

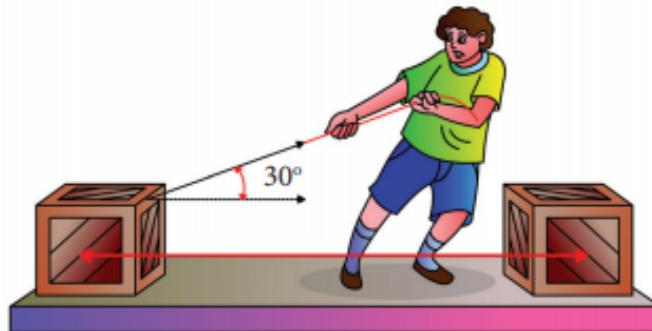


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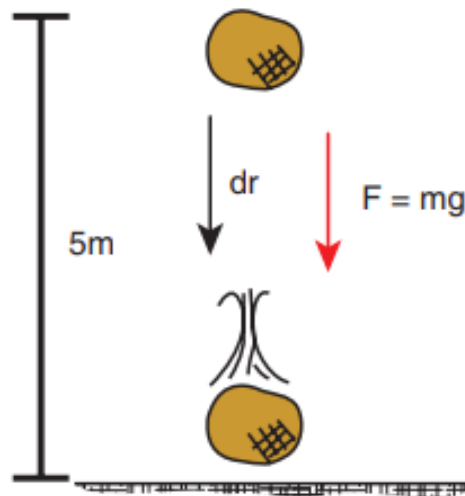
PHY1015 Tutorial Sheet 07

Work, Energy and Power

1. Calculate the work done by a force of 30 N in lifting a load of 2 kg to a height of 10 m ($g = 10 \text{ m/s}^2$).
2. A box is pulled with a force of 25 N to produce a displacement of 15 m. If the angle of displacement is 15° , find the work done by the force.

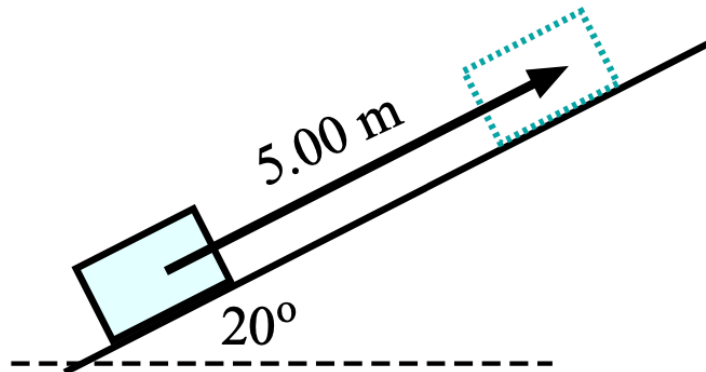


3. An object of mass 2 kg falls from a height of 5 m to the ground. What is the work done by the gravitational force on the object? (Neglect air resistance and take $g = 10 \text{ m/s}^2$)



4. How far must a 5 N force pull a 50 g toy car if 30 J of energy are transferred?

5. A stone of mass 2.5 kg is lifted up to the top of a cliff that is 180 m high. How much potential energy does the stone gain?
6. A student of mass 70 kg runs up a flight of stairs with a vertical height of 5 m. If the trip takes 7 s to complete, calculate the student's power.
7. A motor moves a lift 4 m between floors in 1.5 s. The lift has a mass of 1850 kg (ignore friction).
 - (a) Calculate the weight of the lift.
 - (b) Find the upward force in the cable when the lift is moving at a constant speed.
 - (c) What is the work done by the motor?
 - (d) Compute the motor's minimum power to raise the motor at a steady speed.
8. A moving object possesses kinetic energy. The kinetic energy of an object will increase if its mass and (or) velocity increase(s).
 - (a) Find the kinetic energy of a cricket ball of mass 160 g thrown at 22 m/s.
 - (b) How fast will the ball move if it has 180.5 J of kinetic energy?
9. A billiard ball rolls off a table and hits the floor at 5 m/s. What is the height of the table?
10. A crate of mass 10.0 kg is pulled up a rough incline with an initial speed of 1.50 m/s. The pulling force is 100 N parallel to the incline, which makes an angle of 20.0° with the horizontal as shown in the figure below.



The coefficient of kinetic friction is 0.400, and the crate is pulled 5.00m. (a) How much work is done by gravity? (b) How much energy is lost due to friction? (c) How much work is done by the 100 N force? (d) What is the change in kinetic energy of the crate? (e) What is the speed of a crate after being pulled 5.00 m?