Towards Mastery:

**Calculation Checklist**

1. Write the values you’re given.
2. Check the values are in SI units.
3. Write the equation you will use.
4. Substitute in the values you know.
5. If necessary, re-arrange the equation.
6. Calculate your answer.
7. Write your answer – don’t forget the units!

Kinetic Energy Calculations

[Learning]

*This is what you really need to be able to do – use the equation exactly as it is given to you, substitute in the values you are given in the question and calculate the kinetic energy. Show all your working out.*

1. Calculate the kinetic energy of an 8kg object travelling with a velocity of 10m/s.
2. A bus is travelling at 5m/s and has a mass of 500kg. Calculate the kinetic energy.
3. Usain bolt has a mass of 55kg and is moving at 10m/s, what is his kinetic energy?
4. A cyclist is travelling at 4m/s and has a mass of 80kg, what is her kinetic energy?
5. Calculate the kinetic energy of a dog moving with a speed of 5m/s, the dog’s mass is 20kg.
6. What is the kinetic energy of a space rocket moving at 50m/s with a mass of 10,000kg?
7. A ball is moving at 15m/s; it has a mass of 5kg. What is the kinetic energy of the ball?
8. A brick is falling at 20m/s, calculate the kinetic energy if the mass is 4kg.

[Challenge]

*These are the more difficult questions – you will need to substitute and then rearrange these equations – if you can do these then you are really starting to grasp these calculations. Show all your working out.*

1. Calculate the mass of a man moving at 10m/s with 1000J of kinetic energy.
2. What is the mass of a bird flying at 5m/s with 100J of kinetic energy?
3. Hot air balloon with a kinetic energy of 76550J and a mass of 1890kg. What is the speed of the hot air balloon?
4. A canoe is moving down the river with a kinetic energy of 5J and a speed of 0.5m/s. Calculate the mass of the canoe.
5. A lift is travelling up to the top floor of the Empire State building with a mass of 4200kg and a kinetic energy of 4116J. Calculate the speed of the lift.
6. A Wii remote flung from a hand through a TV, with a kinetic energy of 1.44J and a mass of 4.5kg. What speed is the remote travelling at?
7. How fast is an object moving if it has 10,000J of kinetic energy and a mass of 5kg?
8. Calculate the speed of a parachutist with a mass of 50kg and 10000J of kinetic energy.

[Extreme]

*These are the most difficult questions – you will need to convert the units, substitute your values and then rearrange the equations – if you can do this you are well on your way on the journey to mastery of these calculations. Show all your working out.*

1. A balloon has a mass of 15g, it is rising at a rate of 4m/s, what is the kinetic energy of the balloon?
2. A bus has 10kJ of kinetic energy, the mass of the bus is 1000kg, calculate the speed of the bus.
3. A child has 0.5kJ of kinetic energy, the child is moving at 0.01km/s. Calculate the mass of the child.
4. A bird is flying at 100cm/s, the bird has 0.5kJ of kinetic energy. Calculate the mass of the bird.
5. Sam has a mass of 55kg. Sam has 0.1kJ of kinetic energy. How fast is Sam walking to his exam?