

How moving and lifted objects store energy

Grade 7 science (Year 8 · Class 7) · Test answers (mark scheme)

Model answers with the marks available. Award marks for correct substitution even when the final arithmetic contains a slip, and always check the unit.

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

Question 1 Types of energy (2 marks)

- a. **Kinetic energy.**
- b. **Gravitational potential energy.**

Marking: 1 mark each.

Question 2 A football in flight (3 marks)

- a. $KE = \frac{1}{2} \times m \times v^2$.
- b. $KE = \frac{1}{2} \times 0.45 \times 12^2 = 0.225 \times 144 = \mathbf{32.4\ J}$.

Marking: (a) 1 mark; (b) 1 mark for substitution, 1 mark for the answer with unit.

Question 3 Pot on a shelf (3 marks)

- a. $GPE = 4.0 \times 9.8 \times 2.5 = \mathbf{98\ J}$.
- b. Twice the height gives twice the energy: **196 J**.

Marking: (a) 1 mark for substitution, 1 for the answer with unit; (b) 1 mark.

Question 4 Speed and energy (2 marks)

Kinetic energy depends on the **square of the speed**. The speed is twice as large, so the kinetic energy is $2^2 = 4$ times larger, which is more than double.

Marking: 1 mark for saying energy depends on speed squared; 1 mark for four times.

Question 5 Pendulum (3 marks)

- a. At **B**, the lowest point.
- b. At A the bob is momentarily at rest, so the kinetic energy is **zero**.
- c. Friction and air resistance transfer energy to the surroundings as thermal energy.

Marking: 1 mark for each part.

Question 6 Diving board (3 marks)

- a. $GPE = 50 \times 9.8 \times 5.0 = \mathbf{2450\ J}$.
b. All of it is converted: **2450 J**.

Marking: (a) 1 mark for substitution, 1 for the answer; (b) 1 mark.

Question 7 Mass or height? (2 marks)

He is **not right**. First ball: $1 \times 9.8 \times 2 = 19.6\ \text{J}$. Second ball: $2 \times 9.8 \times 1 = 19.6\ \text{J}$. They store the same energy.

Marking: 1 mark for each correct calculation or one for calculations and one for the conclusion.

Question 8 Rolling coaster (2 marks)

The car can only convert the gravitational potential energy it had at the top of the first hill. Some of it is always transferred as thermal energy by friction, so there is not enough energy to reach a higher point.

Marking: 1 mark for energy cannot be created; 1 mark for energy lost to friction.