

TeachME Professional Development

Promoting Numeracy Goals and Enhancing Math Problem Solving Skills

Part 1

1. The average preschool spends approximately how many seconds per day on math instruction?

- A. 58
 - B. 109
 - C. 12
 - D. 62
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Part 1

2. A young student looks at a group of four apples and informs you, without counting from one to four, that there are four apples present. What skill is the student demonstrating?

- A. Subtracting
 - B. Synthesizing
 - C. Subitizing
 - D. Summing
-

Part 1

3. According to some experts, which of the following is potentially a better choice for introductory math activities than counting drills?

- A. Measurement
 - B. Music
 - C. Dancing in a group
 - D. Drawing with shapes
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Part 1

4. Each of us, 'math people' or not, operates with subconscious mastery of numeracy in our lives. Which one of these everyday actions is an example of numeracy in action?

- A. We can recognize numerical counts in songs we haven't heard in years
 - B. We can recognize mathematical concepts in the spoken word
 - C. We can make a delicious recipe without using measurements
 - D. We can populate missing segments of patterns
-

Part 1

5. Which attribute of commonly-accepted structures for literacy development are modern scholars positing that we should extrapolate to numeracy development?

- A. Repetition
 - B. Creation
 - C. Composition
 - D. Comprehension
-

Part 1

6. Which of these is the most beneficial reason that a young child's gameplay is similar to early math problems?

- A. Both are repetitive
 - B. Both are more effective when done with others
 - C. Both involve interpreting and executing basic tasks
 - D. Both involve higher level logic
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Part 1

7. Why does it help when teachers use visual aids during math lessons?

- A. It helps appeal to many learning modalities
 - B. It helps the presentation be more dynamic
 - C. It gives the lesson a real-life feel
 - D. It helps kids who are artistic pay attention
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8. Experts propose that an effective numeracy educator:

- A. Incorporates math into activities one day a week
 - B. Models different numeracy strategies for students
 - C. Introduces crucial or complex topics immediately
 - D. Tells students of their experiences with math anxiety
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Part 1

9. Which of the following attributes about a student's classmates might be best to keep track of over time in order to learn measuring and graphing skills?

- A. Measuring height
 - B. Graphing eye color among classmates
 - C. Measuring shoe size
 - D. Graphing hair color differences
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Part 1

10. On a recent national math assessment, what percent of fourth-grade students achieved a proficient score?

- A. 40%
 - B. 60%
 - C. 30%
 - D. 55%
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Part 2

11. Experts believe that students who develop proficiency in mathematical problem solving early are better prepared for advanced mathematics and other complex problem-solving tasks later in life.

- A. True
 - B. False
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Part 2

12. The practice guide expert panel defined the characteristics of problem solving to include each of the following EXCEPT:

- A. Students can learn mathematical problem solving, as it is neither an innate talent nor

happenstance that creates skilled problem solvers

B. Mathematical problem solving need not be treated like just another topic in the pacing guide, but instead, it can serve to support and enrich the learning of mathematics concepts and notation

C. Mathematical problem solving is relative to the group for which it is being taught, and what is challenging or non-routine for one student is generally the same for the group

D. Often more than one strategy can be used to solve a problem, and may enable students to think more flexibly when presented with a problem that does not have an obvious solution

Part 2

13. Which of the following recommendations for math problem solving is supported by a strong level of research evidence?

A. Teach students how to use visual representations

B. Prepare problems and use them in whole-class instruction

C. Expose students to multiple problem-solving strategies

D. Help students recognize and articulate mathematical concepts and notation

Part 2

14. In order to determine which problems will be routine or non-routine for students, teachers must consider students':

A. Ability to retrieve basis math facts

B. Level of motivation

C. Previous experience with problem solving

D. Comfort with verbalizing the steps to solve a problem

Part 2

15. Which of the following is NOT one of the recommendations for teachers in helping prepare lessons to ensure student understanding?

A. Choose problems with familiar contexts

B. Choose challenging problems that will increase students' confidence in problem solving

C. Clarify unfamiliar language and contexts

D. Reword problems, drawing upon students' experiences

Part 2

16. Studies that examined students' mathematics achievement in different content areas showed that:

- A. Providing students with a task list that identified specific steps to solving problems resulted in better student achievement**
 - B. Using a self-questioning checklist improved achievement**
 - C. Student performance improved when teachers modeled a self-questioning process and then asked students to practice it**
 - D. All of the above**
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Part 2

17. When responding to prompts, steps include identifying the givens and goals of the problem and the problem type, recalling similar problems to help solve the current problem, _____, solving the problem, and checking the solution.

- A. Using a visual to represent and solve the problem**
 - B. Distinguishing substantive information from superficial information**
 - C. Identifying underlying structural features of each problem**
 - D. Getting feedback from peers**
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Part 2

18. A major task for any student engaged in problem solving is to translate the quantitative information in a problem into a:

- A. Graphic illustration**
 - B. Symbolic equation**
 - C. Distinct diagram**
 - D. Allegorical statement**
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Part 2

19. Thinking aloud involves having the teacher tell students what he or she is doing,

and expressing thoughts while explaining what decisions he or she is making and why those decisions are being made.

- A. True
 - B. False
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Part 2

20. The estimated effects of teaching multiple strategies on students' ability to solve problems correctly is known as operational knowledge, while awareness of mathematical concepts is known as theoretical knowledge.

- A. True
 - B. False
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Part 2

21. When demonstrating the use of multiple strategies, teachers should randomly call on students to share their strategies, rather than selecting students purposefully based on the strategies they have used to solve the problem.

- A. True
 - B. False
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Part 2

22. Teachers can turn problem-solving activities into learning opportunities by connecting students' intuitive understanding to formal mathematical concepts and notation, as students tend to enter school with ways of making sense of math that are:

- A. Non-conventional and globally constructed
 - B. Informal and personally constructed
 - C. Ambiguous and individually constructed
 - D. Inaccurate and subjectively constructed
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Part 2

23. Teachers should encourage students to use logical variables that relate to the items in the problem rather than arbitrary ones, as this will help clarify the abstract role that

variables play in representing quantities.

- A. True
 - B. False
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Part 2

24. Several studies, including some that also involved teacher modeling, prompted students to self-question or to complete tasks or steps while problem solving, and in all of these studies, the intervention's effects were positive.

- A. True
 - B. False
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Part 2

25. Solving intermediate arithmetic problems before representing them with algebraic notation may help students understand problem structure using the mathematical knowledge they already possess, and students can then use this existing knowledge to more easily determine algebraic notation.

- A. True
 - B. False
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Part 3

26. Curriculum development theories play a critical role in planning a mathematics/STEM framework for early education, and it includes each of the following basic principles of curriculum EXCEPT:

- A. Educational purposes and the experiences provided to fulfill the purposes
 - B. Effective organization of the educational experiences
 - C. Successful implementation of the educational purposes
 - D. The determination whether the purposes have been fulfilled
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Part 3

27. When analyzing the learning environment best suited for implementation of the framework, the key question asked was, "What are the key factors necessary to create a

mathematics friendly teaching and learning environment?”

- A. True
 - B. False
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Part 3

28. The foundation for understanding operations such as addition and subtraction is created when children are able to interpret a quantity in terms of:

- A. Sequence
 - B. Comparison
 - C. The parts
 - D. Patterns
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Part 3

29. Which of the following is NOT one of the outcomes of STEM-based curriculum according to Moomaw and Davis?

- A. It helps children focus and collaborate with one another
 - B. It increases overall skills
 - C. It helps young learners increase their vocabulary
 - D. It encourages students to create scientific relationships
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Part 3

30. Playing is a natural condition that helps children learn and grow, and through play they can build their own knowledge by trying a new activity that meets their needs of curiosity, and guided play can be used in a classroom setting to achieve standard learning outcomes.

- A. True
 - B. False
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