Year 11 Physics Worksheet Work, Energy and Momentum

- 1. Calculate the kinetic energy of a car of mass 1200 kg moving at a speed of 15 ms⁻¹.
- 2. Calculate the work (energy) needed to lift an object of mass 200 kg to a height of 4.00 m.
- 3. State the gravitational potential energy of the object in question 2 once it has been lifted.
- 4. If the object from questions 2 and 3 is dropped from its new height of 4.00m:(a) State its kinetic energy by the time it reaches the ground.(b) Hence calculate its speed just before it hits the ground.
- 5. Discuss how energy was conserved throughout questions 2,3 and 4.
- 6. Two tugboats, as shown in the diagram below, tow an oil tanker.



The tension in each towrope is 25000 N and each make an angle of 15.00° with the direction of the tanker's motion. Calculate the work that is done by each tug if the tanker is towed 1000 m.

7. A ball of mass 1 kg bounces off a wall without a change in speed, as shown below.



- (a) Calculate the ball's change in velocity, and hence calculate the ball's change in momentum.
- (b) Hence calculate the force the wall exerts on the ball, if the collision lasts 0.1 seconds.
- (c) State the force the ball exerts on the wall.

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- (a) Consider a 6 kg fish that swims toward and swallows a 2 kg fish that is at rest. If the larger fish swims at 1 ms⁻¹, determine its velocity immediately after lunch.
- (b) Use calculations to show why the collision was inelastic.
- 9. A hockey puck with a momentum of 4.03 kg ms⁻¹ to the right strikes a toy octopus thrown onto the ice, as shown below. The octopus has a momentum of 2.65 kg ms⁻¹ towards the bottom of the page. The puck and octopus slide off together.

Calculate the final magnitude of momentum.

