

# Practice Problems For Chapter 04

The problems and solutions that follow were designed by students. Although I have checked them, there are very possibly a few errors here and there. If you notice a mistake and turn in a typed correction, you will receive two extra homework points. You may also write new homework problems to add to any chapter and receive between 2 and 5 homework points per problem (see syllabus for details.) Please note: since these problems were written by students, the teacher takes no responsibility for errors – in other words, if there is a mistake and you make the same mistake on a test, you will not get credit for that mistake.

In the problems below, I have highlighted what I feel are the best problems to study prior to tests. The other problems are all ok, but they tend to be very easy problems or repeats of homework problems with slight variations. You may want to start with a few of the regular problems as warm up and then move on to the highlighted problems.

Chapter 4 Questions

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1. If a Volvo C70 goes 0-60 mph in 7 seconds, how far does it go to get to this speed?

John Stevenson '07

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2. Stewart drove his car 560 km to the east of Joseph's house. If Stewart left his house at 8 A.M. and arrived at Joseph's house at 12 P.M. what is Stewart's average velocity?

Karl Thumm '07

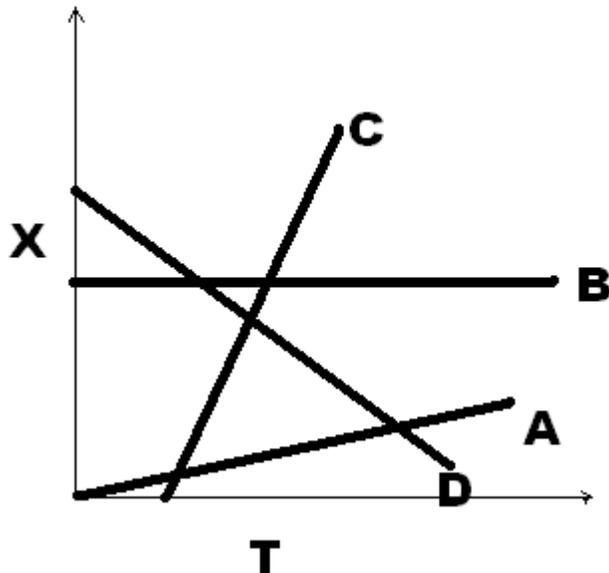
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3. Lance Armstrong can ride his bike an average speed of 15.62 m/s during the 6th leg of the Tour De France. How long did it take Lance to Finish the race if the race is 6000m?

Karl Thumm '07

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4.

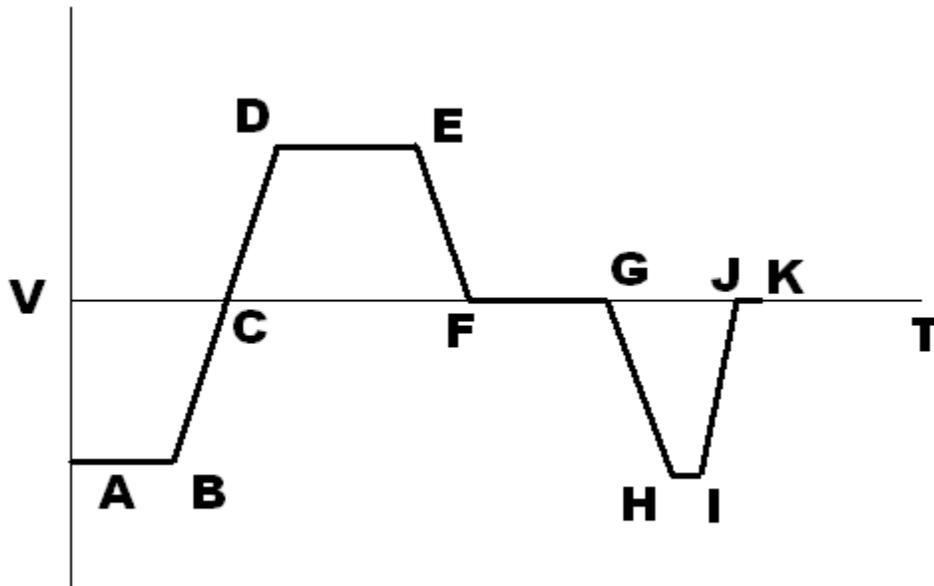


- On the X vs. T graph above, which line(s) represent:
- An object moving away from you (i.e. forward)
  - An object at rest
  - The object that traveled the farthest distance

d. An object moving towards you (i.e. backwards)

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5.



On the V vs. T graph above, what part of the graph represents:

- a. An object traveling at a constant moving velocity
- b. An object accelerating (speeding up)
- c. An object decelerating (slowing down)
- d. An object at rest

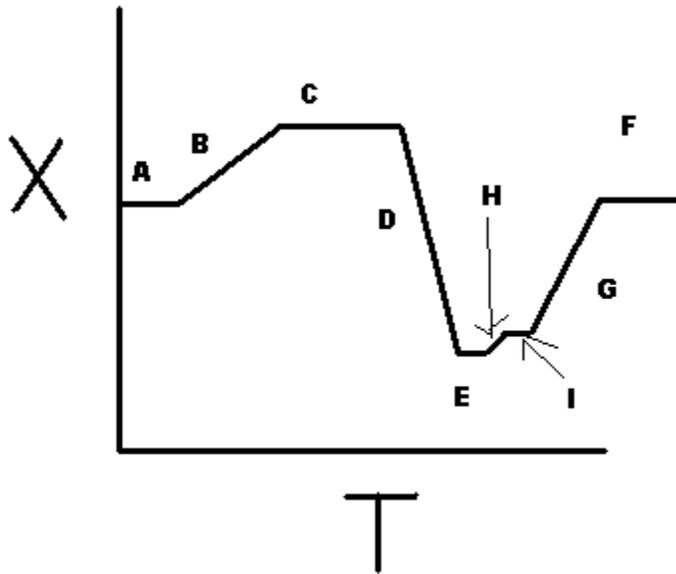
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6.) Awkward stain cat has been stolen! An ancient tribe of crazy physicists have stolen it and have taken it to a shrine in the middle of the Amazon jungle where they will worship it like a god. Although you cannot blame them for wanting such a crazy cat, you must go after it. The physicists have decided that they will sacrifice awkward stain cat on the night of the next eclipse (precisely 72 hours away). If the Amazon jungle is 14000km away, and you travel at 55m/s, will you get there in time?

Mitchell Williams '08

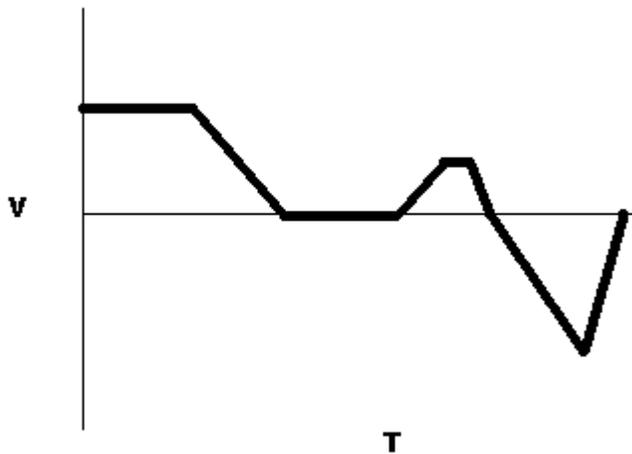
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7. On the X vs. T graph shown, label the points where the object is moving at a constant speed, standing still, the point that the object is the farthest away from its starting point.



Mitchell Williams '08

8. Describe the motion of the object that the V vs. T graph shows:



Mitchell Williams '08

9. Mitch and Russell are "racing" down Walnut Hill at mind blowing speeds. They lay out a track 50km (roughly 30 miles) long. It takes Mitch 20 min to finish the race while it takes Russell 35 min. What were their avg. velocities? (\*\*Bonus: find their velocities in mph.\*\*)

Stephen Tonti

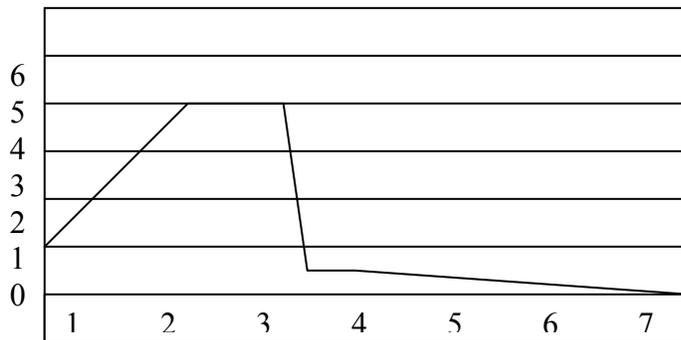
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10. The Earth orbits the sun roughly every 29.43 years. The distance of the Earth's orbit around the sun is 939,889,369 km. What is the avg. speed of the Earth's orbit? (in Km/h)

Stephen Tonti

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11. If you flew a plane, and your velocity vs. time looked like this:



What would your distance v. time graph look like? What can we guess happened in between minute 3 and minute 4? What kind of pilot are you?

**Franci Rooney 08**

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12. Superman is lazy, and he only wants to make one nonstop trip to the top of the building to save the two children from the fire. In fact, he's so lazy, he's planning on closing his eyes while he flies up there. To make sure he arrives at the right point, he realizes he is 35 meters from the base of the building, and that his line of sight is  $60^\circ$ . He plans to use the information he learned in physics to determine the information. How tall is the building? To get to the top of the building in 12 seconds, how fast would he have to fly?

**Franci Rooney 08**

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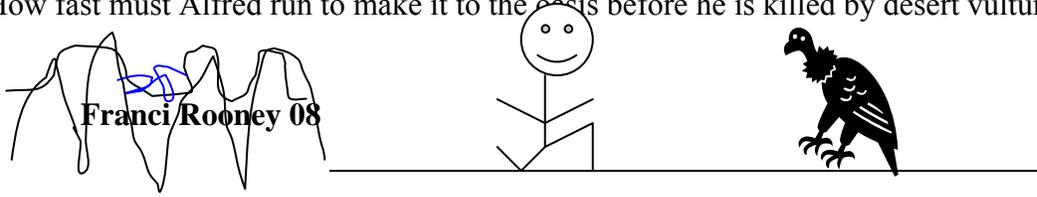
13. If your car can go 0 – 60 in 3.5, what is its acceleration? What distance does it cover?  
Franci Rooney ('08)

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14. Alfred is stranded in the desert. All he has in his possession are the clothes on his back and a deep, comprehensive knowledge of physics. Having already used the shadows of the hills in the distance and his trigonometric skills, he's determined that the oasis in the hills is 860 meters away. He is planning to walk there. But, since this is the desert, vultures will come out



and attack whatever is out in the open at sundown. The sun will set in 1 minute and 12 seconds. How fast must Alfred run to make it to the oasis before he is killed by desert vultures?



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## Chapter 4 Solutions

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1.  $a = \Delta V / \Delta T$

$$a = 26.8224 / 7$$

$$a = 3.8317714292 \text{ m/sec}^2$$

$$V_f^2 = v_i^2 + 2a\Delta x$$

$$26.8224^2 = 0 + 2 * 3.8 * \Delta x$$

$$\text{Answer: } \Delta x = 93.8784 \text{ m}$$

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2.  $560 \text{ km} / 4 \text{ h} = 140 \text{ km/h}$

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3.  $6000 / 10.42 = t = 575.8156$

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4. a. Lines A and C  
b. Line B  
c. Line C  
d. Line D
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5. a. Line AB, line DE, line HI, and line JK  
b. Line CD, line GH  
c. Line BC, line EF, line IJ  
d. Point C, line FG, Line JK
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6.  $14000 \text{ km} = 14000000 \text{ meters}$ .  $55 \text{ m/s} = ? \text{ m/hour}$   $55 \times 60 \times 60 = 198000 \text{ m/hour}$   $198000 \times 72$  (the hours till the eclipse) =  $14256000 \text{ meters}$  in that time.  $14256000 > 14000000$  so you make it in time.

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7. Moving constant, D, H, G  
Not moving: A, C, E, I, F  
Point farthest from start: E
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8. Object is moving forward at a constant velocity. Object then decelerates (but is still moving forward) then comes to a complete stop. Object accelerates forward again then travels at a constant speed, then decelerates (accelerating in the negative direction) then stops moving for a split second. Object then begins accelerating in the backwards or negative direction then instantly (while still going backwards) accelerates in the positive direction until it comes to a stop.

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9. Mitch: 50000m/1200sec  
Mitch=41.67m/s

Russ:50000m/2100sec  
Russ=23.81m/s

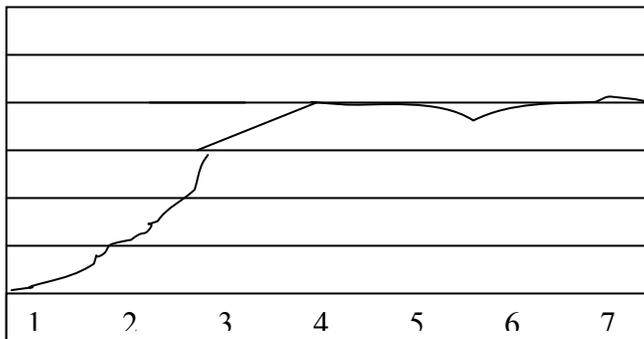
\*\*Mitch: 93.2mph  
Russ: 53.26mph

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10. There are 8765.8 hours in 1 year.  
 $29.43\text{ys}(8765.8\text{hrs})=257977.5\text{hrs}$   
 $939,889,369\text{km}/257,977.5\text{hrs}=(\text{the Earth orbits the sun at }3646.3\text{km/h [that's }1.01\text{ km/s...almost a mile every second]})$ .

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11.



You crashed into something and are a terrible pilot.

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12. Using trig, the building is 60.6 meters tall and 70 meters away. To get to the building, superman has to fly 5.8 m/s

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13. 60 mph = 26.822 m/s

$$V_i = 0$$

$$V_f = 60$$

$$T = 3.5$$

$$26.822 = 3.5a$$

$$a = 7.6634$$

$$x = 7.6634(3.5)^2/2$$

$$\Delta x = 46.938 \text{ m}$$

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14. 1 minute and 12 seconds = 72 seconds  
860 meters.  
11.9 m/s

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