

Schaums Problems: 3.39, 3.40, 3.43, 3.45, 3.46

3.39 *This is a vector addition problem just like you did on the worksheets.*

3.40 *“Compute algebraically” means do them like you did on the worksheets. Break them up into i and j coordinates, etc. (You can also solve them graphically. See page 31 for an example)*

3.43 *A ramp (or inclined plane) is the basis for using a smaller force than what would appear to be required to do some work (like lifting a piano). A screw is simply an inclined plane wrapped around a nail. **INCLINED PLANES ARE JUST ABOUT THE MOST IMPORTANT THING YOU WILL STUDY IN THIS CLASS SO PAY ATTENTION!!***

If you use a ramp to lift an object that weighs say 150 newtons, instead of needing to lift with a force equal or greater than 150 newtons, you would only need to lift with a force of 150 N times the sine of the angle at which the ramp is tilted in respect to the horizontal. (of course you must actually lift through a greater distance to get it to the height you desire)

3.45 Newton’s Second Law (notice that it is underlined) states that *Force is equal to mass times acceleration*

or

$$F=ma$$

Since you know the force and the mass, you can determine the acceleration as long as you put the force and the mass in proper SI units.

3.46 First of all a ms is a milli-second which is one thousandth of a second, or 0.001 s. (notice that I put a zero in front of the decimal point to avoid confusion or mistakes. It is a mistake not to put a zero in front of a decimal number in my class and I will take off for not doing it)

Acceleration is defined as the change in velocity divided by the change in time or

$$a = \frac{V_f - V_o}{t}$$

So what does it mean?

V stands for velocity which is a fancy word for speed (it actually means you know the direction of the speed as well as its magnitude)

“a” stands for acceleration

“t” stands for time and must, I mean must be in seconds

“f” stands for final and the little zero (often pronounced “sub-naught” by big shot physics geeks at dinner parties to impress others) means the initial.

So the initial velocity is zero and the final velocity is 262 m/s. Time is equal to 0.001 s. Solve for “a”

To find the average force on the bullet, use Newtons Second Law $F = ma$ but convert the 16.2 grams to 0.0162 kg first.

There is another way to solve for the acceleration.

One of the most useful equations of motion is

$$V_f^2 = V_o^2 + 2ad$$

You should memorize it and talk about it at length at parties and at the dinnertable.

So what does it mean?

V stands for velocity which is a fancy word for speed (it actually means you know the direction of the speed as well as its magnitude)

a stands for acceleration

d stands for distance

Well, the initial velocity of the bullet is 0 m/s so we get

$$V_f^2 = 2ad$$

we know the final speed (262 m/s) and the distance d (5.0 inches times 2.54 cm /inch = 12.7 cm = 0.127 m which gives $2.7 \times 10^5 \text{ m/s}^2$ or to one significant figure the same answer as the book.