

PHYSICS 11

Work, Energy, Power

Concepts:

Matching

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| 1. Energy | A. Uses energy and can create energy. |
| 2. Power | B. The units for energy and work. |
| 3. Work | C. The rate of doing work (faster work uses more of this). |
| 4. Joules | D. Has the ability to create forces; stored work. |

Is the person doing work? (Y/N)

- When pushing a 1000 N car 20 meters?
- When lifting a rock off the ground?
- When holding a book in their hands?
- When pushing hard against a brick wall?
- When walking up the stairs?

Increase, Decrease or the Same amount of Work?

- You use more force to move an object.
- You lift a 20 N object faster.
- You raise an object a shorter height.
- You move a lighter object.
- You move an object farther.

More or Less Power?

- An engine can lift an object faster.
- Someone takes more time to push a car.
- You take the same amount of time to do more work.
- Same distance; same time; more force.

Practice:

You move a 25 N object 5 meters. How much work did you do?

You carry a 20 N bag of dog food up a 6 m flight of stairs. How much work was done?

You push down on a 3 N box for 10 minutes. How much work was done?

You use 35 J of energy to move a 7 N object. How far did you move it?

You do 45 J of work in 3 seconds. How much power do you use?

A car uses 2,500 Joules in 25 seconds. Find power.

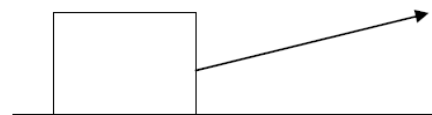
A 60 watt light bulb runs for 5 seconds. How much energy does it use?

You push a 10 N object 10 meters. How much work was done on the object?

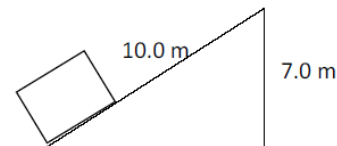
On the same object as in the previous question, you have to push with 15 N to move it 10 meters. How much work do you do?

Homework

1. A 20.0 N pomegranate is lifted at a constant velocity from the floor to a height of 1.50 m. How much work is done on the object?
2. A 15.0 N potato is moved horizontally 3.00 m across a level floor using a horizontal force of 6.00 N. How much work is done on the potato?
3. A 2.20 N book is held 2.20 m above the floor for 10.0 s. How much work is done on the book?
4. A 10.0 kg barrel is accelerated horizontally from rest to a velocity of 11.0 m/s in 5.00 s by a horizontal force. How much work is done on the barrel assuming no friction?
5. A 90.0 N box is pulled 10.0 m along a level surface by a rope. If the rope makes an angle of 20.0° with the surface, and the force in the rope is 75 N, how much work is done on the box?



6. A 60.0 kg student runs at a constant velocity up a flight of stairs. If the height of the stairs is 3.2 m, what is the work done against gravity?
7. A 20.0 kg mass is pulled horizontally 9.0 m along a level frictionless surface at a constant velocity. How much work is done on the mass?
8. An 80.0 kg box is pushed up at a constant velocity along a frictionless incline as shown in the diagram. How much work is done on the box in moving it up the incline?



9. A 25.0 kg pumpkin is accelerated from rest through a distance of 6.0 m in 4.0 s across a level floor. If the friction force between the pumpkin and the floor is 3.8 N, what is the work done to move the object?
10. A 1165 kg car traveling at 55 km/h is brought to a stop while skidding 38 m. Calculate the work done on the car by the friction forces.

Answers: 1) 30.0 J 2) 18.0 J 3) 0 J 4) 605 J 5) 705 J 6) 1900 J 7) 0 J 8) 5500 J 9) 135 J 10) 1.4×10^5 J