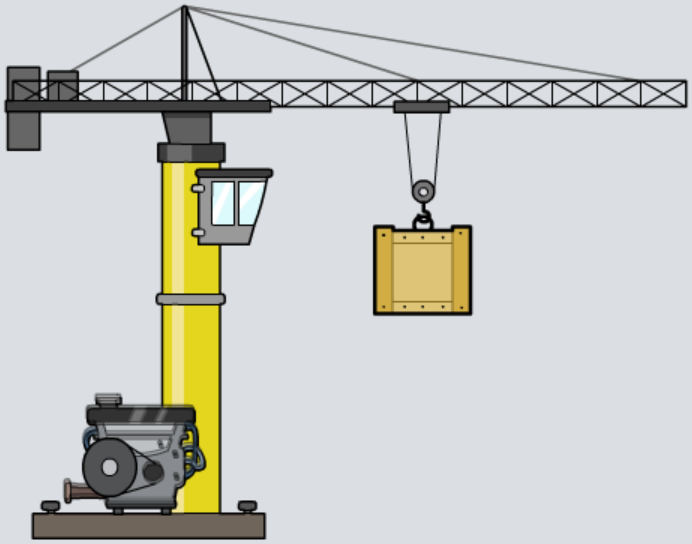
Gravitational Potential Energy



A long way down…

How would you describe a bungee jumper? You might say that they are someone who is:

- brave
- insane
- full of **gravitational potential energy (GPE)**.

GPE is the amount of energy an object has because of its position above the ground, i.e. its height.

What is gravitational potential energy?

The gravitational potential energy (GPE) of an object on Earth depends on its **mass** and its **height** above the Earth's surface.

- When a bungee jumper starts to fall, he starts to **lose** GPE.
- As the elastic cord pulls the bungee jumper back up, he **gains** GPE.

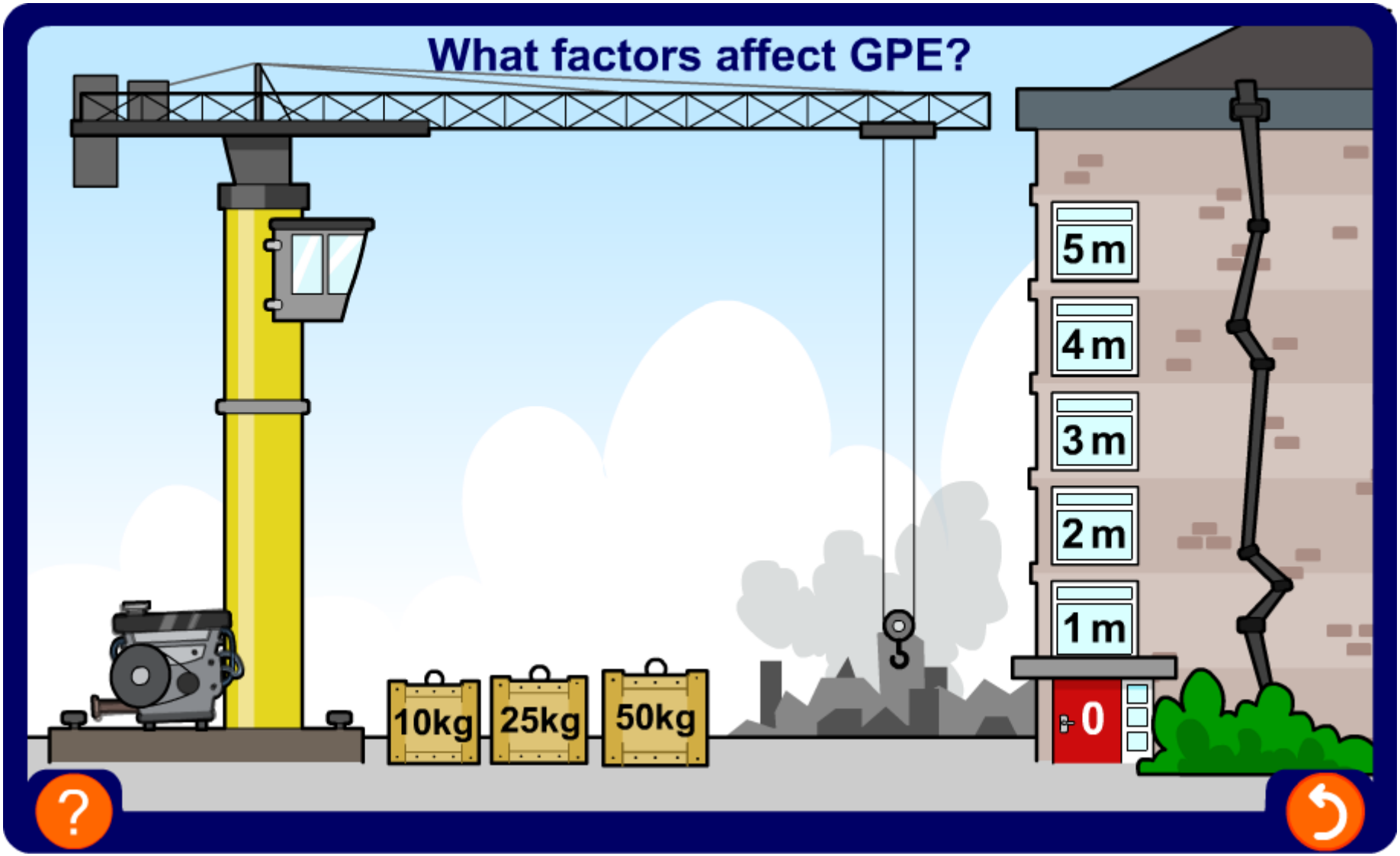
How is GPE calculated?

The GPE of an object can be calculated using this equation:

GPE = mass × gravitational field strength × height

- Mass is measured in **kilograms** (**kg**).
- Gravitational field strength is measured in **newtons per kilogram** (**N/kg**), usually taken as 10 N/kg on Earth.
- Height is measured in **meters** (**m**).
- GPE is measured in **joules** (**j**).

Factors affecting GPE



Calculating GPE question 1

An eagle with a mass of 2 kg flies at a height of 200 m above the ground.

How much gravitational potential energy does the eagle have?

GPE = mass × gravitational field strength × height

= 2 × 10 × 200

= **4,000 J**

Calculating GPE question 2

An apple with a mass of 200 g falls 3 m from its branch to the ground.

How much GPE will the apple have lost when it reaches the ground?

GPE lost = mass × gravitational field strength × change in height

= 0.2 × 10 × 3

= **6 J**

GPE, mass and height calculations

You will need this equation to answer the following questions about GPE, mass and height:

GPE = mass x gravitational field strength x height

Click "**start**" to begin.

start