YOUNG MASTER CHALLENGE

Student Learning Pack
Honeybee (MATHEMATICS)

Resources:

Maths in life Concept: Engineering

🧮 Worksheet 1: The Speed, Distance, and Time Trick

Topic: Understanding the relationship between Speed, Distance, and Time

Objective:

- To apply the formula Speed = Distance ÷ Time in real-life situations.
- To understand how small changes in speed or time can greatly affect travel outcomes.

Questions:

1.A car travels 150 km in 2 hours. What is its average speed in km/h?

2. If a driver increases speed from 60 km/h to 90 km/h, how much less time will it take to travel 180 km?

3. A cyclist rides for 45 minutes at 12 km/h. How far does she go?

4. In the article, it mentions a reaction time of 1.5 seconds at 108 km/h.
   Convert 108 km/h to m/s.
   Calculate the thinking distance.

Reflection: Why is calculating speed, distance, and time important for road safety?

🚙 Worksheet 2: Understanding Car Crashes – It's Basic Physics

Topic: Energy, Force, and Safety in Motion

🎯 Objectives:

- Understand the relationship between speed, force, and energy.
- Learn how kinetic energy affects vehicle safety.
- Apply the formula to understand stopping distance and impact.

✏️ Questions:

1. A car (mass = 1,200 kg) moves at 20 m/s. Calculate its kinetic energy.
2. If speed doubles, how does the kinetic energy change?
3. A car takes 30 m to stop from 50 km/h. Estimate the new braking distance if it travels at 100 km/h.
4. What happens to the force on passengers if the car's stopping distance is doubled?
5. How do crumple zones and airbags help reduce injury in a crash? Explain in your own words.

🧩 Challenge Problem:

A 1,500 kg car traveling at 28 m/s crashes into a barrier and stops in 2 seconds.
Find the average force on the car using F=maF = maF=ma.

🕰️ Worksheet 3: Swing in Time

Topic: The Pendulum and Timekeeping

🎯 Objective:

- To understand how pendulums led to precise time measurement.
- To apply pendulum formulas to create and compare different designs.

✏️ Questions:

1. What is the length of a pendulum that makes one complete swing every 2 seconds?
2. If a clock runs fast, what adjustment could be made to the pendulum's length?
3. A pendulum's length is shortened from 1 m to 0.25 m. What happens to the period?
4. Explain how Galileo's discovery of isochronism changed the design of clocks.

Reflection: Why is mathematical accuracy important in engineering designs such as clocks or timing systems?

⏱️ Worksheet 4: Swinging on a String

Topic: The Mathematics of Pendulums

🎯 Objectives:

- Understand periodic motion using a pendulum.
- Learn to calculate a pendulum's period using length and gravity.
- Explore how pendulums connect to time measurement.

✏️ Questions:

1. What does the period (T) of a pendulum represent?
2. Calculate the period of a pendulum 1 m long on Earth.
3. If a pendulum's length is increased to 4 m, how does its period change?
4. A clock pendulum completes one swing every 2 seconds. Find its length.
5. Why doesn't the pendulum's mass affect its period?

🔍 Challenge Problem:

A 16 m long pendulum in a museum takes how many seconds to complete one swing?