

What is Newton's Second Law?

Worksheet

Newton's second law states that the net force on an object equals its mass times its acceleration: $F = ma$. Force and acceleration point in the same direction.

$$F = m \cdot a$$

Questions

1. A net force of 20 N acts on a 4 kg object. What is its acceleration?

- A) 80 m/s
- B) 5 m/s
- C) 0.2 m/s
- D) 24 m/s

2. Which equation is Newton's second law?

- A) $F = m/a$
- B) $F = m + a$
- C) $F = ma$
- D) $F = a/m$

3. What is the SI unit of force?

- A) Joule
- B) Watt
- C) Newton
- D) Pascal

4. If the force on an object doubles while mass stays constant, acceleration...

- A) halves
- B) doubles
- C) stays the same
- D) becomes zero

5. A 1000 kg car accelerates at 2 m/s. What net force is needed?

6. A 50 N force pushes a 10 kg box on a frictionless floor. Find its acceleration.

7. A 0.5 kg ball is hit with a 10 N force. Find its acceleration.

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

9. Define: What is the SI unit of force?

10. Define: If mass doubles and force stays the same, what happens to acceleration?

Answer Key

1. B) $5 \text{ m/s} - a = F/m = 20/4 = 5 \text{ m/s}$.
2. C) $F = ma$ - Force equals mass times acceleration.
3. C) Newton - Force is measured in newtons (N) = kgm/s.
4. B) doubles - $a = F/m$, so doubling F doubles a when m is constant.
5. $F = ma$ $F = 1000$ $2 F = 2000 \text{ N}$
6. $a = F / m$ $a = 50 / 10$ $a = 5 \text{ m/s}$
7. $a = F / m$ $a = 10 / 0.5$ $a = 20 \text{ m/s}$
8. $F = ma$ - net force equals mass times acceleration.
9. The newton (N), where $1 \text{ N} = 1 \text{ kgm/s}$.
10. Acceleration is halved ($a = F/m$).

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