Combined science/Physics - KS4 - Energy

Lesson 2 - The kinetic energy store

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Independent practice

1. What are the factors that affect the value of the kinetic store?
    a. **M**____
    b. **s**____
2. Which will have more energy in its kinetic store?
    a. Two cars (A and B) both with mass 1000 kg but car A is travelling at 10 m/s and car B is travelling at 20 m/s.
    b. A car travelling at 20 m/s or a lorry travelling at 20 m/s

Independent practice

Calculate the kinetic energy of the following objects:

1. A 1000 kg car moving at 10 m/s.
2. A 0.1 kg apple falling from a branch at 5 m/s
3. **Challenge:** A 500 g football kicked at 25 m/s
4. **Challenge:** An 20g European swallow flying at 11 m/s
5. **Super challenge:** If a moon with a mass of 9.8×10^{22} kg orbits at a velocity of 60 km/s, what is its kinetic energy store?

Independent practice

1. An asteroid flies past the Earth at 28000 m/s. What is its mass given that it has 786500 J of energy in its kinetic store?
2. A motorbike has 710500 J of KE and a velocity of 70m/s. What is its mass?
3. A cyclist has 400 J of KE and a velocity of 10 m/s. What is their mass?
4. **Challenge:** A car has 56 kJ of KE and a velocity of 35 m/s. What is its mass?
5. **Super challenge:** What is the mass of the ISS? Its orbital velocity is 8 km/s and its KE is 1.4×10^{13} J.

Independent practice

1. A bullet with a mass of 0.012kg has 1400 J of energy in the kinetic store. What is its velocity?
2. Find the velocity of a cyclist with a mass of 85 kg and 2.5 kJ of energy in the kinetic store.
3. **Challenge:** An oil tanker with a mass of 30 000 tonnes (1 tonne = 1000 kg) has a kinetic energy of 1.2×10^9 J. What is its speed?

Answers

Review

1. What are the factors that affect the value of the kinetic store?
    a. **Mass**
    b. **speed**
2. Which will have a more filled kinetic store?
    a. Two cars (A and B) both with mass 1000 kg but car A is travelling at 10 m/s and car B is travelling at 20 m/s. **Car B**
    b. A car travelling at 20 m/s or a lorry travelling at 20 m/s. **Lorry**

Review

Calculate the kinetic energy of the following objects:

1. A 1000 kg car moving at 10 m/s. **50 000 J**
2. A 0.1 kg apple falling from a branch at 5 m/s **1.3 J (1.25 J)**
3. **Challenge:** A 500 g football kicked at 25 m/s **160 J (156.25 J)**
4. **Challenge:** An unladen 20g European swallow flying at 11 m/s **1.2 J (1.21 J)**
5. **Super challenge:** If a moon with a mass of 9.8×10^{22} kg orbits at a velocity of 60 km/s, what is its kinetic energy store? **1.8×10^{32} J**

Review

1. An asteroid flies past the Earth at 28000 m/s. What is its mass given that it has 786500 J of energy in its kinetic store?
2. A motorbike has 710500 J of KE and a velocity of 70m/s. What is its mass?
3. A cyclist has 400 J of KE and a velocity of 10 m/s. What is their mass?
4. **Challenge:** A car has 56 kJ of KE and a velocity of 35 m/s. What is its mass?
5. **Super challenge:** What is the mass of the ISS? Its orbital velocity is 8 km/s and its KE is 1.4×10^{13} J.

Review

1. A bullet with a mass of 0.012kg has 1400 J of energy in the kinetic store. What is its velocity? **483 m/s**
2. Find the velocity of a cyclist with a mass of 85 kg and 2.5 kJ of energy in the kinetic store. **7.7 m/s**
3. **Challenge:** An oil tanker with a mass of 30 000 tonnes (1 tonne = 1000 kg) has a kinetic energy of 1.2×10^9 J. What is its speed? **8.9 m/s**