

**Group Activity on Dimensional Analysis (2A and 2B)** (pages 1 and 2 here)

Work on this activity in groups of three students.

1. (Spend 2 minutes reading and thinking on your own and then three minutes talking in your group about how to solve this. It is not necessary to solve it at this point – just talk about strategies you might use. After that, the whole class will share their insights.)

We typically measure the speed of a car on a highway in miles per hour. However, when there is an issue about how fast a car can stop, the time of interest is usually in seconds and the thing that is causing the car to need to stop is much closer than a mile. Often it is best to measure that distance in feet. So it would be convenient to think of the speed of that car in feet per second.

If a car is going 65 miles per hour, what is its speed in feet per second?

Notes on strategies:

2. (Again, 2 minutes thinking on your own and then three minutes in your group.)

Let's think about a somewhat less complicated problem. Again, we are more interested in a strategy than a numerical value at this point.

A cook is cooking for a much larger group than she usually cooks for. Her recipe for a particular dish requires 2.5 cups of chicken stock. She needs to make 36 times as much as one recipe, so she needs  $(36) \cdot (2.5) = 90$  cups of chicken stock. The food buyer says that he buys chicken stock in gallons. How many gallons does she need?

Question: What is less complicated about this problem than the first problem?

Is there a strategy for solving this problem that would also help with solving the car speed problem?

3: In section 2A, pages 83-86, there is a discussion of unit conversions and conversion factors. Read this in your book (or from the e-book projected in the front of the room.) Use this method to solve exercises 27 and 31 in 2A and then check your answers in the back of the book. Discuss this with your group as you work.

27. Convert 24 feet to inches.

31. Convert 15 gallons to quarts.

4. Use the method of conversion factors to solve the second problem about how many gallons of chicken stock are needed.

5. Use the method of conversion factors to solve the first problem about the speed of the car in feet per second.

6. The material in section 2B is more complex applications of this same mathematical technique of dimensional analysis. A major goal of this section (and of this chapter in the course) is for you to see how using dimensional analysis as illustrated on pages 83-86 can help you understand and confidently work with rather complex concepts such as energy and power and density and concentration. These concepts will come up in practical applications through the rest of the course.

**Week 1 work to do at home:**

Reading (and discuss examples on the Blackboard Discussion Board)

- Read section 2A (before Wed. Jan. 16)
- Read Section 2B (at least skim over the first half of it before Wed. Jan. 16) Read in the homework assignment below about all the tables you'll be allowed to use on a test so you DON'T need to memorize much at all!
- Read the Prologue for our textbook on pages 1-12 (by Friday, Jan. 18)

**HW / Quiz 1. Due at the beginning of class Wed. Jan. 23.**

Do the following exercises, showing your work, checking your answer in the back of the book, and, if it is not correct, then put an X by it and then re-work it correctly. Skip at least one line between your solutions to the different exercises. (Ask questions on the Blackboard Discussion Board as needed, and help each other by answering questions.)

2A: Exercises 3, 9, 11, 13, 15, 17, 21, 29, 33, 37c, 39, 41, 43, 47, 53, 55, 61, 63, 71, 73, 77

- Notice that the first few exercises don't have complete answers in the back. These are good ones to discuss on the Blackboard Discussion Board. It is acceptable to discuss any homework or quiz problems on the Discussion Board and even to tell each other how you worked it and the answer you obtained. It is up to you students in the discussion to decide whether the answers and discussion provided by other students are correct or not. Developing skills in productively working with others on solving problems is an important part of this course.
- Additional note: Some of the answers in the back for money problems (47-54 and similar ones) use slightly different conversion factors from those printed in the text. If you run into trouble checking your answers, these are excellent problems to discuss with other students on the Blackboard Discussion Board. You should be able to determine whether you are doing the problems correctly even if you run into difficulties like this if you talk with each other.  
*You might even discuss with each other why such a mistake might be made in a textbook. Think about how long a particular conversion factor (dollars to euros, for example) is usually valid.*

2B: Exercises 3, 19, 25, 37, 39, 41, 45, 47, 51, 53, 57, 61, 63, 65, 71, 77, 79, 85

On a test, you will have copies of all these conversion factors:

- page 87, Table 2.1 Currency
- page 97, all three tables 2.2-2.4
- page 99, Table 2.5
- page 101, Table 2.6,
- page 103, Temperature conversion equations
- pages 103 and 104. Two facts : 1000 calories is equivalent to 1 Calorie. 1 Calorie is equivalent to 4184 joules.
- page 104 – the contents of both orange boxes about energy and power.

**QUIZ 1:** (55% of the HW/Quiz grade for this week comes from the quiz.)

**On a separate sheet of paper**, work the following eleven quiz problems, in this order and labeled clearly. Show your work, as you were doing for the homework. **For quiz problems, write on only one side of the paper.**

P1. In the Prologue, in the section on Misconceptions, write at least two sentences about something that you found surprising or interesting.

P2. Considering all the sections of the Prologue except for the section on Misconceptions, which did you find most interesting and why? (At least two sentences.)

2A: Exercises 4, 62, 76

2B: Exercises 5, 6, 7, 14, 17, 78

**Put your quiz page(s) at the back of your homework papers, fold them all together, and write your name and the date on the outside of the paper. Turn this in at the beginning of class on Wed. Jan. 23.**