BEEP 4311 Sample Exam 1

Fall 2008 Name:

Instructions: Answer each of the questions below in the space provided. Feel free to use pictures, drawings or examples in your answers. If you have any questions, please raise your hand and confer with me. Try to spread your time evenly: don't spend too much time on any one question. You have two hours.

I. Short answer. Each of the questions in this part requires no more than two sentences as an answer; most can be answered in one (or less). Questions asking for a list do not require complete sentences. (5 points each)

1. *Describe the common "anatomy" (solution phases) of a problem as discussed in class.
2. This semester we discussed a three-part learning trajectory, identified by researchers such as Piaget and Bruner, through which learners pass when learning any new topic. What are the three phases?
3. What is the fundamental difference between the NCTM Standards/NSES and the TEKS?
4. List three (genuinely different, clinical) learning disabilities that might affect a student's performance in mathematics or science.
5. Write a simple story problem involving multiplication and give a visual representation for solving it.
6. List three units (at least one English and one metric) used to measure volume (or capacity).
7. Describe one specific activity that would best help children in a bilingual kindergarten class learn about the differences between animals and plants.
8. Give a specific instruction or question you could use to assess the conceptual understanding of students in a bilingual classroom following a lesson on food chains.
9. (a) List (or describe) the phases of the scientific inquiry process. (b) Circle the one that is likely to differ the most for a bilingual classroom, or a classroom with a mixture of bilingual and monolingual students, from that in a purely monolingual classroom.
10. Name (or describe, if you can't name) one invented strategy for adding 27+35, and show how it would be used here.
11. A principal meaning of fraction is to describe a part-whole relationship. List three different *types* of context for fractions: three different ways in which the parts can be "equal".
12. Consider the following example of student work. (a) What is the student doing?
    (b) Can this approach be used to multiply *any* two integers?

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   24
  x64
  256
+128
 1536
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II. Essays. Each of the following questions requires at least 5 lines/3 sentences (as a rule of thumb—I won't be counting) for a full response. (10 points each)

1. To what extent do you see equity (and to what extent a lack of equity) in the school(s) where you have your field experience?

2. Looking back on your field experience, list three problem solving techniques that you have observed children using, and describe briefly (no more than two sentences each) how they used the techniques, or how the teacher (possibly you) encouraged them to do so. (Recall a problem solving technique must be applicable across a broad range of types of problems. Invented strategies for addition and subtraction, for example, are *not* in this category.)

3. Deconstruct the following problem into its essential elements, taking into account the effect each may have upon the ways the problem can be solved. (List at least four.)

    Carmen vive a 11 km de la escuela. Sandra vive a 20 km de la escuela. ¿Cuántos kilómetros más lejos de la escuela vive Sandra que Carmen?

4. Describe the differences between a constructivist approach and a behaviorist approach to teaching students to perform multidigit addition and subtraction calculations.

BEEP 4311 Sample Exam 2

Fall 2008 Name:

1 Short answer

1. Define "problem solving".
2. List three *evaluative* mathematics activities involving writing (other than worksheets).
3. Give at least one fundamental difference between a fourth-grade student with an elementary understanding of geometry and one with an advanced understanding of geometry. Suppose both know names of shapes. (Don't just say "more abstract" — be specific to geometry.)
4. *List or describe the two conceptual models for multiplication.
5. What is a question or situation you could give to your students to get them to conclude that division by zero is impossible (or meaningless)?
6. Explain (and possibly draw) a way to convince a student that the fractions 3/12 and 2/8 are equivalent.
7. We discussed the need to avoid tedium in having students learn things like arithmetic facts. Give one specific activity that is *not* rote drill, that could be used for this purpose in a primary-grades math class.
8. What three meanings did we identify for "fraction"?
9. List three units (at least one English and one metric) used to measure area.
10. *Name (or describe, if you can't name) an invented strategy that could be used to solve the subtraction problem 40–17, and show how it would be used here.
11. Describe one specific activity that would best help children in a bilingual kindergarten class learn positional terms such as "above" and "below".
12. A classroom aquarium in which students can watch tadpoles hatch from eggs and then mature into frogs would help students learn specifically about frogs, but also lead into more general discussions of what larger ideas? List at least three.

2 Essays

1. Suppose your fourth-grade class is studying factors. A student makes the conjecture that the larger a number is, the more factors it has. Would you

   (a) compliment the student on his or her thinking and give immediate feedback on whether or not the conjecture is true?

   (b) take class time to discuss it, allowing students to give examples to test the conjecture?

   (c) ask the class to look into it, promising to discuss it later?

   (d) use another approach?

2. When asked to compute $423 - 157$, Pat (a third-grader) wrote the following:

   4 -

   30 -

   34 -

   300

   266

   Pat explained, "You can't take 7 from 3: it's 4 too many, so that's negative 4. You can't take 50 from 20: it's 30 too many, so that's negative 30, and with the other 4, it's negative 34. 400 minus 100 is 300, and then you take the 34 away from the 300, so it's 266."

   (a) Is Pat's solution method meaningful and valid?

   (b) Will Pat's reasoning work for all subtraction problems?

3. In a multiplication problem such as 123 x 645, how would you address what is wrong to a student who performs the calculation as follows?

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  123
x 645
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  615
  492
  738
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 1845
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4. If you had the authority to determine policy, would you use multiple-choice standardized tests for assessment purposes at the state or national level? If so, why? If not, what would you use instead? Write your response from the point of view of a policymaker, and defend it against objections you think a policymaker might face.