

1. A measurement is taken to be $5.2 \text{ cm} \pm 0.1 \text{ cm}$. What is the % uncertainty to a single digit? (2%)
2. A car accelerates along a straight road from rest to 50 km/h in 5.0 s . What is the magnitude of its acceleration? (12 km/h/s or 0.2 m/s^2)
3. How long does it take a car to travel 30.0 m if it accelerates from rest at 2.00 m/s^2 ? ($t = 5.48 \text{ s}$)
4. A ball is dropped from a tower 70.0 m high. How far will it have fallen after 3.00 s ? (44.1 m)
5. An explorer walks 22.0 km north and then 47.0 km 60° S of E. What is her displacement? (30.0 km , $\theta = 38.5^\circ$ S of E)
6. A 150 g ball at the end of a string is revolving uniformly in a horizontal circle of radius = 0.600 m . The ball makes 2.00 rev/s . What is $a_c = ?$ ($a_c = 94.8 \text{ m/s}^2$)
7. Estimate the KE and velocity needed for a $70. \text{ Kg}$ pole vaulter to pass over a bar that is 5.0 m . The vaulter's center of mass is initially 0.90 m off the ground and reaches a max height at the level of the bar. ($v = 8.9 \text{ m/s}$ and $\text{KE} = 2800 \text{ J}$)
8. Convert 3.0 m/s^2 to km/hr^2 ($3.9 \times 10^4 \text{ km/hr}^2$)
9. How much energy does a fridge have to remove from 1.5 kg of water at 20°C to make ice at -12°C . (680 kJ)
10. The gravitational force between two blocks is F . What happens to the force if one of the masses doubles and the distance between the masses also doubles? ($F/2$)
11. A copper block of mass 2.5 kg is heated in a furnace to 500 C and then placed on a large ice block. What is the maximum amount of ice than can melt all at 0 C ? The specific heat cap of $\text{Cu} = 390 \text{ J/kg K}$ and L_f water is 334 J/g (1.45 kg)
12. An archer pulls back 0.75 m on a bow which has a stiffness of $200. \text{ N/m}$. The arrows weighs 5.0 g . What is the velocity of the arrow when released? (47.4 m/s)
13. A large ball of mass m hangs on a wall from a string as shown. What is the tension in the string? ($T = mg/\cos\theta$)
14. A motorcycle travels on the highway at a speed of 120 km/h and passes a car going at 90 km/h in the same direction. From the point of view of the car passenger, how fast is the motorcycle going? (30 km/h)

15. A ball thrown vertically upwards with a velocity of 6.0 m/s. How long will it take to return to the boy's hand? Use $g = 9.8 \text{ m/s}^2$ (1.22 s)
16. A toy train moves in a circle of radius 8 m with a speed of 4 m/s. What is a_c ? (2 m/s²)
17. A machine exerts a force of 221 N on a box at a 25° angle from the horizontal. The box has a mass of 30 kg and the machine moves it across the floor 20 m. How much work is done? Round to a whole number. (4000 J)
18. A 10 kg body moving at 10 m/s collides head on with a 15 kg body at rest. They stick together. What is the final velocity of both? (4 m/s)
19. A machine performs 8 J of work in 2 s. What is the power delivered? (4 W)
20. What is the name of the actor who played Stephen Hawking in the movie Theory of Everything? (Eddie Redmayne)