What is Dynamics?

Worksheet

Dynamics studies how forces cause motion, governed by Newton's second law: the net force on a body equals its mass times its acceleration, F = ma.

F = m@a

Questions

1. What does Newton's second law state?

A) F = m + a
B) F = m/a
C) F = m a
D) F = a/m

2. A 500 N net force acts on a 100 kg cart. Its acceleration is:

A) 5 m/s
B) 50 m/s
C) 0.2 m/s
D) 500 m/s

3. Which statement is true only in dynamics, not statics?

A) F = 0
B) The body may accelerate
C) Moments are ignored
D) Mass is irrelevant

4. If net force on a body is zero, the body is:

A) Always dynamic
B) In equilibrium (statics applies)
C) Accelerating rapidly
D) Losing mass

5. A net force of 240 N acts on an 80 kg sled. Find its acceleration.

6. A 1200 kg car accelerates from rest to 20 m/s in 8 s. Find the net force needed.

7. A 0.5 kg ball is thrown and experiences 5 N of air resistance opposing its 10 N weight component along its path. Find its acceleration along that path.

8. Define: What is dynamics?

9. Define: What is Newton's second law?

10. Define: How does dynamics differ from statics?

Answer Key

1. C) F = m a - Force equals mass times acceleration: F = ma.

2. A) 5 m/s - a = F/m = 500/100 = 5 m/s.

3. B) The body may accelerate - Dynamics allows nonzero net force and acceleration; statics requires equilibrium.

4. B) In equilibrium (statics applies) - Zero net force means zero acceleration - the equilibrium condition of statics.

5. F = ma a = F/m a = 240 / 80 = 3 m/s

6. a = v/t = 20/8 = 2.5 m/s F = ma = 1200 2.5 = 3000 N

7. Net force = 10 5 = 5 N a = F/m = 5 / 0.5 = 10 m/s

8. The branch of mechanics studying bodies under unbalanced forces, connecting force, mass, and acceleration.

9. F = ma - the net force on a body equals its mass times its acceleration.

10. Dynamics involves acceleration and unbalanced net force; statics requires zero net force and zero acceleration.