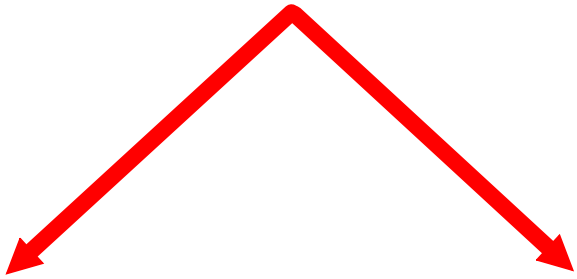

ENERGY

Mechanical Energy



Energy of motion :
Kinetic Energy

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

this is the energy an object has due to its speed relative to a being at rest

Energy of position :
Gravitational Potential Energy

$$E_g = mgh$$

this is the potential energy an object has at a height relative to fixed reference point.

Warmup / Practice

How fast is a baseball traveling if it has 150 Joules of kinetic energy (the mass of a standard baseball is 145grams)?

V = ?? m/s

Warmup / Practice

How fast is a baseball traveling if it has 150 Joules of kinetic energy (the mass of a standard baseball is 145grams)?

→ V = ?? m/s

$m = 0.145\,kg$
$E_k = 150\,J$
} Givens

Velocity Unknown

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

$2E_k = mv^2$

$\frac{2E_k}{m} = v^2$

$v = \sqrt{\frac{2E_k}{m}}$

$= 45\,m/s$

Conservation of Energy

Energy can neither be created nor destroyed.

It can only change forms or be transferred from one object to another.

$$E_{Ti} = E_{Tf}$$

T - total
i - initial
f - final

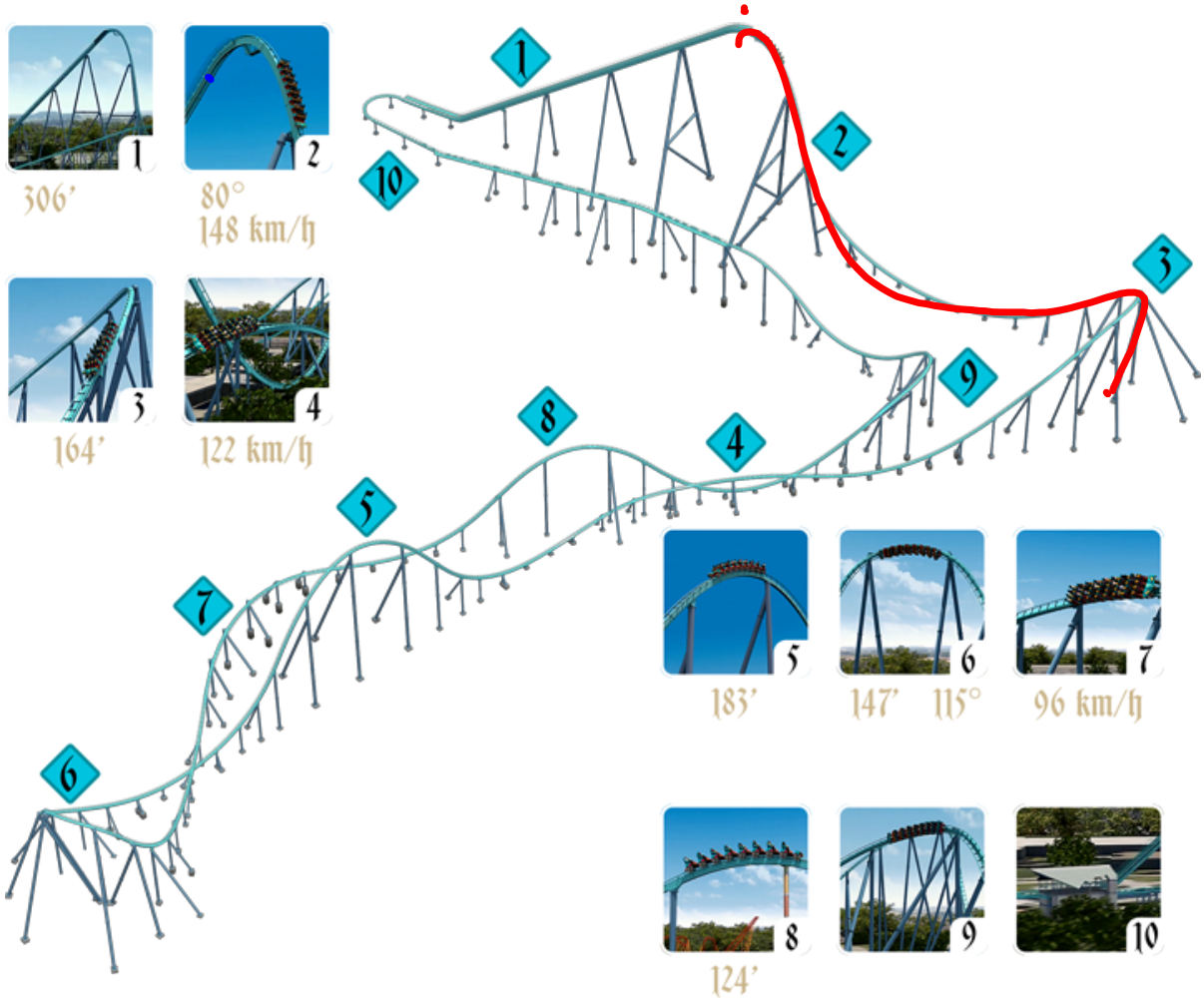
Mechanical Energy

(E_g, E_k)

$$E_{gi} + E_{ki} = E_{gf} + E_{kf}$$

assuming no losses due to friction

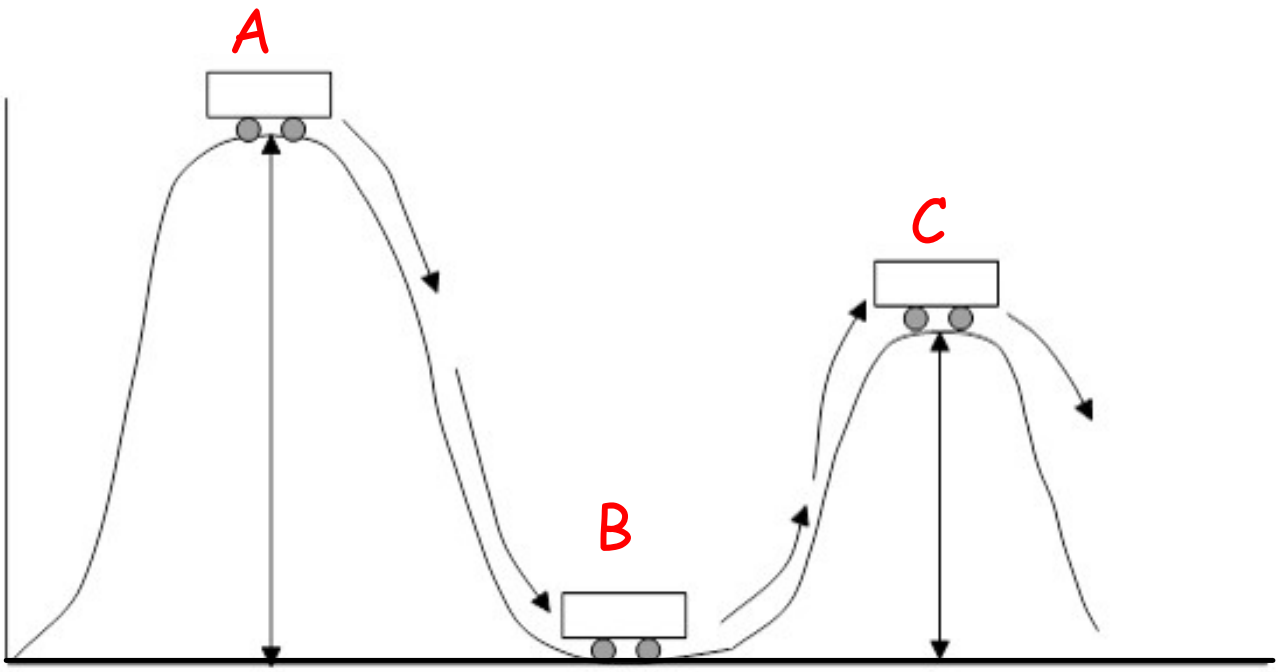
Leviathan



Leviathan

Solve for total energy at Points A, B and C and find the velocity at Points B & C.

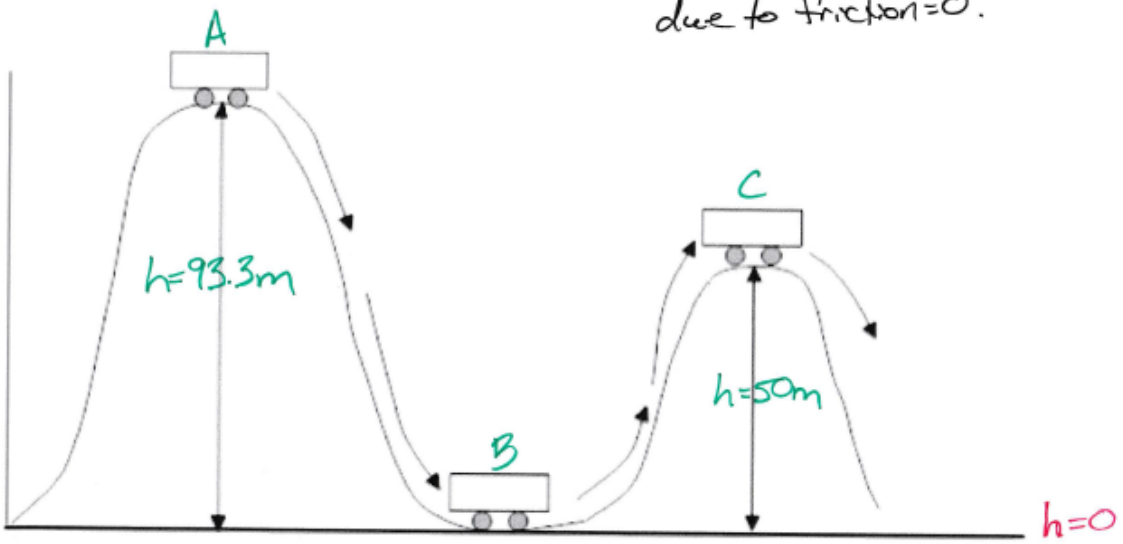
You can assume the velocity at point A is zero and that there are no losses due to friction.



Leviathan

initial velocity = 0 m/s
m = 500 kg

*assume losses due to friction = 0.



	A	B	C
E_K	0	457000 J	212000 J
E_g	457000 J	0	245000 J
E_T	457000 J	457000 J	457000 J

$E_g = mgh$

$V_A = 0$ m/s

$V = \sqrt{\frac{2E_K}{m}}$

$= 42.8$ m/s

$E_g = mgh = 245000$

$V = \sqrt{\frac{2E_K}{m}}$

$= 29.1$ m/s