Examples of contextualized problems

The Common Core/Illinois Learning Standards encourage math to be taught deeply with meaning and the use of context. Because of the number of standards to be met in $9^{th} - 11^{th}$ grade, that goal is sometimes a challenge to accomplish. Transitional math courses have a more streamlined content approach to allow for time for deeper problem solving, often in context and potentially in group settings. Additionally, the contexts used should be related to a high school senior's life as a future citizen, employee, and college student. Here are some examples to illustrate the kinds of contextualized problems that can be used.

NOTE: There are many problems that will satisfy the goals of the course. These are a few examples. Many websites and existing curriculum resources have problems to draw from, including resources designed for the Common Core. There will also be problems written by Illinois high school and college math teachers to increase a list of open resources.

Each example is classified by its pathway as well as a possible use:

- lesson problem
- assessment item
- activity
- project

STEM

Problems in this pathway should be contextualized when possible. When that is not feasible, use problems that require connections and applications of multiple skills in a mathematical context.
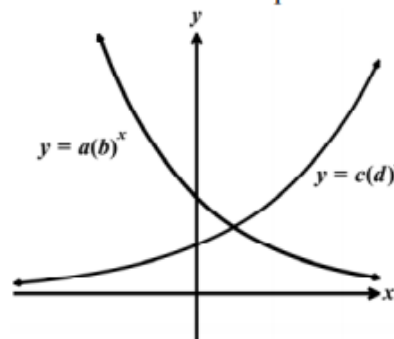
Non-contextualized example

Use: lesson problem or assessment item

The graph below shows two exponential functions, with real number constants a, b, c, and d. Given the graphs, only one pair of the constants shown below could be equal in value. Determine which pair could be equal and explain your reasoning.

b and d a and b a and c

Source: eMathinstruction

Contextualized example

Use: activity or project

Stacks of Cups Problem

You are the package design director for a paper products company that has decided to introduce different-sized paper cups in the general shape shown below as a new product line. Your design team has been given the assignment of designing a cardboard carton that could be used to package the cups for sale. Your supervisor has given you the following requirements.
1. All faces of the carton are to be rectangular.
2. The square base should be just large enough to accommodate a single stack of cups.
3. The height of your carton should be given as a function of the maximum number of cups it will hold, since the marketing director has not yet determined the number of cups that would be best to include for optimum sales.
4. All measurements should be given in metric units, preferably centimeters, since the company is an international one.
5. The expense of constructing the container should not be a factor in your proposal.

Since this is a new product for the team, you decide to study actual stacks of cups to help you discover which features of the cup affect the height of the stack. To do this, the team uses two types of plastic cups that were found around your office. Complete your study, then summarize your findings in a report that you will submit to your supervisor.

Source: The Pacesetter Curriculum, College Board

NOTE: This is the problem statement. In the Pacesetter Curriculum activity, many additional questions and problems related to the stacks of cups are included.

Quantitative Literacy/Statistics example

Use: project

Nestle makes claims in this ad that their new bottles are made of 30% less plastic, which is better for the environment. Determine how much of an impact is made.

NOTE: This problem statement is very broad and vague to encourage student creativity and increase the challenge. However, some assumptions can be made or provided to make the problem more manageable.

Technical math example

Use: lesson problem or assessment item

Abbreviation definitions

p.o. – medication is taken orally

q.6.h. – frequency of medication taken (every 6 hours in this case)

Problem

A doctor orders dicloxacillin sodium 125 mg p.o. q.6.h. for a child who weighs 55 lb. The recommended dosage of dicloxacillin sodium for children weighing less than 40 kg is 12.5 to 25 mg/kg/day p.o. in equally divided doses q.6.h for moderate to severe infections. Is the dosage safe?