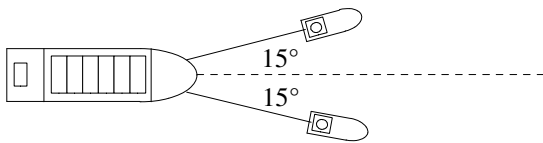


Year 11 Physics Worksheet

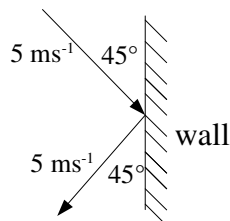
Work, Energy and Momentum

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. Describe the difference between an elastic and an inelastic collision.
8. 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.
9. 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.
10. 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.

