Key

anical Energy Assignment

$PE_G = mgh$ $KE = \frac{1}{2}mv^2$

1. A car is lifted a certain distance in a service station and therefore has potential energy relative to the floor. If it were lifted twice as high, how much potential energy would it have?

Twice as much PE.

2. Two cars are lifted to the same elevation in a service station. If one car is twice as massive as the other, how do their potential energies compare?

Twice as much PE.

3. How many joules of potential energy does a 0.5 kg book gain when it is elevated 4 m? When it is elevated 8 m?

$PE = mgh$
$(0.5kg)(9.8m/s^2)(4m) = 19.6J$

$PE = mgh$
$(0.5kg)(9.8m/s^2)(8m) = 39.2$

4. A moving car has kinetic energy. If it speeds up until it is going four times as fast, how much kinetic energy does it have in comparison?

$KE = \frac{1}{2}mv^2$
$4^2 = 16$ times

5. Consider a ball thrown straight up in the air. At what position is its kinetic energy a maximum? Where is its gravitational potential energy a maximum?

- KE is greatest right after being thrown where speed is the greatest.
- PE_G is greatest at the maximum height.

6. At what point in its motion is the KE of a pendulum bob a maximum? At what point is its PE a maximum? When its KE is half its maximum value, how much PE does it have?

KE is maximum at lowest point where it moves fastest.
PE is maximum at highest points in bob's swing.
When KE is 1/2 max value, PE is also 1/2 max value.

7. What is the kinetic energy of a 2 kg snow ball thrown through the air at 5 m/s?

$KE = \frac{1}{2}mv^2$ $KE = \frac{1}{2}(2kg)(5m/s)^2$

$KE = 25\ J$

8. A 5kg book is sitting on top of a counter. The book has 55 J of potential energy. How tall is the counter?

$PE = mgh$
$55J = (5kg)(9.8m/s^2)(h)$
$55 = 49(h)$

$h = 1.12m$

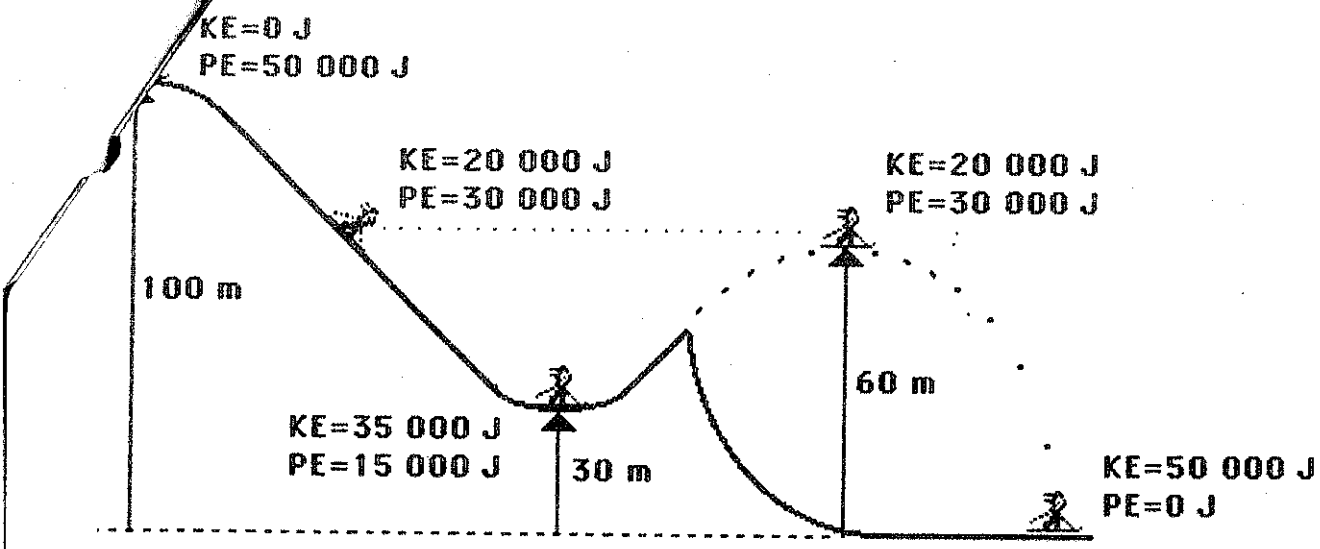
9. The 5kg book slides off the counter and has 55 J of kinetic energy just before it lands on the ground. How fast is the book falling just before it hits the ground?

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

$55J = \frac{1}{2}(5kg)(v)^2$

$\frac{55J}{2.5} = \frac{2.5}{2.5}v^2$

$V = 4.7m/s$



10. Solve for the missing parts:

Elastic Potential Energy

$$PE_e = \tfrac{1}{2} k x^2$$

11. A spring is stretched 6 cm and has a spring constant of 600 N/m. Calculate the potential energy of the spring.

6 cm = .06 m

$PE = \frac{1}{2}kx^2$

$PE = \frac{1}{2}(600)(.06)^2 = 1.08\ J$

12. If you use the spring from problem #11 and stretch it a distance of 10cm, what is the potential energy?

10 cm = .1 m

$PE = \frac{1}{2}kx^2$

$PE = \frac{1}{2}(600)(.1\ m)^2 = 3\ J$

13. A spring with a spring constant of 400 N/m has a mass hung on it so that it stretches 8 cm. Calculate the potential energy in the spring.

8 cm = .08 m

$PE = \frac{1}{2}kx^2$

$PE = \frac{1}{2}(400)(.08)^2$

$PE = 1.28\ J$

14. A spring has a spring constant of 256 N/m. How far must it be stretched to give it an elastic potential energy of 48 J?

$PE = \frac{1}{2}kx^2$

$48\ J = \frac{1}{2}(256\ N/m)(x)^2$

$\sqrt{\frac{48}{128}} = \frac{128}{128}\sqrt{x^2}$

$x = .61\ m$