

1. D [1]
2. (a) $g = \frac{2s}{t^2}$;
 $s = 1.75 \text{ m}$, $t = 0.6 \text{ s}$;
 $g = 9.7 \pm 0.1 \text{ m s}^{-2}$; 3
Award [2 max] if data not from last three data points.
- (b) horizontal speed = 3.2 m s^{-1} ;
use of $v = gt$ or $s = \frac{1}{2}gt^2$;
vertical speed = 11.6 or 11.7 m s^{-1} ;
use of Pythagoras' theorem;
speed = 12 m s^{-1} ; 5
- (c) line always to left of spheres;
becoming more vertical; 2 [10]
3. D [1]
4. A [1]
5. C [1]
6. B [1]
7. (a) (i) $h = \frac{v^2}{2g}$;
to give $h = 3.2 \text{ m}$; 2
(ii) 0.80 s ; 1
- (b) time to go from top of cliff to the sea = $3.0 - 1.6 = 1.4 \text{ s}$;

recognize to use $s = ut + \frac{1}{2}at^2$ with correct substitution,

$$s = 8.0 \times 1.4 + 5.0 \times (1.4)^2;$$

to give $s = 21 \text{ m}$;

3

Candidates might find the speed with which the stone hits the sea from $v = u + at$, (42 m s^{-1}) and then use $v^2 = u^2 + 2as$.

[6]