Work Done and Kinetic Energy

Specification: AQA 7367: MC1, MC3 · Edexcel 9FM0: FM1 Work, energy and power

HOMEWORK Consolidation

1 A horizontal force of 16 N pulls a crate 22 m along a horizontal floor. Find the work done by the force.
AQA 7367 MC1 · Edexcel FM1

2 A train travels 3 km against a constant resistance of 2.5 kN. Find the work done against the resistance.
AQA 7367 MC1 · Edexcel FM1

3 Find the kinetic energy of a runner of mass 70 kg moving at 8 m s^{-1}.
AQA 7367 MC3 · Edexcel FM1

4 A ball of mass 0.4 kg has 20 J of kinetic energy. Find its speed.
AQA 7367 MC3 · Edexcel FM1

5 A particle of mass 1.5 kg speeds up from 2 m s^{-1} to 6 m s^{-1}. Find the increase in its kinetic energy.
AQA 7367 MC3 · Edexcel FM1

6 A rope with tension 40 N at $30°$ to the horizontal pulls a box 12 m across horizontal ground. Find the work done by the tension.
AQA 7367 MC1 (A-level: force at an angle) · Edexcel FM1

7 A force of 80 N acts at an angle θ to the direction of motion of a body, which moves 5 m. The force does 200 J of work. Find θ.
AQA 7367 MC1 (A-level: force at an angle) · Edexcel FM1

8 A box of mass 8 kg is pulled 5 m across a rough horizontal floor by a force of 50 N at $40°$ above the horizontal. The coefficient of friction is 0.3. Take $g = 9.8$ m s^{-2}. Find the work done against friction.
AQA 7367 MC1, MC3 (friction, force at an angle) · Edexcel FM1

9 A bullet of mass 0.05 kg travelling at 400 m s^{-1} enters a fixed wooden block and stops after 0.16 m. Find the average resistive force of the wood.
AQA 7367 MC1, MC3 · Edexcel FM1

10 A box of mass 12 kg is pushed from rest across a rough horizontal floor by a horizontal force P N. Friction is a constant 30 N. After 5 m the speed of the box is 3 m s^{-1}. Find P.
AQA 7367 MC1, MC3 · Edexcel FM1

11 *AQA-style*. A van of mass 2000 kg travels at 18 m s^{-1} on a horizontal road. The engine is switched off and a constant resistance of 800 N acts on the van.
(a) Find the kinetic energy of the van at 18 m s^{-1}. [1 mark]
(b) Use the work–energy principle to find the distance the van travels while its speed falls to 10 m s^{-1}. [3 marks]
(c) Find how much further it travels before it stops. [2 marks]
AQA 7367 MC1, MC3 · Edexcel FM1 · AQA-style

12 *Edexcel-style*. A particle P of mass 0.5 kg is projected with speed 8 m s^{-1} along a rough horizontal surface. It comes to rest after travelling 10 m. The coefficient of friction between P and the surface is μ. Take $g = 9.8$ m s^{-2}.
(a) Use the work–energy principle to find the work done against friction. [2 marks]
(b) Find the value of μ. [3 marks]
(c) A particle of mass 1 kg is projected with the same speed on the same surface. State, with a reason, how far it travels before it comes to rest. [1 mark]
AQA 7367 MC1, MC3 (friction) · Edexcel FM1 · Edexcel-style