What is Statics?

Worksheet

Statics analyzes rigid bodies in equilibrium: the vector sum of all forces is zero (F = 0) and the sum of all moments about any point is zero (M = 0).

@sum F = 0

Questions

1. In statics, what must be true of the net force on a body?

A) It must be positive
B) It must equal zero
C) It must equal its weight
D) It must increase over time

2. Two perpendicular forces of 300 N and 400 N act on a bracket. What is the resultant?

A) 700 N
B) 500 N
C) 350 N
D) 100 N

3. What does M = 0 represent?

A) Sum of masses is zero
B) Sum of moments about a point is zero
C) Sum of velocities is zero
D) Sum of materials is zero

4. A body in statics can be:

A) Only completely motionless
B) At rest or moving at constant velocity
C) Only accelerating
D) Only rotating

5. A bracket is pulled by a horizontal force of 300 N and a vertical force of 400 N. Find the resultant force.

6. A 5 m ladder rests against a frictionless wall, with its base on the ground 3 m from the wall. If the ladder weighs 200 N acting at its center, find the horizontal reaction at the wall using M = 0 about the base.

7. A simply supported beam 6 m long carries a single point load of 900 N at its midpoint (3 m from each support). Find each support reaction.

8. Define: What is statics?

9. Define: What are the two core equilibrium equations?

10. Define: What is a free-body diagram (FBD)?

Answer Key

1. B) It must equal zero - Equilibrium requires F = 0 - forces balance exactly.

2. B) 500 N - R = (300 + 400) = 250000 = 500 N.

3. B) Sum of moments about a point is zero - It's the rotational equilibrium condition - no net turning effect.

4. B) At rest or moving at constant velocity - Statics covers zero-acceleration states: rest or constant-velocity motion.

5. R = (Fx + Fy) R = (300 + 400) = (90000 + 160000) R = 250000 = 500 N

6. Height on wall: h = (5 3) = 4 m M(base) = 0: Wall force 4 Weight (3/2) = 0 Fwall 4 = 200 1.5 = 300 Fwall = 300 / 4 = 75 N

7. By symmetry the load splits equally between both supports Fy = 0: R1 + R2 = 900 N R1 = R2 = 900 / 2 = 450 N

8. The study of bodies in equilibrium, where the net force and net moment acting on them are both zero.

9. F = 0 (sum of forces) and M = 0 (sum of moments about any point).

10. A sketch isolating an object and showing every external force and reaction acting on it.