Answer on Question #70925, Physics / Other

1. Determine the kinetic energy of a 625-kg roller coaster car that is moving with a speed of 18.3 m/s.

Solution:

Given:

$m = 625\ kg,$

$v = 18.3\ m/s,$

$KE - ?$

Kinetic energy is the energy of motion.

The following equation is used to represent the kinetic energy (KE) of an object.

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

where m = mass of object, v = speed of object.

$$KE = 0.5 \times (625\ kg) \times (18.3\ m/s)^2 = 104653.125\ J = 104.65\ kJ$$

Answer: $104.65\ kJ$

2. If the roller coaster car in the above problem were moving with twice the speed, then what would be its new kinetic energy?

Solution:

Given:

$m = 625\ kg,$

$v = 36.6\ m/s,$

$KE - ?$

$$KE = 0.5 \times (625\ kg) \times (36.6\ m/s)^2 = 418612.5\ J = 418.61\ kJ$$

Answer: $418.61\ kJ$

3. A 8-kg bird 60m above the ground is flying at 25m/s. Find its potential energy and kinetic energy.

Solution:

Given:

$m = 8\ kg,$

$v = 25\ m/s,$

$h = 60\ m,$

$KE - ?$

$PE - ?$

The kinetic energy (KE) is

$$KE = \frac{1}{2}mv^2 = 0.5 \times (8\ kg) \times (25\ m/s)^2 = 2500\ J$$

The potential energy (PE) is

$$PE = mgh$$

where m represents the mass of the object, h represents the height of the object and g represents the gravitational field strength (9.8 m/s^2 on Earth).

$$PE = (8) \times (9.8) \times (60) = 4704\ J$$

Answer: $KE = 2500\ J;\ \ PE = 4704\ J.$

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