

# What is Work (in Physics)?

## Worksheet

Work equals force times displacement in the direction of the force:  $W = Fd$ , measured in joules (J). If the force and displacement are at an angle, only the parallel component counts:  $W = Fd\cos$ .

$$W = F d \cos(\theta)$$

## Questions

1. What is the formula for work when force and displacement are parallel?

- A)  $W = F + d$
- B)  $W = F/d$
- C)  $W = Fd$
- D)  $W = d/F$

2. What is the SI unit of work?

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

3. If a force is perpendicular to the displacement, the work done is...

- A) maximum
- B) negative
- C) zero
- D) undefined

4. A 100 N force moves an object 3 m in its own direction. What is the work done?

- A) 33.3 J
- B) 103 J
- C) 300 J
- D) 97 J

5. A 50 N force pushes a box 4 m in the direction of the force. Find the work done.

6. A 10 kg mass is lifted straight up 2 m. Find the work done against gravity ( $g = 9.8 \text{ m/s}^2$ ).

7. A 30 N force is applied at 60° to a 5 m displacement. Find the work done.

8. Define: What is the formula for work in physics?

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

10. Define: What is the work done if force is perpendicular to displacement?

## Answer Key

1. C)  $W = Fd$  - Work equals force times displacement when they point in the same direction.
2. C) Joule - Work is measured in joules (J), equivalent to Nm.
3. C) zero -  $\cos(90) = 0$ , so no work is done by a perpendicular force.
4. C) 300 J -  $W = Fd = 100 \cdot 3 = 300$  J.
5.  $W = Fd$   $W = 50 \cdot 4$   $W = 200$  J
6.  $F = mg = 10 \cdot 9.8 = 98$  N  $W = Fd = 98 \cdot 2$   $W = 196$  J
7.  $W = Fd \cos$   $W = 30 \cdot 5 \cos(60)$   $W = 150 \cdot 0.5$   $W = 75$  J
8.  $W = Fd$  - force times displacement in the direction of the force, measured in joules.
9. The joule (J), where  $1 \text{ J} = 1 \text{ Nm}$ .
10. Zero - only the force component parallel to the displacement does work.

### **Bounlu**

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