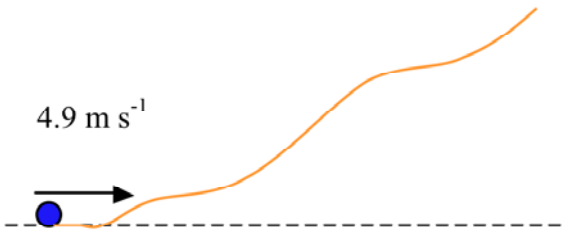
Support Worksheet – Topic 2, Worksheet 3

1 A body of mass 2.0 kg and initial speed 4.9 m s^{-1} climbs a ramp with no friction.



Calculate the maximum vertical height reached by the body. [1]

2 The body of question **1** is replaced with one of double the mass. How does your answer to that problem change, if at all? [1]

3 A body is dropped from rest from a height of 1.2 m. It bounces off a hard floor. At the impact with the ground 20% of the body's total energy is lost. Calculate the rebound height. [2]

4 In an **inelastic** collision which of the following is true about the total momentum and total kinetic energy?

	momentum	**kinetic energy**
A	conserved	conserved
B	conserved	not conserved
C	not conserved	conserved
D	not conserved	not conserved

[1]

5 An electric motor is used to lift a mass of 6.0 kg up a vertical distance of 3.0 m in 5.0 s at constant speed. The efficiency of the motor is 30%. Calculate the input power to the motor. [2]

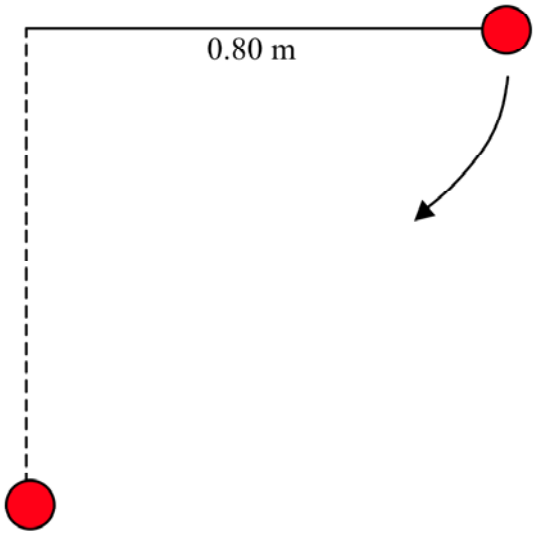
6 A body is projected vertically upwards. Air resistance is neglected. Sketch a graph to show the variation with distance travelled of the kinetic energy of the body from the time of launch until the maximum height is reached. [2]

7 A body that has been dropped from a very large height reaches terminal velocity. Discuss the energy changes taking place from the moment terminal velocity is reached until just before the body reaches the ground. [2]

8 The Earth moves around the Sun in an approximately circular orbit. State the force that acts as the centripetal force in this case. [1]

9 A body moves with constant speed on a horizontal circle. Explain why the body is accelerating even though the speed is constant. [2]

10 A ball of weight 2.4 N is attached to a horizontal string of length 0.80 m. The ball is allowed to swing as shown in the diagram.

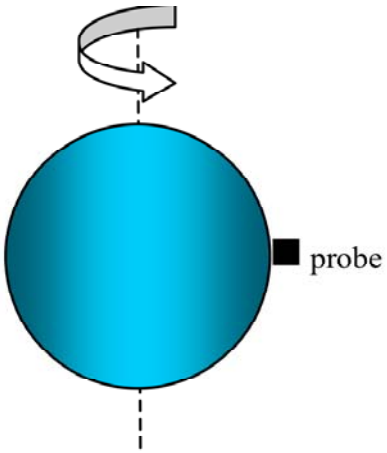


When the string is in the vertical position:

a Explain why the ball is not in equilibrium. [1]

b Calculate the tension in the string. [2]

11 A neutron star has a radius of 30 km. The acceleration of free fall at the surface of the star is $3.0 \times 10^{11}\ \text{m s}^{-2}$. The neutron star rotates about its axis with *f* revolutions per second.



A probe is on the equator of the star. Determine *f* such that the reaction force on the probe from the star is zero. [2]