistance is greater explanation of why: correct quantification, air resistance proportional to v or v^2 or in terms of molecules harder collisions or increased rate of collision power greater as force is greater power greater as velocity is greater MAX 3 TOTAL [12]	B1 B1 B1 B1
2(a)(i)	point where the (whole) weight / mass of a body (appears to) act	B1
(ii)	sketch with point or pivot, force and distance labelled / clear symbols moment = force x perpendicular distance (full definition can score two marks without a sketch provided the distance is from the pivot to the force)	B1 B1
(b)(i)	W = 5 x 9.81 = 49 (N) (allow g = 10)	A1
(ii)	arrow acting down (labelled W) drawn approximately halfway from A to B	A1
(iii)	any correct moment F x 0.8 = 200 x 0.25 + 49 x 0.4 F = 87 (N)	C1 C1 A1
2(b)(iv)	upward force acts at the hinge So F and force at hinge equals weight of table and computer (allow one mark for the upward forces equal the downward forces) TOTAL [10]	B1 B1

3	(a)	$v_x = 42 \cos 36$	B1
		$= 34$ (m s^{-1})	A0
	(b)	time = 170 / 34	B1
		= 5 (s)	A0
	(c)(i)	$v_y = v \sin 36 / \cos 54$	C1
		= 24.7 (allow 25)	A1
	(ii)	$v^2 = u^2 + 2as$ / $s = ut + \frac{1}{2} at^2$ / $s = [(u + v)/2]t$	C1
		$0 = (24.7)^2 - 2 \times 9.81 \times s$ ecf from (c)(i)	C1
		s = 31.(1) (m) allow 31 to 32 as answer depends on sig figs and equation used	A1
	(d)	k.e. = ½ m v^2	C1
		= 0.5 x 50 x 10^{-3} x (34)^2	C1
		= 28.9 (J)	A1
	(e)(i)	height less	B1
		range less	B1
	(ii)	force acting against the motion and this effect on the acceleration / ball does work against air resistance / k.e. reduced due to air resistance / velocity is reduced by air resistance	B1

TOTAL [13]

4	(a)	the force that causes a mass of one kg to accelerate at 1 m s^{-2}	B1
	(b)(i)	acceleration = 13 / 20 or gradient attempted	C1
		= 0.65 (m s^{-2}) ± 0.01	A1
	(ii)	force = ma / 1200 x 0.65 ecf (b)(i)	C1
		= 780 (N)	A1
	(iii)	force = 400 x 0.65 ecf (b)(i)	C1
		= 260 (N)	A1
4	(c)(i)	(gradient is less hence) acceleration is less / reaches terminal velocity	B1
	(ii)	resultant force is less / resistive forces are increasing / driver eases off the accelerator / climbing a hill	B1

TOTAL [9]

5 (a)(i) extension / original length or unit length **B1**

(ii) force / (cross – sectional) area **B1**

(iii) (tensile) stress / (tensile) strain **B1**

(b) Pa / $N\,m^{-2}$ **B1**

(c) measurements:
area / diameter, original length, force / mass and extension **B1**

micrometer for the diameter **B1**
(metre) rule for the original length **B1**
masses used for the load / force = mass x g **B1**
marker on the wire and mm scale / rule for extension **B1**
[MAX 3]

length of wire greater than one metre stated **B1**
repeating for a number of loads **B1**
measure the diameter in several places **B1**
measure the original length to the marker **B1**
marker put nearer to pulley **B1**
[MAX 3]

allow one mark for good physics **B1**
eg using a second wire as a reference or to compensate for temperature changes / use a second wire with a micrometer scale to measure the extension / remove load to check extension

calculations:

plot a graph (eg force against extension of equivalent) **B1**
determine the gradient **B1**
E = (gradient x length) / area **B1**

substituting values into the equation scores one out of three
[TOTAL MAX 10]

QWC

Spelling, punctuation and grammar **B1**
Organisation **B1**

TOTAL [16]