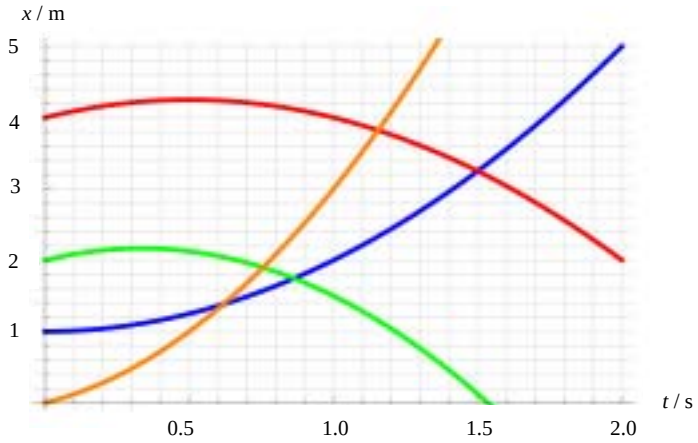
Extension Worksheet – Topic 2, Worksheet 1

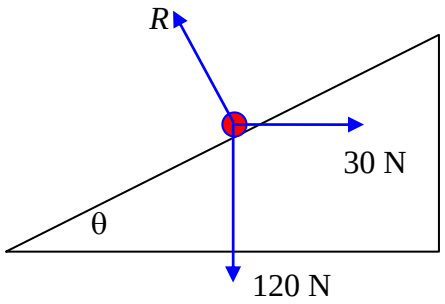
1 A particle that started from rest moves on a straight line with constant acceleration. Calculate the ratio of the distance travelled between 1 s and 2 s to the distance travelled between 2 s and 3 s. [2]

2 The graphs show the variation with time of the displacement of four objects moving with constant acceleration on a straight line.



Determine in which case the initial velocity is zero. [1]

3 A body of weight 120 N is at rest on an inclined plane as shown.



A horizontal force of magnitude 30 N acts on the body. Determine the magnitude of the normal reaction force R on the body and the angle θ of the incline. [3]

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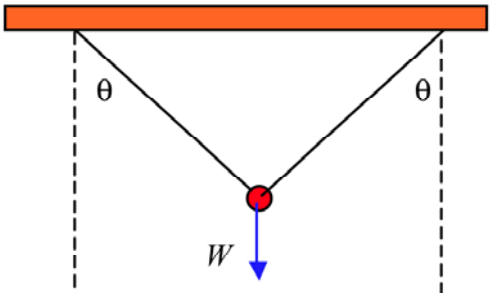
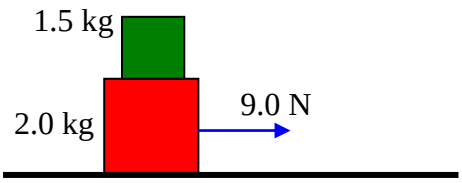
4 The ball shown, of weight *W*, is in equilibrium, hanging from two strings of equal length that are attached to the ceiling.



a Calculate the tension in one of the strings in terms of *W* and *θ*. [2]

b The strings are shortened by the same amount but their point of support at the ceiling stays the same. How does this change your answer to **a**, if at all? [2]

5 Two blocks are placed on top of each other as shown in the diagram. A horizontal force of 9.0 N is applied to the bottom block. The two blocks move as one (i.e. one does not slide over the other). The floor is frictionless.



Determine the frictional force (magnitude and direction) between the blocks. [3]

6 Sugar falls vertically from rest from a height of 30 cm above a weighing scale at a rate of 40 g per second. The sugar comes to rest on the scale without rebounding.

a Calculate the speed with which sugar hits the weighing scale. [2]

At a time of 5.0 s after the sugar first hits the weighing scale calculate

b the force on the scale. [3]

c the reading of the scale in grams. (Assume that the sugar spreads on the scale so that the height of fall does not appreciably change during the 5.0 s.) [1]

7 A student says that ‘a large force always produces a larger impulse than a smaller force’. Explain why the student’s statement is not correct. [2]

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