

Physics 101Rec
Quiz#3-Sect 05
Chapters 4&5

Name:

Key

Id:

1. At $t = 0$, a particle moving in the x - y plane with a constant acceleration of $\mathbf{a} = (2\mathbf{i} - 5\mathbf{j}) \text{ m/s}^2$, has an initial velocity $\mathbf{v}_0 = 5\mathbf{i} \text{ m/s}$. What is the speed of the particle at $t = 2 \text{ s}$?

$$\begin{aligned}\vec{v} &= \vec{v}_0 + \vec{a} t \\ &= 5\hat{i} + (2\hat{i} - 5\hat{j}) \times 2 \\ &= 5\hat{i} + 4\hat{i} - 10\hat{j} = (9\hat{i} - 10\hat{j}) \text{ m/s}\end{aligned}$$

$$\text{Speed} \Rightarrow v = \sqrt{9^2 + 10^2} = \boxed{13.5 \text{ m/s}}$$

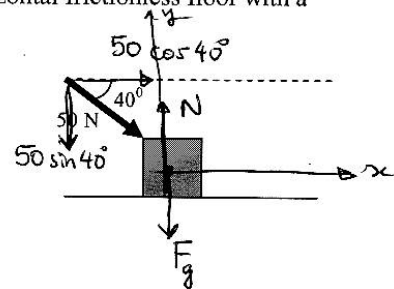
2. As shown in the figure, a 20 kg block is pushed across a horizontal frictionless floor with a force of 50 N.

(a) What is the acceleration of the block?

$$\sum F_x = m a$$

$$50 \cos 40^\circ = 20 a$$

$$\Rightarrow \boxed{a = 1.9 \text{ m/s}^2}$$



(b) What is the normal force on the block?

$$\sum F_y = N - F_g - 50 \sin 40^\circ = 0 \Rightarrow N = mg + 50 \sin 40^\circ$$

$$\boxed{N = 228 \text{ N}}$$