Friction: Balancing the Necessary

Choose the correct answer:

1. Why is friction called a necessary evil?

(a) It only causes harm

(b) It helps and hinders motion

(c) It can be completely removed

(d) It is caused by temperature

2. Which of the following is an advantage of friction?

(a) Causes wear and tear

(b) Slows down vehicles

(c) Helps us walk without slipping

(d) Wastes energy

3. Lubricants are used to:

(a) Increase friction

(b) Reduce noise

(c) Reduce friction between surfaces

(d) Stop objects completely

B. Fill in the Blanks:

1. Friction is useful because it allows us to _____ and _____.

2. Friction causes wear and _____ of machine parts.

3. Applying _____ or using smooth surfaces can reduce unwanted friction.

C. Case Study:

A school robotics team designed a robot to move smoothly on a race track. They noticed the robot wheels were wearing out due to high surface friction. To fix the problem, they used rubber wheels with ball bearings and added oil to reduce the resistance.

Case Study Questions:

1. Why were the robot's wheels wearing out quickly?

2. What did the team do to reduce friction?

3. How did ball bearings help in balancing friction?

4. Why is it important to reduce excess friction in machines?

D. Short Answer Questions:

1. Why is friction both helpful and harmful?

2. How can we reduce undesirable friction?

3. Give two examples where high friction is beneficial.

E. Long Answer Questions:

1. Explain how friction can be both useful and undesirable. Give at least two examples of each.

2. Describe methods of increasing and reducing friction, and explain when each is needed.

3. Why do we call friction a “necessary evil”? Support your answer with real-life applications.