

What is Friction Force?

Worksheet

Friction force equals the coefficient of friction times the normal force: $f = \mu N$, where μ depends on the two materials in contact and N is the perpendicular contact force.

$$f = \mu N$$

Questions

1. What is the formula for friction force?

- A) $f = + N$
- B) $f = N$
- C) $f = N/$
- D) $f = N$

2. What does the coefficient of friction (μ) represent?

- A) Mass of the object
- B) A unitless number describing surface roughness
- C) Force in newtons
- D) Acceleration due to gravity

3. If the normal force doubles while stays the same, friction force...

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

4. Which is generally larger for the same surfaces?

- A) Kinetic friction
- B) Static friction
- C) They are always equal
- D) Neither - friction is random

5. A wooden crate has a normal force of 200 N on a wooden floor ($\mu = 0.4$). Find the friction force.

6. A 10 kg box sits on a floor with $\mu = 0.25$. Find the friction force ($g = 9.8 \text{ m/s}^2$).

7. A crate has static friction coefficient $\mu_s = 0.6$ and normal force 50 N. Find the maximum static friction before it starts sliding.

8. Define: What is the formula for friction force?

9. Define: What does (μ) represent?

10. Define: Does friction force depend on contact area?

Answer Key

1. B) $f = N$ - Friction force equals the coefficient of friction times the normal force.
2. B) A unitless number describing surface roughness - is a unitless ratio that depends on the two materials in contact.
3. B) doubles - $f = N$ is directly proportional to N , so doubling N doubles f .
4. B) Static friction - It takes more force to start motion than to keep it going, so static friction is usually larger.
5. $f = N$ $f = 0.4 \cdot 200$ $f = 80$ N
6. $N = mg = 10 \cdot 9.8 = 98$ N $f = N = 0.25 \cdot 98$ $f = 24.5$ N
7. $f(\text{max}) = \mu N$ $f(\text{max}) = 0.6 \cdot 50$ $f(\text{max}) = 30$ N
8. $f = N$ - coefficient of friction times normal force.
9. The coefficient of friction, a unitless number describing how rough two surfaces are together.
10. No - for dry sliding friction, it depends only on the normal force and μ , not surface area.

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