

WORKSHEET SCIENCE



Figure 1 shows the first two hills of the Big Dipper with the train about to go down the first drop.

1. What type of energy does the train have at the top of the first drop?
2. What type of energy does the train have at the bottom of the first drop?

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

3. Assuming the Big Dipper track is 1000 metres long and the train takes 3 minutes to completed the circuit, what is the average speed in metres per second?

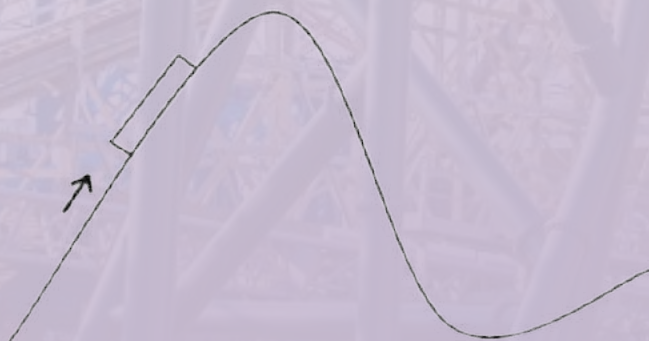


Figure 2 shows The Big One train being pulled up to the top of the first drop

Gravitational Potential Energy = mass X gravitational field strength X height

$$PE = mgh$$

m = mass (kg)

g = gravitational field strength (N/kg)

h = height (metres)

Facts:

- mass of The Big One train = 7,500 kg
- height of first drop = 72 metres
- gravitational field strength = 10 N/kg

4. At the top of the first drop, what gravitational potential energy does The Big One train have?
5. Name three things that will take energy away from the train as it travels around the track?
6. What two effects could high winds have on the train?

ICON - Blackpool Pleasure Beach's newest ride, is the UK's first double launch coaster

$$\text{Acceleration} = \frac{\text{Change In Speed}}{\text{Time Taken}}$$

7. ICON's first launch section is 60m in length. From a standing start, the train takes 2 seconds to travel this distance. At the end of the launch, it is travelling at 22 metres per second. What is the acceleration of the train?

Revolution facts:

- mass of train = 5,500 kg
- potential energy at first drop = 935,000 joules

8. From the Revolution facts above, work out the height of the first drop
9. If the Revolution train has a mass of 5,500 kg, what is its weight?

Nickelodeon Streak

Facts:

length of track = 699 metres

mass of train = 5,000 kg

velocity = 4 metres per second

$$\text{Kinetic Energy} = \frac{1}{2} mv^2$$



10. What kinetic energy does the Nickelodeon Streak train have?

11. Assume a rollercoaster has 5,000 Joules of kinetic energy and has a velocity of 10 m/s. What is the mass of the train?

Dodgems

12. Electricity from the grid in the Dodgems roof travels down the pole mounted on each car. When the ride starts, what is that electrical energy converted into?

13. If the forces acting on a dodgem car are balanced, what will happen to the car?

14. The red and yellow dodgems are about to collide. They have exactly the same mass and are travelling towards each other at the same speed. Draw arrows to show which direction each dodgem will be travelling in after the collision.



15. Assume a dodgem car with a mass of 300 kg is being driven by a 50 kg child and is travelling 3 m/s. A second dodgem with a mass of 300kg is being driven by a 150kg adult and is travelling at 2 m/s. Which car has the greatest kinetic energy and by how many Joules?

16. Assume a dodgem car with a mass of 300 kg is being driven by a 100kg driver. The dodgem has 5,000 Joules of kinetic energy. What is its velocity?