Types and Measurement of Motion

A. Fill in the Blanks

1. Motion is the change in _____ with respect to a reference point.
2. An object moving in a straight line with constant speed is in _____ motion.
3. The motion of a spinning top on its axis is an example of _____ motion.
4. To find the distance traveled, you multiply _____ by time.
5. The standard unit for speed is _____ (m/s).

B. Match the Following;

Match the example in Column A with the primary type of motion in Column B.

Column A (Example)	Column B (Type of Motion)
1. A car moving on a straight highway	A. Periodic / Oscillatory.
2. A spinning basketball on a finger	B. Random
3. The hands of a clock	C. Rectilinear
4. A child on a playground swing	D. Rotational
5. A flying butterfly	E. Circular

C. Practice Problems

Identify the type of motion or perform the calculation.

1. A soldier marching in a straight line on a parade ground is an example of what type of motion?
2. A child on a swing moves back and forth. What type of motion is this?
3. What type of motion do the wheels of a moving bicycle show? (Hint: It can be more than one!)
4. A cheetah runs a distance of 300 meters in 15 seconds. What is its speed?
5. A train travels 450 kilometers in 5 hours. What is its average speed in km/h?
6. If a snail moves at a speed of 0.01 m/s, how far will it travel in 100 seconds?
7. A bus is traveling at a speed of 60 km/h. How long will it take to cover a distance of 180 km?
8. Is a car moving in heavy city traffic an example of uniform or non-uniform motion? Explain why.
9. Identify the type of motion for a flying bee.

10. A satellite orbits the Earth at a constant speed. What two types of motion is it undergoing?

D. Warm-up Questions

Answer these quick questions to get your brain moving!

1. What is motion?
2. What is the basic formula to calculate speed?
3. Give an example of an object that is in circular motion.
4. What is a "reference point"?
5. What is the standard international (SI) unit for distance?

E. Challenge Questions

Think critically to solve these problems.

1. A cyclist travels the first 10 km of a journey in 30 minutes and the next 15 km in 45 minutes. What is the average speed of the cyclist for the entire journey in km/h?
2. An express train travels at a speed of 108 km/h. What is its speed in meters per second (m/s)? (Hint: 1 km = 1000 m, 1 hour = 3600 s)
3. Two friends, Alex and Ben, have a running race. Alex runs 400 meters in 80 seconds. Ben runs 200 meters in 35 seconds. Who is the faster runner? Justify your answer with calculations.
4. You are sitting on a moving train. Is the person sitting opposite you in motion relative to you? Is that same person in motion relative to a tree outside the train? Explain.
5. A car travels from Town A to Town B, a distance of 120 km, in 2 hours. It then immediately returns from Town B to Town A in 3 hours. What is the average speed of the car for the entire round trip?

F. Word Problems & Application

Apply your knowledge to these real-world scenarios.

1. A school bus takes 45 minutes to reach the school from a student's home, which is 18 km away. What is the average speed of the bus in km/h?
2. The blades of a ceiling fan are 0.5 meters long. When the fan is on, the tip of a blade moves in a circle. What type of motion does the tip of the blade have? What type of motion does the fan as a whole have on its central axis?
3. An elevator in a tall building travels 90 meters from the ground floor to the 30th floor in 30 seconds. What is its speed? What type of motion is this?
4. A family drives for 2 hours at 80 km/h, then stops for a 1-hour lunch break, and finally drives for another 1 hour at 70 km/h. What is the total distance they traveled?

5. A pendulum in a grandfather clock completes one full swing (back and forth) every 2 seconds. What is this type of motion called? Why is this type of motion useful for keeping time?

G. True or False

1. The motion of the Earth revolving around the Sun is an example of rectilinear motion. _____
2. A car moving on a winding road at a constant speed has uniform motion. _____
3. Speed is a measure of how fast an object is moving, regardless of direction. _____
4. To calculate time, you multiply speed by distance. _____
5. A flying kite shows only one type of motion. _____