



ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2011

Physics

Assessment Unit AS 1

assessing

Module 1: Forces, Energy and Electricity

[AY111]

TUESDAY 21 JUNE, MORNING

MARK SCHEME

1	(a)	<table border="1"> <thead> <tr> <th>Base Quantities</th><th>S.I. Unit</th></tr> </thead> <tbody> <tr> <td>mass</td><td>kg</td></tr> <tr> <td>length</td><td>m</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Derived Quantities</th><th>S.I. Unit</th></tr> </thead> <tbody> <tr> <td>volume</td><td>m^3</td></tr> <tr> <td>density</td><td>$kg\ m^{-3}$</td></tr> </tbody> </table>	Base Quantities	S.I. Unit	mass	kg	length	m	Derived Quantities	S.I. Unit	volume	m^3	density	$kg\ m^{-3}$	AVAILABLE MARKS
Base Quantities	S.I. Unit														
mass	kg														
length	m														
Derived Quantities	S.I. Unit														
volume	m^3														
density	$kg\ m^{-3}$														
<p>Don't accept a solidus (here or elsewhere)</p> <p>[$\frac{1}{2}$] each quantity in correct place, [$\frac{1}{2}$] each unit with quantity, round down Allow ecf for SI unit from named quantity</p>															
	(b)	Uses appropriate equation <u>and</u> converts to base units $kg\ m^2\ s^{-2}$	[1] [1] [2]												
2		Largest error in timing (with stopwatch) – reaction time Use electronic timing system instead of stopwatch or equivalent Repeat times (at each height) Use a range of heights	[1] [1] [1] [1]												
		Calculate g for each height or plot graph of s against t^2 (or any suitable alternative)	[1]												
		Average values of g (if from calculation) or states how g is found from gradient of their graph.	[1] [6]												
		Quality of written communication													
	2 marks	The candidate expresses ideas clearly and fluently, through well-linked sentences and paragraphs. Arguments are generally relevant and well structured. There are few errors of grammar, punctuation and spelling.													
	1 mark	The candidate expresses ideas clearly, if not always fluently. Arguments may sometimes stray from the point. There are some errors in grammar, punctuation and spelling, but not such as to suggest a weakness in these areas.													
	0 marks	The candidate expresses ideas satisfactorily, but without precision. Arguments may be of doubtful relevance or obscurely presented. Errors in grammar, punctuation and spelling are sufficiently intrusive to disrupt the understanding of the passage.	[2]												
			8												

				AVAILABLE MARKS
3	(a) Parabolic path, starting at 1.0 m ending at height of 0.40 m	[1]	[1]	
	(b) (i) 6.6 ms^{-1}		[1]	
	(ii) Uses $v^2 = u^2 + 2as$ Subs into equation (ignore negative signs) Calculation leading to 7.417 (> 2 sig fig) ↳ for v or v^2	[1]	[1]	[3]
	(iii) Subs correct signs into suitable equation of motion $v = u + at$ Calculation to 1.4 s	[1]	[1]	8
4	(a) (i) Anticlockwise		[1]	
	(ii) Continues line of action of F and shows perpendicular distance, 90° by eye		[1]	
	(b) (i) Correct relative positions of branch and monkey Forces correct, 1766 N, 235 N (allow 180 kg and 24 kg)	[1]	[1]	[2]
	(ii) Calculates any moment correctly ecf (i) Subs: $1766(1.3) + 235(3.5) + X(284) = 4020$ $X = 3.2 \text{ m}$	[1]	[1]	[3]
	(iii) Perpendicular distance reduced when branch bends		[1]	8
5	(a) (i) Shows efficiency = p.e. at end/p.e. at start Cancels m and g	[1]	[1]	[2]
	(ii) Uses rebound height of 1160 mm $\text{Efficiency} = \frac{1160}{1800} = 0.64$	[1]	[1]	[2]
	(b) Equates: $mgh = \frac{1}{2}mv^2$ or $v^2 = u^2 + 2as$ $v = 4.3 \text{ (ms}^{-1}\text{)}$	[1]	[1]	6
6	(a) Extension is proportional to applied force Provided the proportional limit is not exceeded	[1]	[1]	[2]
	(b) (i) Graph starts at (5,0) Straight line up to (8 N) Correct curve after 8 N Forfeit 1st mark for extension graph	[1]	[1]	[3]
	(ii) Uses $F = kx$ or calculates gradient of straight line graph $k = 0.67$ or 67 N cm^{-1} or N m^{-1} (must be consistent with their answer)	[1]	[1]	8

