The Story thus far ...

2nd Law ... $\sum F = ma = kg\ m/s^2 = N$

A Net force ($\sum F$) causes an object (m) to accelerate (a)

$Ft = m\Delta v = kg\ m/s$

An impulse (Ft) changes an objects momentum ($m\Delta v$)

and now ...

Feb 23-7:04 AM

F =

Ft =

Fd =

Feb 23-7:14 AM

Work

$W = Fd_{\parallel}$

$W = N \times m = \text{Joules}$ $J = Nm = kg\ m/s^2\ m = kg\ m^2/s^2 = J$

$W = Fd_{\parallel}$

$v_2^2 = v_1^2 + 2ad$

$v_2^2 - v_1^2 = 2ad$ $F = ma$ *and* $a = F/m$

$v_2^2 - v_1^2 = 2Fd/m$ *mult by "m" div by 2*

$\frac{1}{2}mv_2^2 - \frac{1}{2}mv_1^2 = Fd$

$W = \Delta\frac{1}{2}mv^2$

$KE = \Delta\frac{1}{2}mv^2$

Kinetic Energy is the energy of a moving object ... When work is done on an object it changes the KE of it. This is called the Work-Energy Theorem: $\Delta KE = W$

Feb 6 - 10:13 AM

Calculating Work:

A 140 g baseball is thrown at 40.0 m/s by a force of 93 N acting over a distance of 1.2 m.

a) What work does the pitcher do on the ball?

b) What is the change in the ball's energy?

c) Using the Work-Energy Theorem find the speed of the ball as it left the pitchers hand.

Feb 8-11:00 AM

Calculating Work:

A 140 g baseball is thrown at 40.0 m/s by a force of 93 N acting over a distance of 1.2 m. a) What work does the pitcher do on the ball?
b) What is the change in the ball's energy?
c) Using the Work-Energy Theorem find the speed of the ball as it left the pitchers hand.

a) $W = Fd$
$W = 93\ N\ (1.2\ m) = 112\ J$

$W = Nm = J$

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b) $KE = \frac{1}{2}mv^2$
$KE = \frac{1}{2}\ (.140\ kg)\ (40.0\ m/s)^2$

$KE = 112\ J$

$KE = kg \times m^2/s^2$
$KE = (kg \times m/s^2) \times m = Nm = J$

c) $W = \Delta KE$
$Fd = \frac{1}{2}mv^2$

$v = \sqrt{2Fd/m}$

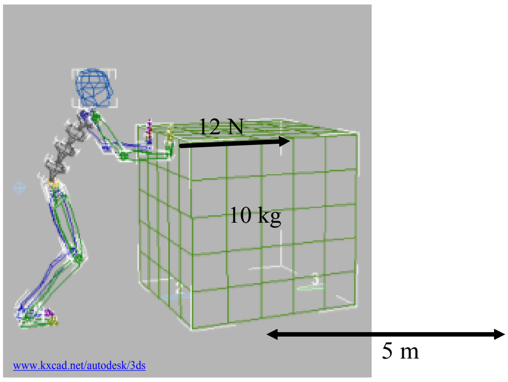
$v = \sqrt{[2(93\ N \times 1.2\ m)]/.140\ kg}$

$v = 39.9\ m/s$

$v = \sqrt{[N \times m)]/kg}$
$v = \sqrt{[(kg \times m/s^2) \times m)]/kg}$
$v = \sqrt{m^2/s^2}$
$v = m/s$

Feb 8-10:07 AM

You apply an average force of 12 N to a 10 kg box to move it 5 m.
a) How much work do you do?
b) If $v_1 = 0$ and $\mu = 0$, What velocity would this work give the box?



Feb 8-11:00 AM

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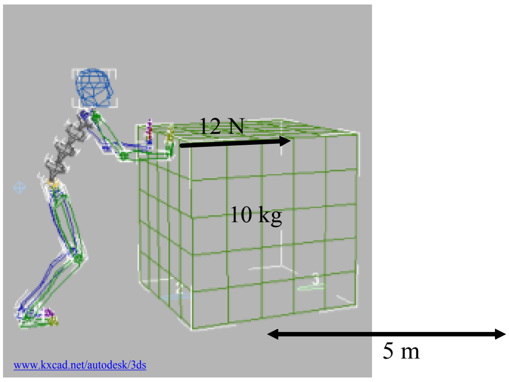


a) $W = Fd$

$W = 12\text{ N} \times 5\text{ m} = 60\text{ Nm} = 60\text{ J}$

b) $W = \Delta KE$

$W = \frac{1}{2}mv^2$

$v = \sqrt{2W/m}$

$v = \sqrt{[(2(60\text{ J})]/10\text{ kg}}$

$v = 3.5\text{ m/s}$

$v = \sqrt{J/kg} = \sqrt{Nm/kg} = \sqrt{[(kg \times m/s^2) \times m]/kg} = \sqrt{m^2/s^2} = m/s$

Feb 6 - 10:37 AM

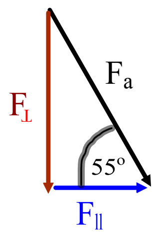
A woman applies a 140 N force to a lawnmower handle. What work does she do if the handle makes an angle of 55^0 with the horizontal and she pushes it 15 m?

Feb 8-11:00 AM

A woman applies a 140 N force to a lawnmower handle. What work does she do is the handle makes an angle of 55^0 with the horizontal and shepushes it 15 m?

$F_{ll} = \text{Cos } 55^0 (140 \text{ N}) = 80. \text{ N}$

$W = F_{ll}\, d = 80. \text{ N} \times 15 \text{ m} = 1200 \text{ J}$



or $W = F_{ll}\, d = (\text{Cos } \theta Fa)\ d$

$W = FdCos\theta = 140 \text{ N}(15 \text{ m}) \text{ Cos } 55^0 = 1200 \text{ J}$

When the force is along the plane of motion then theta is 0^0, and the Cos of 0^0 is "1"

Feb 8-11:03 AM