V_iV_fDat Problems is Where It's At

1. A bobsled has a constant acceleration of 4.0 m/s² starting from rest.
   a. After 5.00 seconds how far has it gone?

$d = \cancel{V_i t}^{0} + \frac{1}{2}at^2$

$d = \frac{1}{2}(4)(5)^2 = 50m$

$V_i = 0$ 0
$V_f =$?
$d = ?$ 50
$a = 4.0$ 4.0
$t = 5.0$ 5.0

   b. After 5.00 seconds how fast is it traveling?

$V_f = \cancel{V_i}^{0} + at$

$V_f = 4(5) = 20m/s$

   c. What is the average velocity during the first 5.00 seconds?

$\bar{V} = \frac{V_i + V_f}{2}$

$\bar{V} = \frac{0+20}{2} = 10m/s$

-or-

$d = \bar{V} \cdot t$

$50 = \bar{V} \cdot 5$

$\bar{V} = 10m/s$

more than 1 way To do the Problem

$V_i = 0$
$V_f = 40$
$d = ?$
$a = 4$
$t = *$

   d. How far has it traveled by the time its velocity is 40.0 m/s?

$V_f^2 = \cancel{V_i^2}^{0} + 2ad$

$40^2 = 2(4)d$

$8d = 1600$

$d = 200m$

2. A Porsche, initially traveling at a uniform velocity, accelerates at a rate of 12 m/s² for a period of 5.0 seconds. If the car traveled 200.0 m during this 5.0 s period, what was the velocity of the Porsche before it started to accelerate?

$d = V_i t + \frac{1}{2}at^2$

$200 = V_i(5) + \frac{1}{2}(12)(5)^2$

$200 = 5V_i + 150$

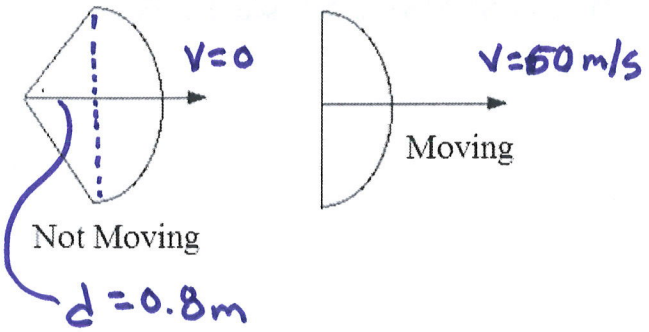
$-150 \quad -150$

$5V_i = 50$

$V_i = 10m/s$

$V_i = ?$
$V_f = *$
$d = 200$
$a = 12$
$t = 5$

3. An arrow, after being pulled back, was accelerated over a distance of 0.8 m in the bow. If its speed at the moment it left the bow was 60.0 m/s what is the acceleration imparted by the bow? (Hint: Look at the picture below. The arrow is going from the left bow picture to the right one).



$V_f^2 = \cancel{V_i^2}^{0} + 2ad$

$60^2 = 2(a)(.8)$

$3600 = 1.6a$

$a = 2250m/s^2$

$V_i = 0$
$V_f = 60$
$d = 0.8$
$a = ?$
$t = *$

4. A train started from rest and moved with a constant acceleration. At one time, it was traveling 10 m/s. 50 m further down the track it was going 16 m/s.

$V_i = 10$
$V_f = 16$
$d = 5$
$a = ?$
$t = *$

a. Calculate the acceleration.

We are looking @ the time from 10 m/s → 16 m/s

$V_f^2 = V_i^2 + 2ad$

$16^2 = 10^2 + 2(a)(50)$

$256 = 100 + 100a$
$-100 \quad -100$

$100a = 156$

$a = 1.56 \text{ m/s}^2$

b. Find the time required to travel the 50 m mentioned.

$V_f = V_i + at$

$16 = 10 + 1.56t$
$-10 \quad -10$

$1.56t = 6$

$t = 3.85$ sec

c. Find the time required to reach 10 m/s from rest.

acceleration is same as above but $V_i = 0$ & $V_f = 10$

$V_f = \cancel{V_i}^{0} + at$

$10 = 1.56t$

$t = 10/1.56 = 6.41$ sec

$V_i = 0$
$V_f = 10$
$d =$
$a = 1.56$
$t = ?$

d. Find the distance the train moved in going from rest to 10 m/s.

$d = \frac{V_1 + V_2}{2} \cdot t = \frac{0+10}{2}(6.41) = 32.05 \text{ m}$

-or- another way...

$d = \cancel{V_i t}^{0} + \frac{1}{2} a t^2 = \frac{1}{2}(1.56)(6.41)^2 = 32.05 \text{ m}$

1) 50 m, 20 m/s, 10 m/s, 200 m 2) 10 m/s 3) 2250 m/s^2 4) 1.56 m/s^2 ,3.85 sec, 6.41 sec, 32.1 m