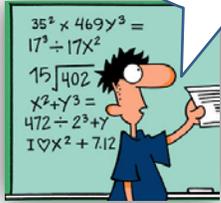


Caution:

The next few pages will reveal the answers to the "Do the Math" physics problems. Make sure you have "done the math" before looking at the answers.

I was told there would be no math!!

# Physics Problems: Laws of Motion



## Review the Newton's Laws of Motion Brain Pop.

Solve these problems:

$$F = ma$$

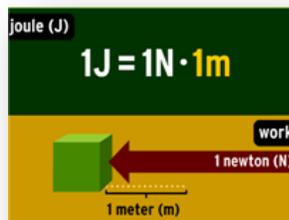
Force = Mass X Acceleration  
(Newtons) (Kg) m/s/s

1. A bowler rolls a 5 Kg bowling ball down a frictionless alley. The ball accelerates at an average rate of 2m/s/s. How much force did the bowler apply to the ball?
2. A kid applies a force of 27 Newtons to a 9 Kg wagon. How fast does it accelerate?



## Review the Work Brain Pop.

Solve these problems:

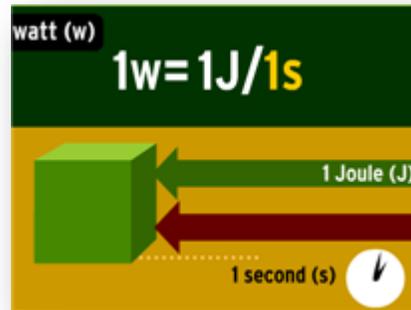


$$\text{work} = \text{force} \times \text{distance}$$
$$W = Fd$$

3. A horse exerts 400 Newtons of force to pull a wagon 25 meters. How much work has the horse done (in Joules)?
4. A strong man tries to pull a 13,000 Kg school bus. He pulls and pulls for twenty minutes and then falls in a heap of exhaustion? How much work did he do (in Joules) if he failed to move the bus?

## Review the **Power** Brain Pop.

Solve these problems:



$$\text{power} = \text{work} / \text{time}$$
$$P = W/t$$

5. A man does 35 Joules of work to carry box of groceries into a house. If he makes the trip in 20 seconds, how many Watts of power did he put out?
6. The man carries the same box of groceries back to the car (he delivered to the wrong house). He does 35 Joules of work once again but this time he completes the trip in 15 seconds. How many Watts of power did he put out this time?

## Force, Work, Power: Putting it all together. Hint: you will need to use all three formulas to solve this problem.

Solve this problem:

$$F = ma$$

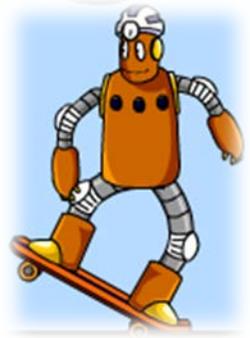
$$\text{work} = \text{force} \times \text{distance}$$
$$W = Fd$$

$$\text{power} = \text{work} / \text{time}$$
$$P = W/t$$

7. A robot moves a 15Kg box at 2m/s/s for a distance of 10 meters. If he moved it in 15 seconds, how much power did he put out (in Watts)?

## Review the **Acceleration** Brain Pop.

Solve these problems:



$$\text{ACCELERATION} = \frac{\text{FINAL SPEED} - \text{INITIAL SPEED}}{\text{TIME}}$$

8. A robot goes down a steep slope on its skateboard. If it started at rest and reached a final speed of 20m/s in a time of 5 seconds, what was its acceleration?

\_\_\_\_\_ m/s/s

9. A rocket on board a jet fighter traveling at 250 m/s was launched. After 10 seconds the rocket was traveling at 300 m/s. What was the rockets acceleration once it was launched?

\_\_\_\_\_ m/s/s

## Review the **Distance, Rate, and Time** Brain Pop.

Solve these problems:

$$\begin{aligned} \text{DISTANCE} &= \text{RATE} \times \text{TIME} \\ d &= r \cdot t \\ r &= \frac{d}{t} \quad t = \frac{d}{r} \end{aligned}$$

10. A car traveling at 100kph (kilometers per hour) for 6 hours will have covered a distance of how many kilometers?
11. A train travelled a distance of 750 kilometers in 2 hours. How fast was it travelling?
12. How long would it take to travel 200 kilometers at 25 km/hour?