

WORK & POWER Review

- ✓ A quick summary
- ✓ tips and tricks
- ✓ - pictures and drawing, graphs, diagrams
- ✓ - All formulas
- ✓ - 2 examples
- ✓ - 1-5 prac. prob

- work is basically done when a force is applied to an object and makes it move.

- there are two formulas

$$\textcircled{1} W = F \cdot d$$

where $F = \text{force (N)}$ and

$d = \text{distance (m)}$

$$\textcircled{2} W = F \cdot \cos \theta \cdot d$$

$F = \rightarrow$

$d = \rightarrow$

$\cos \theta = \frac{\text{adj}}{\text{hyp}}$ = the degree of a certain angle = θ .

- power is basically the rate at which you do work.
there are two formulas

$$\textcircled{1} P = W/t$$

power (watts, J/m)
(watts) — time (s)

$$\textcircled{2} P = f \cdot v$$

power (watts) / force (N) — velocity (m/s)

100
100
100

Work & Power Review

1. The work done by a force is given by the equation $W = Fd \cos \theta$.
 2. The power is the rate at which work is done, $P = \frac{W}{t}$.
 3. The work done by a force is zero if the force is perpendicular to the displacement.

4. The work done by a force is positive if the force and displacement are in the same direction.
 5. The work done by a force is negative if the force and displacement are in opposite directions.

6. The work done by a force is zero if the force is perpendicular to the displacement.
 7. The power is the rate at which work is done, $P = \frac{W}{t}$.
 8. The work done by a force is given by the equation $W = Fd \cos \theta$.

9. The work done by a force is positive if the force and displacement are in the same direction.
 10. The work done by a force is negative if the force and displacement are in opposite directions.

11. The work done by a force is zero if the force is perpendicular to the displacement.
 12. The power is the rate at which work is done, $P = \frac{W}{t}$.

13. The work done by a force is given by the equation $W = Fd \cos \theta$.
 14. The power is the rate at which work is done, $P = \frac{W}{t}$.

15. The work done by a force is positive if the force and displacement are in the same direction.
 16. The work done by a force is negative if the force and displacement are in opposite directions.

* TIPS

Some people may find this easy, but it actually took me a while to learn.
 - when working with power, if you're going to use the second formula $P = F \cdot v$, and you have to find P and F , always remember $F = m \cdot a$. I always forgot that and got confused because I was like how am I supposed to solve for two things.

Example:

How much power would you need to push a 20kg lawn mower at 2m/s?

Step 1: formula

$$P = F \cdot v$$

$$P = ?$$

$$F = ? \quad 196 \text{ N}$$

$$v = 2 \text{ m/s}$$

$$P = 196 \cdot 2$$

$$\boxed{392 \text{ (W)}}$$

$$* F = m \cdot a$$

$$F = 20 \text{ kg} \cdot 9.8$$

$$F = 196 \text{ N}$$

* - a tip for work is only use the formula (cos) when you're dealing with angles.
 - everything else is pretty explanatory.

The first thing I noticed when I stepped
 out of the plane was the fresh air. It felt
 like a breath of life. The sun was shining
 brightly, and the birds were chirping.
 I had never felt so alive before. The
 landscape was beautiful, with rolling hills
 and green fields. I had heard that the
 weather was perfect, and it was true.
 I had come to the right place at the
 right time. I was going to have a
 great vacation.

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- ex: If you push a box 7m along floor with 895nm worth of work how much does box weigh? and what if we needed to get that box on a truck with ramp incline of 18°?

$$W = F \cdot d$$

$$\rightarrow \frac{895}{7} = F \cdot \frac{7m}{7}$$

$$\boxed{F = 127N}$$

* don't forget to label

$$W = F \cdot \cos \theta \cdot d$$

$$W = 127N \cdot \cos 18^\circ \cdot 7m$$

$$\rightarrow \boxed{W = 849nm}$$

See what happened there.

★ Practice Problems 1-5

simple

- 1.) How much power would you need to push a 50kg box at 3m/s (impossible, I know).

$$P = f \cdot v$$

$$P = 490 \times 3$$

$$P = \boxed{1470 \text{ (w)}}$$

$$P =$$

$$F = 490N$$

$$v = 3m/s$$

$$f = m \cdot a$$

$$f = 50kg \cdot 9.8$$

$$490N$$

Handwritten notes at the top of the page, including the word "NOT" and some illegible text.

Handwritten notes in the middle section of the page, containing several lines of text.

Handwritten notes in the lower middle section, including the word "PROBLEM" and some mathematical symbols.

Handwritten notes at the bottom of the page, including the word "PROB" and some mathematical symbols.

2.) How much time would it take if the final power applied to an object is 2360(w) and 3N/m was applied to it?

$$P = W/t$$

$$\frac{2360}{3} = \frac{3 \text{ N/m} \cdot t}{3}$$

$$t = 786.66 \text{ s}$$

3.) How much work would be needed to move a 30kg box for 4 meters?

$$W = F \cdot d$$

$$W = (30 \cdot 9.8) \cdot 4$$

$$W = 1176 \text{ n/m}$$

4.) In tug o war, team X pulled team Y with a force of 80000N a distance of 30 meters. The angle they pulled at was 13°. How much work has been done?

$$W = F \cdot \cos \theta \cdot d$$

$$W = 80,000 \cdot 30 \cdot \cos 13^\circ$$

$$W = 80,000 \cdot 30 \cdot .974$$

$$W = 2338488 \text{ n/m}$$

$\frac{1}{2} = \frac{1}{2} + \frac{1}{2}$
 $\frac{1}{2} = \frac{1}{2} + \frac{1}{2}$
 $\frac{1}{2} = \frac{1}{2} + \frac{1}{2}$

$$+ \text{min} = 0.05$$

$$\frac{1}{2} = \frac{1}{2}$$

$$v = (1.000) = v$$

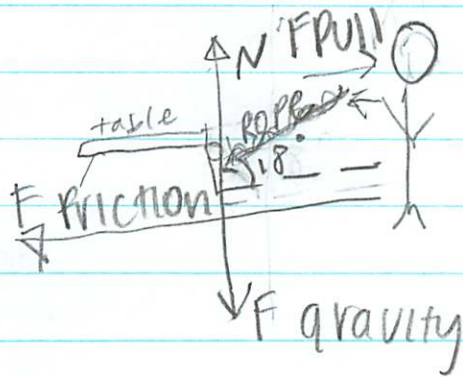
$$\frac{1}{2} = \frac{1}{2}$$

$$v = 0.000 \cdot 30 \cdot 0.015$$

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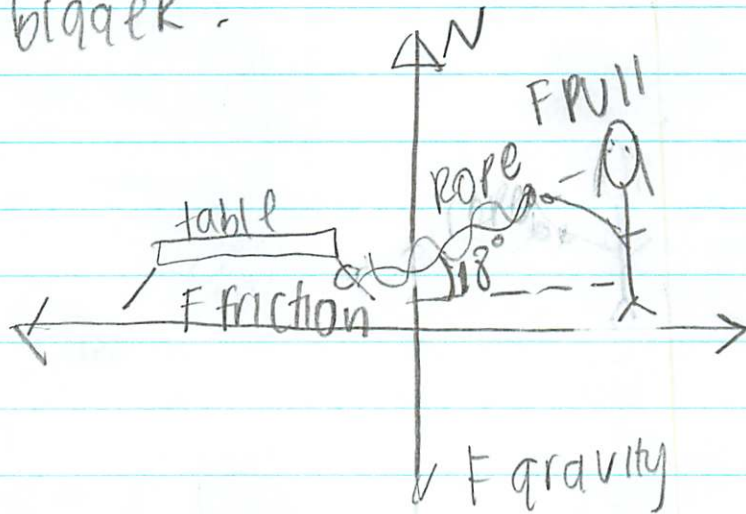
$$v = 0.000 \cdot 30 \cdot 0.015$$

5.) draw a free body diagram
 a someone pulling a rope tied
 to a table at an angle
 of 18° .



x i just realized
 you cant
 see this,

bigger:



2
3) Draw a free body diagram of a block on an inclined plane. The block is at the top of the plane and is about to slide down. The forces acting on the block are gravity, normal force, and friction force.

