Assignment 2-Game Physics

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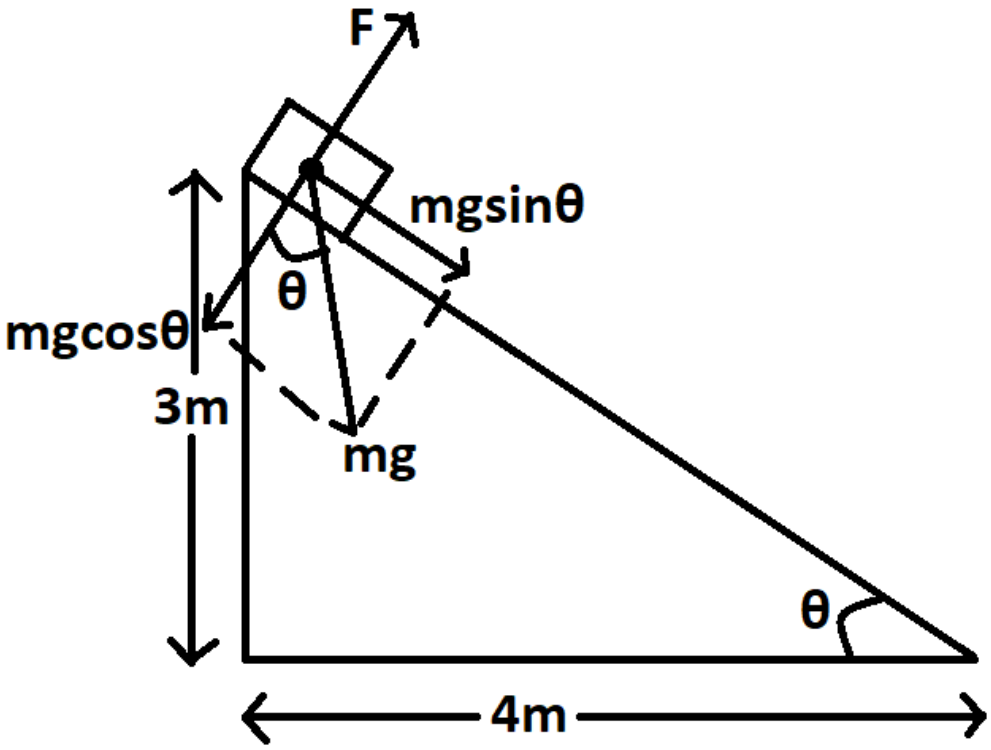
Problem Solution:

1A)



1B)

We can put the Pythagorean theorem to calculate the length of inclined plane,

$C^2 = A^2 + B^2$

$C = \sqrt{A^2 + B^2}$

So, if we plug in the values, we know i.e. A=3,B=4

$C = \sqrt{3^2 + 4^2}$

$C = \sqrt{9 + 16}$

$C = \sqrt{25}$

$C = 5$

$Cos\theta = \frac{4}{5}$

$Sin\theta = \frac{3}{5}$

So, We can calculate the net Force

$F = mgsin\theta$

$F = 12.8 \times 9.8 \times (\frac{3}{5})$

$F = 75.3$ N

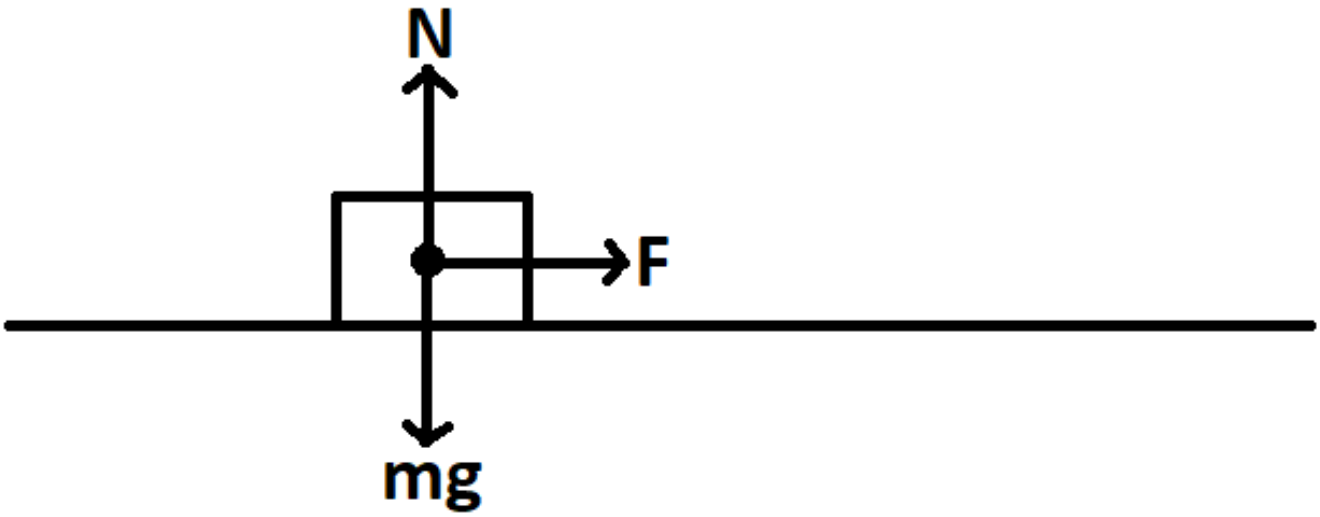
We know that F=ma. So for a

$a = \frac{F}{m}$

$a = \frac{75.3}{12.8}$

$a = 5.88\ {}^{m}/_{s^2}$,this acceleration is constant down to the incline and the crate will increase it's speed as it moves down towards the Horizontal surface.

1C)



$N = mg$

$N = 12.8 \times 9.8 = 125.44\ N$

$F = \mu \times N = 0.42 \times 125.44 = 52.7\ N$,to the left side

Again for the acceleration we can apply same equation,

$a = \frac{F}{m}$

$a = \frac{57.2}{12.8}$

$a = 4.12\ {}^{m}/_{s^2}$,to the left

1D)

We know that the stored potential energy can be converted into kinetic energy. So, we can say that

$$\Delta K = U$$

$$^1/_2\, mv^2 = mgh$$

$$v^2 = 2gh$$

$$v = \sqrt{2gh}$$

$$v = \sqrt{2 \times 9.8 \times 3}$$

$$v = \sqrt{58.8}$$

$$v = 7.67\, ^m/_s$$

$$v = v_0 + at$$

$$t = \frac{v - v_0}{a}$$

$$t = \frac{0 - 7.67}{-4.12}$$

$$t = 1.86\, s$$

$$v^2 = v_0^2 + 2ad$$

$$d = \frac{v^2 - v_0^2}{2a}$$

$$d = \frac{0 - 7.67}{2 \times (-4.12)}$$

$$d = 7.14\, m$$

Assignment Solution Introduction:

Height_Ramp = h

Width_Ramp = w