1(a)	the velocity is the speed in a particular direction **OR** velocity has a direction **OR** velocity is 56 m / s in a certain direction velocity is a vector **OR** speed is a scalar
1(b)	6.9×10^8 J **OR** 690 000 000 J **OR** 690 MJ
	(KE =) ½ mv^2 **OR** $0.5 \times 440\,000 \times (56)^2$
1(c)(i)	5.3×10^5 N **OR** 530 000 N
	(F =) ma **OR** $440\,000 \times 1.2$
1(c)(ii)	1300 m **OR** 1.3 km
1(c)(ii)	(d =) W / F **OR** (Δ)t = Δv / a **OR** 56 / 1.2 **OR** (Δ) t = change of momentum / force
	(distance =) 6.9×10^8 / 530 000 **OR** (distance =) average velocity × time taken **OR** 1.3×10^N

2(a)(i)	direction (changes)
	any **one** from: • magnitude of the velocity (changes) • speed (changes) • (there is) acceleration
2(a)(ii)	any **one** from: • (change) size • (change) shape
2(b)	1 place (the centre of) the metre ruler on the pivot owtte **OR** (labelled) diagram showing metre ruler on a pivot
	2 add mass on one side (of pivot) and then add mass on other side to balance the ruler owtte
	3 (moment =) force × <u>perpendicular</u> distance (from pivot)
	4 sum of clockwise moments = sum of anticlockwise moments (when in equilibrium)

3(a)	<u>gravitational</u> potential to kinetic to gravitational potential
	to thermal (store) **OR** to internal (store)
3(b)(i)	1800 J
	(W =) Fd **OR** (W =) $65 \times 9.8 \times 2.8$
3(b)(ii)	$F = \Delta p \div (\Delta)t$ **AND** Δp is change in momentum, (Δ)t is time (taken) **OR** $F = \Delta\{mv\} \div (\Delta)t$ **AND** $\Delta\{mv\}$ is change in momentum, (Δ)t is time (taken) **OR** force = rate of change in momentum **OR** force = change in momentum divided by time (taken)
	$F = \Delta p \div (\Delta)t$ **OR** $F = \Delta\{mv\} \div (\Delta)t$ **OR** $F = I \div (\Delta)t$

10(a)	Jupiter is gaseous
	Earth is rocky
10(b)(i)	(gravitational) force per unit mass **OR** (g =) $\frac{\text{weight}}{\text{mass}}$ in this form
	(gravitational) force on a mass **OR** $W = mg$
10(b)(ii)	mass
10(c)	(orbital speed of) Jupiter is slower ORA
	Jupiter is further from the Sun ORA **OR** orbital speeds of planets decrease as distance from the Sun increases ORA
	gravitational field (strength) of Sun decreases with distance (from Sun) ORA

Multiple Choice Answers

Q5: A

1(a)(i)	(magnitude of velocity =) 0.90 m / s
	use of Pythagoras' theorem e.g. $a^2 + b^2 = c^2$ OR (speed =) $\sqrt{(0.54^2 + 0.72^2)}$ **OR** correct vector triangle or rectangle drawn
	(direction of velocity =) 53° (to riverbank)
	use of trigonometry to find angle e.g. $\tan\theta = 0.72 / 0.54$ **OR** (only) angle with horizontal identified on the diagram
1(a)(ii)	(distance =) 81 m
	$v = s / t$ **OR** (s =) vt **OR** (s =) $0.9(0) \times 90$
	(time =) 1.5×60 (= 90) **OR** (time =) 90
1(b)	friction (of water backwards) **OR** resistance (on swimmer backwards)
	(friction / resistance) balances forward force **OR** (there is) no resultant force