

## Chapter 2 Inclined planes. Revision Questions page 89-91 – Multiple Choice Answers

Q	Ans	Explanation
1	В	The net force on the cart down the incline = mg sin $\theta$ . The value of sin $\theta$ equals height divided by the length (hypotenuse) of the ramp. Hence the net force is proportional to height. By Newton's 2 <sup>nd</sup> law acceleration is proportional to (F <sub>net</sub> = ma), thus the acceleration is proportional to the net force which is proportional to the height. That means acceleration is directly proportional to height, which will give a linear graph passing through the origin.
2	A	The equation $v^2 = u^2 + 2as$ shows that velocity squared is proportional to acceleration when the object starts from rest and the displacement (length of the incline) is constant. That is $v^2 \propto a$ ( $\propto F_{net} \propto$ height). Hence, $v^2 \propto h$ , or $v \propto \sqrt{h}$ . The graph shape for $y \propto \sqrt{x}$ is Graph A.
3	D	The component of the weight of the mass <i>m</i> will be $0.5m$ N down the incline as $\sin 30^{\circ}$ is 0.5. The weight of mass <i>M</i> will be <i>m</i> N, which is greater than the force down the incline. There will be a net force up the incline of $(0.5m \text{ N})$ so m will accelerate up the incline with a value of a = $0.5m/(2m) = 0.25$ m s <sup>-2</sup> .
4	A	To accelerate down the incline the force down the incline $(F_{\parallel})$ must be greater than friction which acts up the incline. If they were equal the block would travel at constant speed (or stay at rest).
5	С	The net force down the incline equals $mg \sin \theta$ and according to Newton's 2 <sup>nd</sup> law this equals $ma$ . Hence $a = mg \sin \theta/m = g \sin \theta$

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