

Independent Math Studying

TIME MANAGEMENT

- Organize your notes after you exit class (use Cornell notes or another method.) You need 10-15 minutes to just review material, and determine what you don't know or understand. Ideally, do this right after class, or at least on the same day as class so that the material is fresh in your mind.
- Work with the course tutor to create a weekly schedule that accommodates this type of review.

COMPREHENDING A PROBLEM

When studying a new math concept, first you should work through a representative problem (ideally one that you have done in class, but don't look at the notes!). You need to devote time after class on the same day to solve this problem, so you can take advantage of the familiarity you've gained with the material during class. That means you need to set aside an hour or two to study *on the same day*. Again, speak to the course tutor about creating a study schedule.

Example

You just had a lesson on imperfect square roots. You leave class with notes that show how to work through a problem involving imperfect square roots. Here is a problem from the notes: How do you simplify $\sqrt{72}$? Your instructor solved this problem in class. During your 1-2 hours of study time, you should begin by solving this problem *without referencing your notes*.

First, recall what math procedure you need to use to solve the problem. In this case, you need to know that no integer multiplied by itself equals 72. You need to factor this imperfect square to try to find some perfect squares.

As you work through each step of the problem, write *in plain English* what you are doing:

1. List out all factors of 72:
 - a. $72 = 8 \times 9 = (2 \times 2 \times 2) \times (3 \times 3) = 2^2 \times 2 \times 3^2$
2. Take the square root of the factored version of 72:
 - a. $\sqrt{72} = \sqrt{2^2 \times 2 \times 3^2} = (\sqrt{2^2}) \times (\sqrt{2}) \times (\sqrt{3^2})$
3. Recall: if $x \geq 0$, then $\sqrt{x^2} = x$
4. Simplify the result of Step 2 using the fact in Step 3:
 - a. $(\sqrt{2^2}) \times (\sqrt{2}) \times (\sqrt{3^2}) = 2 \times (\sqrt{2}) \times 3 = 2 \times 3 \times \sqrt{2} = 6\sqrt{2}$
5. Realize that you have solved the problem:
 - a. $\sqrt{72} = 6\sqrt{2}$

Why/Where did you get stuck?

After you work through that familiar problem, select and try to work through a comparable problem from the review section of the chapter. If you get stuck, consult the

book or go to an easier problem, then return to the initial problem. If you get *really* stuck, speak to the instructor/tutor about the problem. After you have completed the problem, you need to reflect on the points where you had difficulty. Did you not know a step? Did you make an error in arithmetic or algebra? Did you misunderstand something conceptually? Once you identify what, where, how, and why something went wrong, write these down in plain English.

THROUGHOUT THE PROCESS, REFLECTION MUST HAPPEN!

You might experience different problems as you are solving an equation:

Situation A: You don't know a step (you just don't remember or you never learned it)

If you experience Situation A, after you complete the equation move on to a new one.

Situation B: You make an error because you have an incorrect interpretation of what to do.

*If you experience Situation B, you **need** to reflect on what happened.*

Example

You have written down $\frac{4}{3}$ and want to find its decimal equivalent.

You think $\frac{4}{3}$ means “divide 3 by 4,” i.e., $4\overline{)3}$. So you do this division and get 0.75. However, you then type $\frac{4}{3}$ into a calculator and it returns $1.\overline{3}$. Obviously, $0.75 \neq 1.\overline{3}$, so something is wrong. Your error? You interpreted the horizontal bar incorrectly! In fact, $\frac{4}{3}$ means “divide 4 by 3,” and we write $3\overline{)4}$, which equals $1.\overline{3}$.

***** Don't move on to the next question just yet. *****

First, determine why you had trouble here and what was causing the error. You need to build an explanation that makes sense to *you*.

BUILDING FLUENCY

You need to spend time (an hour or two) doing variations of the problem so that you can begin to understand errors that you are making in your reasoning and thinking, and to understand how to avoid those errors in the future. This can be done by doing extra problems in the courseware (e.g. WeBWork), by doing problems not assigned by the instructor, and by doing problems on the chapter review page in your book or any relevant textbook. *Every time you have trouble while solving a problem, you should reflect.* This will ultimately help you succeed in taking standardized and instructor-created tests, and in actually understanding the course material.