3.3 Moving objects have kinetic energy

Student worksheet answers (pages 46–47)

Kinetic energy

1 What is kinetic energy?

The energy of motion

2 Which types of objects have the greatest kinetic energy?

Heavy, fast-moving objects

3 Give four examples of kinetic energy.

*Answers will vary.* Examples include a moving rollercoaster, a wheel turning, you (writing the answer to this question ,water flowing down a hill.

4 Which has greater kinetic energy? Explain your answers.

a A jogger or a sprinter?

The sprinter; the sprinter is moving faster

b A car moving at 100 kilometers per hour or a train moving at 100 kilometers per hour?

The train; it is heavier than the car even though they are moving at the same speed

c Electricity or flowing water?

Electricity; although electrons are much smaller than water molecules, they move much faster

d A person on a bicycle moving at 5 kilometers per hour or a person on a motorcycle moving at   
60 kilometers per hour?

The person on the motorcycle; they are heavier and are able to move faster

5 When can our eyes not detect light energy?

We can only see light in the very small visible region of the spectrum; outside of this region our eyes cannot detect light energy

6 What is the function of a solar cell?

To convert light from the Sun into electricity

7 How is thermal energy created?

Through friction, burning chemicals or electrical devices

8 How/where does thermal energy move?

From a place of high temperature to low temperature

9 What is sound made up of?

Vibrations of air particles

Extend your understanding

10 Newton’s second law of motion states that force is equal to the mass of an object multiplied by its acceleration. This means that heavier objects (mass) are harder to push (force), so they cannot move as fast (acceleration). On the other hand, lighter objects are easier to push, so they can move faster.

a An elephant and a mouse are on skateboards. If you were to push both at the same time using the same amount of force, which one would move further? Explain your answer using Newton’s second law of motion.

The mouse would go further. If the force is constant, then the object with a smaller mass will experience a greater acceleration. *F* = *m* × *a*. If F is constant, as *m* decreases, *a* must also increase.

Weight can also be explained using Newton’s second law of motion. Your weight (the force) is equal to your mass multiplied by your acceleration. The unit used for weight is Newtons (N).

b What is the name that is given to your acceleration (9.8 m/s/s) on Earth?

Gravity

c If acceleration is constant, what it the relationship between weight and mass?

As mass increases, weight also increases

d A person has a weight of 50 N on Earth. Calculate their mass in kilograms use the equation   
*F* = *m* × *a*.



e What is the weight in Newtons of the same person on the Moon, if the Moon has th of the Earth’s acceleration?

