

How moving and lifted objects store energy

Grade 7 science (Year 8 · Class 7) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test checks kinetic energy, gravitational potential energy and conversions between them.
Use $g = 9.8 \text{ N/kg}$, show every step of each calculation and include units in your answers.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS3-1, MS-PS3-2

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Types of energy (2 marks)

- State the type of energy of a speeding train. (1 mark)
- State the type of energy of a ball held at the top of a tower. (1 mark)

Question 2 A football in flight (3 marks)

A football of mass 0.45 kg moves at 12 m/s.

- Write the formula for kinetic energy. (1 mark)
- Calculate the kinetic energy of the football. (2 marks)

Question 3 Pot on a shelf (3 marks)

A pot of mass 4.0 kg stands on a shelf 2.5 m above the floor ($g = 9.8 \text{ N/kg}$).

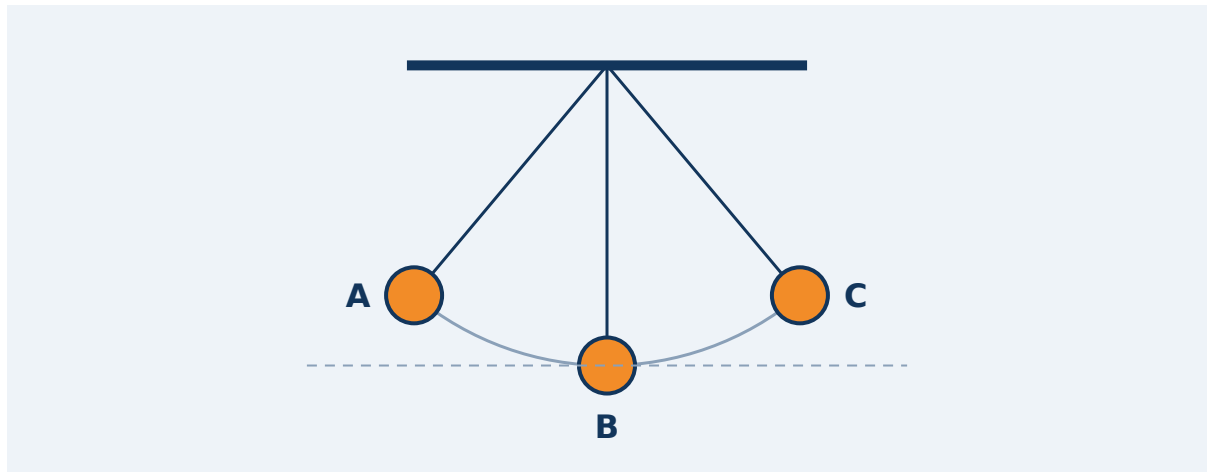
- Calculate its gravitational potential energy. (2 marks)
- State its gravitational potential energy if the shelf is moved to twice the height. (1 mark)

Question 4 Speed and energy (2 marks)

Explain why a car travelling at 30 m/s has much more than twice the kinetic energy of the same car at 15 m/s.

Question 5 Pendulum (3 marks)

A pendulum bob swings between A and C and passes through B, the lowest point.



A pendulum bob swinging between A and C.

- State where the bob has maximum kinetic energy. (1 mark)
- State the kinetic energy of the bob at A. (1 mark)
- Explain why the swings gradually get smaller. (1 mark)

Question 6 Diving board (3 marks)

A diver of mass 50 kg stands on a board 5.0 m above the water ($g = 9.8 \text{ N/kg}$).

- Calculate the gravitational potential energy of the diver. (2 marks)
- State the kinetic energy at the moment the diver reaches the water, ignoring air resistance. (1 mark)

Question 7 Mass or height? (2 marks)

Aarav says that a 1 kg ball held 2 m high has less energy than a 2 kg ball held 1 m high. Decide whether he is right and show why.

Question 8 Rolling coaster (2 marks)

A roller coaster is not given extra energy after it leaves the first hill. Explain why the second hill cannot be higher than the first.