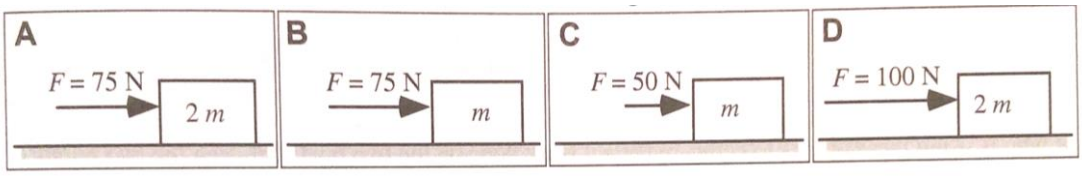
Problem 1

Use this image for all of the questions below.



a) In each case the box is pushed 10 m across the floor. All boxes have an initial velocity of 10 m/s. The mass of the box and the net horizontal force are given for each case.
Rank the change in kinetic energy of the boxes:

Greatest _____ _____ _____ _____ Least

Indicate ties by putting them on the same line or using an equal sign.

If any are equal to zero, list them here: _____

b) In each case the boxes are initially at rest. The mass of each box and the net horizontal force are given for each case.
Rank the magnitude of the impulse on each box for a 2 second time interval:

Greatest _____ _____ _____ _____ Least

Indicate ties by putting them on the same line or using an equal sign.

If any are equal to zero, list them here: _____

c) In each case the boxes are initially at rest. The mass of each box and the net horizontal force are given for each case.
Rank the magnitude of the change in momentum for each box for a 2 second time interval:

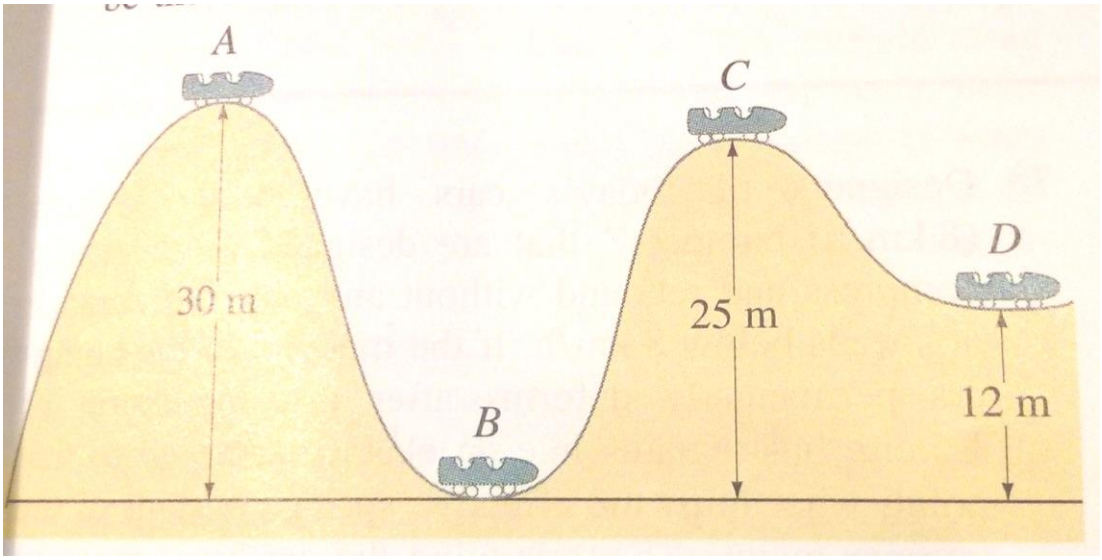
Greatest _____ _____ _____ _____ Least

Indicate ties by putting them on the same line or using an equal sign.

If any are equal to zero, list them here: _____

Problem 2

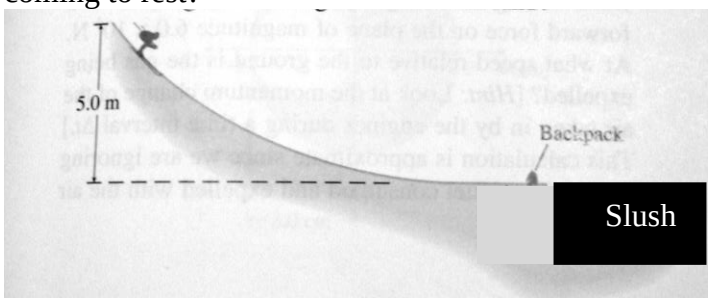
a) A roller coaster car is pulled up to point A, where it is released from rest. Assuming no friction, find the speed at points B, C, and D.



b) Suppose the roller coaster passes point A with a speed of 1.7 m/s. If the average friction force equals 1/5 its weight, what will be its speed at point B? The distance between A and B is 45 m.

Problem 3

A skier with a mass of 65 kg (including all their gear) starts from rest and skis down a frictionless hill that is 5 m high. At the bottom of the hill the ground levels out to horizontal. The skier grabs a 20 kg backpack that was sitting on the snow. The skier then encounters some slush (melted snow) that creates a coefficient of kinetic friction of 0.4 between the skies and the snow. How far along the slush does the skier ski before coming to rest?



Problem 4

A 2 kg block is pushed against a spring (k = 400 N/m), compressing it 0.3 m. When the block is released, it moves along a frictionless, horizontal surface, and then up an incline that has friction ($\mu_s = 0.4$ and $\mu_k = 0.2$). How far up the incline does the block slide before coming to rest?