

Name _____

Class _____

Date _____

By the end of this worksheet I can...

- ☐ calculate potential energy using $E_p = mgh$
- ☐ convert grams to kilograms and centimetres to metres
- ☐ find a change in potential energy
- ☐ use energy conversion to find kinetic energy and velocity

I DO**Key ideas and worked example** Read this first **$E_p = mgh$**

Potential energy = mass × gravitational field strength × height

- Mass m in kilograms (kg)
- $g = 9.8 \text{ N/kg}$ (9.8 m s^{-2} in the data booklet)
- Height h in metres (m)
- Energy E_p in joules (J)

Remember

Convert first: 400 g = 0.4 kg, 75 cm = 0.75 m. 1 litre of water has a mass of 1 kg.

*A drone of mass 3 kg flies to an altitude of 125 m.***Example Calculate its potential energy.****Worked answer** set out every step like this

$$E_p = mgh = 3 \times 9.8 \times 125$$

$$E_p = 3675 \text{ J (3.7 kJ)}$$

WE DO**Guided practice** Follow the steps to help you*A roller coaster track has a highest point of 50 m and a lowest point of 5 m. A rider has a mass of 80 kg.***1 Calculate the change in the rider's potential energy between the highest and lowest points.** (3 marks)**Steps**

1. Find E_p at the top: $80 \times 9.8 \times 50$
2. Find E_p at the bottom: $80 \times 9.8 \times 5$
3. Subtract to find the change (or use the height difference, 45 m)

YOU DO

On your own Give answers to two significant figures. Show your working.

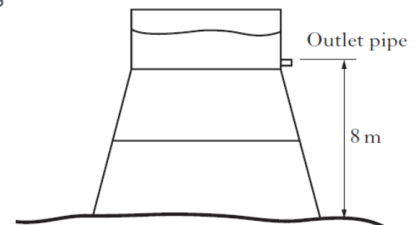
2 A 1.5 kg toy buggy rolls down ramps of different heights. Calculate its potential energy at the top of each ramp.

Ramp height	Working	E_p (J)
50 cm		
75 cm		
1 m		
1.24 m		

3 Using a ramp height of 1.22 m, calculate the potential energy of buggies of different mass.

Mass	Working	E_p (J)
2.5 kg		
3.5 kg		
6 kg		
400 g		

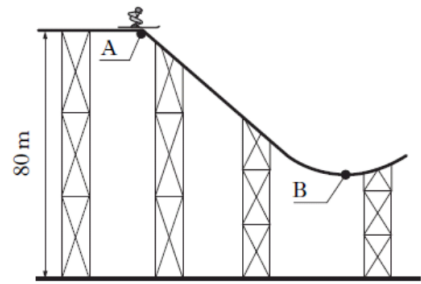
4 A crofter uses a wind pump to fill a water storage tank. The outlet pipe is 8 m above the ground.



a) Calculate the potential energy of 6 litres of water at the outlet pipe. (2 marks)

b) Describe why not all of this potential energy is converted into useful energy. (1 mark)

5 A ski jumper of mass 65 kg starts at rest at point A, 80 m above the ground.



a) Calculate the potential energy of the ski jumper at point A. (2 marks)

b) At point B the ski jumper has 31.5 kJ of potential energy. Calculate the kinetic energy at B, assuming no energy is lost. (2 marks)

c) Calculate the velocity of the ski jumper at point B. (3 marks)

Check and reflect

Mark your answers with the answer sheet. Which “I can” statement above still needs work? Look back at the notes for that topic on the site.
