**Graphs**

Total energy, GPE, KE, graph

Velocity time graph

For each question, show answer button

**Observation for graphs**

***What do you notice about TE between each bounce?***

***If air resistance is present, will the TE graph between each graph change?***

After each bounce total energy drops, but stays constant between bounces because it is only during bounce that it loses energy.

If no energy loss selected, the v flip direction but half mv square still the same, no energy dissipated to the ground or surroundings.

Gradient always same because always accelerating downwards with g

(maybe)displacement time graph

**Points to look out for/observations**

Observe what happens when u throw down or throw up with same velocity, and without energy loss when bouncing, both would reach same height above.

***Set energy loss between bounces to zero, compare the initial height of the ball with the maximum height reached by the ball after a bounce in these 3 different scenarios.***

***thrown downwards at a speed of 5m/s from height of 2m***

***thrown upwards at a speed of 5m/s from height of 2m***

***dropped from height of 2m***

***(What values of initial height and initial velocity should you set to correspond to the 3 cases above?)***

***How do you explain the observation made in the previous question?***

*Initial gpe is …, initial ke is…, te is …, te does not change, at maximum height, ke is 0, means all the te that the ball has is now converted to gpe, mgh, calculate h*

***If energy loss when it bounces from the ground is 20%, is the maximum height reached after the 3rd bounce 20% of the maximum height reached after the 2nd bounce?***

***If energy loss when it bounces from the ground is 20%, is the maximum velocity reached right after the 3rd bounce 20% of the maximum height reached right after the 2nd bounce?***

***Are the lines of the velocity-time graph parallel? Why or why not?***

**Code implementation**

Code is such that when s hits min displacement, restart equation with u = -v. or with half mv square = energy remaining \*

**Input**

Initial height

Or say throw upwards/downwards with initial speed of \_\_\_\_\_\_\_

Initial velocity, 0 means drop, explain positive means throw upwards, negative means throw downwards

(time goes on and on, v also no final v, a is always -10 for sec sch)

**Calculations display**

Use half mv square and mgh to calculate max height above and minimum height below, maybe show it in working

Show max height after bounce 1, velocity right after bounce 1

After bounce 2, after bounce 3 keep generating

Graph and bounces just continues and move to the left when it is filled

Compare height of v before and after first bounce, or compare max and min v

Animate the energy loss by energy loss words flying away

Description

Object is thrown upwards/ thrown downwards / dropped

From above the ground/at the ground surface

It slows down as object is moving upwards but acceleration is downwards

It speeds up as object is moving downwards and acceleration is also downwards

It reaches a maximum height, changes direction and move downwards

It eventually hits the ground and loses /does not lose energy

Before bouncing back up with a lower/the same velocity than the velocity it hits the ground

After the second bounce, it reaches a maximum height higher than the initial height at which it was dropped because (inference)

Simulation of all cases of velocity time graph

Add graphical inference to 1d motion, not just mathematical