

Characteristics of good Situations, as seen in Situation 35

10/12/06

1. The Prompt is authentic. This particular one occurred in an Algebra class.
2. The Commentary gives reasons the Situation is important, and an overview, introduction, and rationale for the Mathematical Foci.
3. In working on this Situation through its many revisions and updates, we found that the Prompt lead to much discussion that was rich and challenging. Therefore it seems that the final product will also stimulate good discussion among math educators. A significant amount of our discussion centered around representing algebraic concepts graphically. We have only one instance of the “graphical approach” in Focus 2 (for example, we do not compare graphs of $f(x) = x^2$ and $f(x) = x + 6$ to see where they intersect) because we felt that this approach was better employed in other Situations. However, we did feel that a graphical representation for finding solutions to a quadratic was valuable (i.e. setting the equation equal to zero, graphing, and finding the x -intercepts). In doing so, we explain the relationship between a solution of an equation and a zero of a function.
4. The Foci dig deeper than the single matter of solving a quadratic equation. That is, the Foci are not simply a list of methods for finding solutions—they include such topics as absolute value, the difference between an unknown and a variable, what it means to be a “solution,” and the importance and uniqueness of the Zero-Product Property. In this way, the Situation presents knowledge that would be helpful/useful for secondary teachers to have, and encourages a higher level of mathematical knowledge.

This depth occurs, for example, in Focus 1 in which we highlight the importance of maintaining equivalence when solving equations. In this particular case, this was connected to one of the definitions of absolute value. We also explain in this Focus what it means to be a “solution.” In Foci 3 and 4, we elaborated on the standard methods of solving quadratic equations (factoring and the Quadratic Formula) by pointing out the importance and uniqueness of the Zero-Product Property (used in factoring), and explaining why the Quadratic Formula is helpful.

5. The Foci are diverse, addressing various issues raised by the Prompt: things to keep in mind when solving any equation (maintaining equivalence), a graphical approach, correct methods of solving quadratics, and a geometric approach. By doing so, various connections among mathematical ideas are implied (though not explicitly stated in this Situation). Focus 5 contributes to this diversity in that it includes what is perhaps a “non-standard” method of representing a quadratic equation. In our view, this not only diversifies the Foci, but provides yet another means of digging deeper into the concept of quadratics, or at least seeing them from a fresh perspective.
6. The mathematics involved in this Situation (quadratics, solving equations, absolute value, geometry, graphing) is accessible to secondary mathematics teachers.