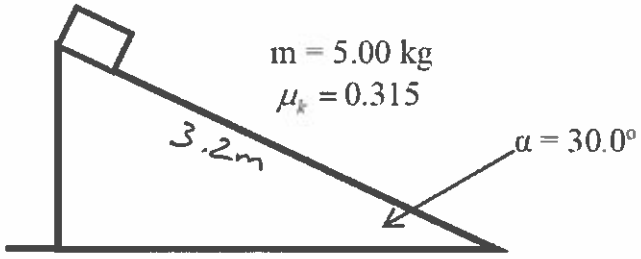
Acceleration of System (Ramps)

$F_{side} = mg\sin(\theta)$

$f = \mu mg\cos(\theta)$



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

$a = \frac{5(9.8)\sin(30) - .315(5)(9.8)\cos(30)}{5}$

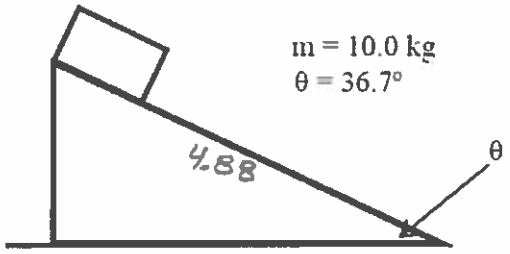
P7. A wooden block is placed at the top of an inclined plane and released. The block travels 3.20 m down the incline to the lower end. How fast is the block traveling just as it reaches the lower end?

$a = 2.226\ m/s^2$

A) 3.05 m/s
B) 3.23 m/s
C) 3.41 m/s
D) 3.59 m/s
E) 3.77 m/s

$v_f^2 = v_0^2 + 2ax$

$v_f = \sqrt{2(2.226)(3.2)} = 3.77$



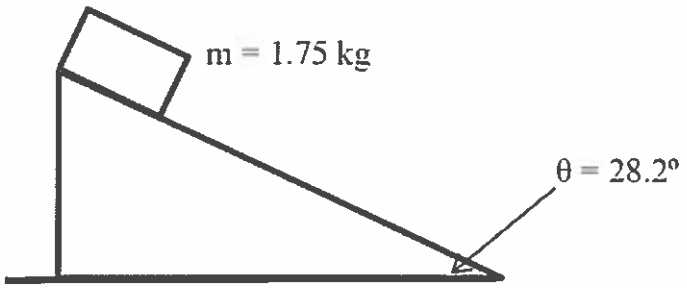
can be solved w/ energy or same as above

P7. A wooden block is placed at the top of an inclined plane and released. The block travels 4.88 m down the frictionless surface to the bottom of the inclined plane. How fast is the block traveling just as it reaches the bottom?

$a = \frac{10(9.8)\sin(36.7)}{10} = 5.85$

A) 6.56 m/s
B) 6.89 m/s
C) 7.22 m/s
D) 7.56 m/s
E) 7.89 m/s

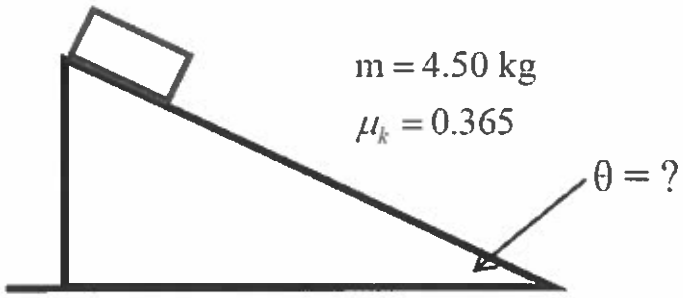
$v_f = \sqrt{2(5.85)(4.88)} = 7.56$



Same as previous

P7. A wooden block is placed at the top of an inclined plane and released. The block travels 2.62 m down the inclined plane to the bottom. How fast is the block traveling just as it reaches the bottom if the coefficient of kinetic friction between the surface and the block is 0.388?

A) 2.81 m/s
B) 2.59 m/s
C) 2.37 m/s
D) 2.15 m/s
E) 1.93 m/s



P7. A wooden block is placed at the top of an inclined plane and given a slight push. The block then travels at constant speed down the incline. Find the angle of inclination.

Forces are equal in all directions

A) 20.1°
B) 23.3°
C) 26.5°
D) 29.7°
E) 32.9°

$F_{side} = F_{friction}$

$mg\sin(\theta) = \mu mg\cos(\theta)$

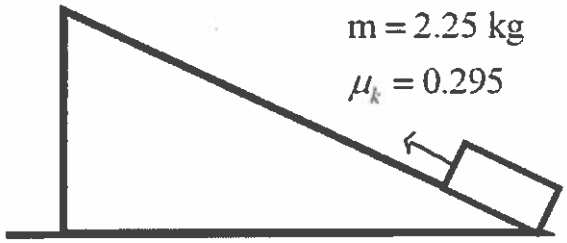
$\sin(\theta) = \mu\cos(\theta)$

$\frac{\sin(\theta)}{\cos(\theta)} = \mu$

$\tan(\theta) = \mu$

$\theta = \tan^{-1}(.365)$

$\theta = 20.1°$



P07. A wooden block is placed at the bottom of a plane inclined at an angle of 29.7° above the horizontal. A force parallel to the plane is applied to the block and it accelerates up the the incline at 1.52 m/s^2. Find the magnitude of the force.

A) 17.8 N
B) 20.0 N
C) 22.2 N
D) 24.4 N
E) 26.6 N

slide force & friction are in same direction against the applied Force.

$$a = \frac{F - mg\sin(\theta) - \mu mg\cos(\theta)}{m}$$

$$1.52 = \frac{F - 2.25(9.8)\sin(29.7) - .295(2.25)(9.8)\cos(29.7)}{2.25}$$

$$F = 19.99\,N$$