**Mathematic activity ideas that use the Core Standards of Practice to develop the math knowledge your students need to be successful in your trade area.**

***Mathematical knowledge has two conditions:***

* ***Understanding* the concepts and the connections.**
* ***Practicing* the computational and problem solving skills.**
1. **What is the Situation???**

Supply pairs or small groups of students with a problem that is used in your content area and have them write a scenario/situation/project (general or detailed) to fit that example and find a solution that make sense (use a Collins Writing Type 1 or 2).

You can find problems in your textbook, related mathematics resources, from your experiences, etc. Start with a simpler problem and, as you repeat the activity, work up to more complicated examples. All students can have the same problem or each group could have a different problem.

* *Suggestions* – Use this when you have math problems as part of your theory or lab - you have a ready-made problem to use.
* *Scaffolding -*  provide: partial scenarios or project descriptions that fit the problem; example of a similar problem that shows a correct solution; have several types of problems including some very obvious/easy or more challenging and distribute to students accordingly; have a “hint option” – students can ask for a hint to get them on the right track.
* *Extension* - After trading problems with another pair/group, students solve the contextual word problem and use a Collins Writing Type 2 as an explanation of the problem-solving process that was used. Students present their explanations to the creator of the contextual problem and the creators provide the feedback. The instructor gets the Collins Writing document.
1. **Too Much Information (TMI)!!**

Gather a set (3-5) of mathematics word problems that are commonly used in your industry or from work/situations/problem sets that you have doing. *Rewrite so that each problem contains extraneous information with an incorrect solution.*

Randomly distribute so that each student gets only one problem (several students will have the same problem). At first, students will work individually to identify the extraneous information and determine the error(s) in the problem-solving process.

They should hi-light the extraneous information and write a description of the error(s) in the problem solving process (use a Collins Writing Type 1 or 2). Next, working in a group with the other students who had the same problem, they will share their findings and reach a consensus within the group on the correct solution.

* *Suggestions* - This more complicated activity could be done during one long session depending on the complexity of the problems, what students are doing for the visual, and how well they work in cooperative groups.

Alternatively this activity could be done over several days with a short work time (5-15 minutes) each day: day one: individual; day two: group findings and consensus; day three: construction of the visual; day four: presentations and class discussion. Use Collins Writing Type 2 or 3 following the discussion.

Students could also have related homework assignments. For example, the initial individual work could be done as a homework assignment and then the first day would be the group work.

* *Scaffolding -*  provide: a correctly completed example for each problem type; have several types of problems including some very obvious/easy or more challenging and distribute to students accordingly; have a “hint option” – students can ask for a hint to get them on the right track.
* *Extension:* The group records their findings, solution, and explanations on a poster/overhead/PowerPoint to share with the class. A spokesperson from each group will present the visual with the original problem, identified extraneous information and errors, and the correct solution. When all groups have presented, the class discusses the similarities in the different problem examples. Display or retain the visual presentation for student reference. Students write about the presentations in a Collins Writing Type 2 or 3.
1. **Missing Information……**

Use the examples (including the solution) from your textbook or math resource materials create a list of sample problems with missing information (just leave out one value/piece of information from the example) and the solution.

Distribute a problem to a small group of students. The group must determine what information is missing and supply the information needed in order for the solution given to be correct. This requires the group to work the problem backwards from the solution to find the missing number.

* *Suggestions* – Use this after the class has practice this type of problem to solidify their understanding of the concepts and procedures. Good for a transition time assignment. Justify their solution in a Collins Writing Type 1 or 2.
* *Scaffolding -*  provide: example of a similar problem that shows a correct solution; have several types of problems including some very obvious/easy or more challenging and distribute to students accordingly; groups may do more than one problem; have a “hint option” – students can ask for a hint to get them on the right track.
* *Extension* - This would work well for a review activity with a set of several different kinds of problems. Each group can have exactly the same set of problems, different sets but the same types of problems, or create several different sets with mixed types of problems. Vary the number of problems depending on the complexity of the problems and how much time available for the activity – it can be as little as one problem per group. A spokesperson from each group could explain how they found the missing information. There may be several different ways to approach finding the missing information and students may hear alternative methods that no one in their group thought of. Collins Writing Type 2 follows where students describe a method that they heard about, but did not use themselves.
1. **Find the Mistake ☹**

Create a problem set of wrong answers by having each student work one problem and deliberately make a common mistake (mistake in calculation, wrong formula, sign error, wrong definition, etc.).

Students exchange problems and “solutions” and practice identifying the errors and making corrections. Students share their answers with a partner or small group. Assign each pair or group one or two problems to analyze and then share with the class.

* *Suggestions* – Another good activity for review or transitions times. Students can share their “errors” with a Collins Writing Type 1 or 2.
* *Scaffolding -* provide: example of a similar problem that shows a correct solution and help student find a good spot to make a mistake; have several types of problems including some very obvious/easy or more challenging and distribute to students accordingly; have a “hint option” – students can ask for a hint to get them on the right track.
* *Extension –* Create set (2-4) problems that all have the same type of error. Students should identify the common error and the procedural or computational mistake. Correct the error by resolving the problems and justify your solution in a Collins Writing Type 2 or 3.
1. **Plan for a Project ☺**

Give students the specifications for a project including measurements, blueprints, or specs. Students describe how they would complete the construction including a step by step plan (you can decide how detailed you want it), list of materials, and measurement tools. They Research the costs of materials, estimate labor cost and write an estimate. Students can work as individuals, pairs or in cooperative groups. Students’ plans can be kept in a class notebook for reference and examples (Collins Writing Type 3, 4, or 5).

* *Suggestions –* Students should have experienced the needed skills by doing some similar work/problems/skills prior to this assignment, but with this project they are using and synthesizing their knowledge by combining skills. This activity could follow a theory unit, practical lessons, a less complicated project, etc. Differentiate for all levels of students by changing requirements and complexity. Use Collins Writing Type 1 and 2 along the way to assess student ideas and progress.
* *Scaffolding -* provide: a list of material costs; labor cost; partially completed lists; completed example of an estimate and/or a form to use for an estimate.
* *Extension –* *The clients changed their mind?!* After students’ complete the initial project, make some major or minor changes to the specs/blueprints/criteria/measurements. How will these changes affect their calculations, costs, and estimates?