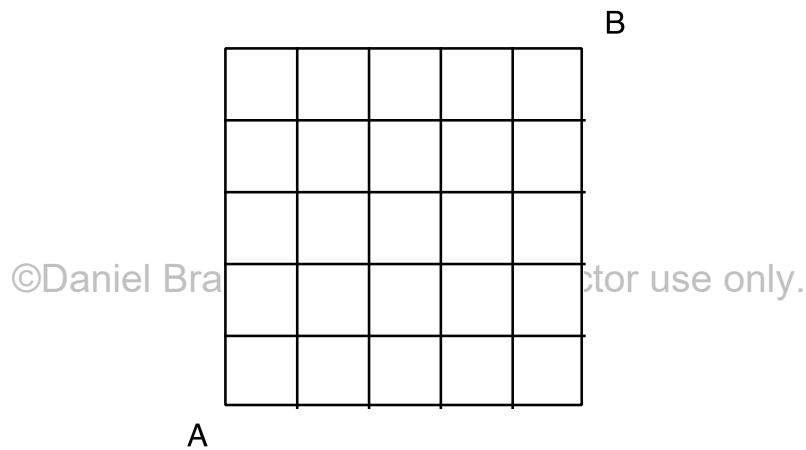


Travel Paths Problem

The city of Perrysburg is located at point A. A person wants to travel to Detroit (point B), moving only right along horizontal lines or up along vertical lines. How many paths are there from point A to point B?



Test Bank Items

MULTIPLE CHOICE

1. As stated in the text, success in teaching mathematics requires a caring person who is interested in which of the following?
 - a) Content being taught and the development of young adolescents.
 - b) The development of young adolescents and an interest in student extracurricular activities.
 - c) An interest in student extracurricular activities and student backgrounds.

- d) Student backgrounds and content being taught.
 - e) Student backgrounds and the development of young adolescents.
2. In which year was the Third International Mathematics and Science Study (TIMSS) initially conducted?
- a) 1979.
 - b) 1982.
 - c) 1987.
 - d) 1991.
 - e) 1995.
3. The first TIMSS report compared more than 50 countries around the world in which areas?
- a) Achievement, economic support, and curriculum.
 - b) Achievement, economic support, and teaching practices.
 - c) Achievement, curriculum, and teaching practices.
 - d) Economic support, curriculum, and teaching practices.
 - e) Achievement, economic support, curriculum, and teaching practices.
4. The first TIMSS report primarily studied which three grade levels?
- a) 4th, 8th, and 10th.
 - b) 4th, 8th, and 11th.
 - c) 4th, 8th, and 12th.
 - d) 5th, 8th, and 11th.
 - e) 5th, 8th, and 12th.
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5. When compared to other countries, the results of the first TIMSS achievement test placed eighth graders in the United States into which category?
- a) Lowest.
 - b) Below the international average.
 - c) Average.
 - d) Above the international average.
 - e) Highest.

6. Reports stemming from TIMSS (the Third International Mathematics and Science Study) described the mathematics curriculum in the United States as addressing which of the following?
- a) Little content taught and at a surface level.
 - b) Little content taught but in-depth.
 - c) A reasonable amount of content and taught in-depth.
 - d) A great deal of content taught but at only a surface level.
 - e) A great deal of content taught but in-depth.
7. The results of TIMSS (the Third International Mathematics and Science Study) stated which of these regarding the secondary and middle school curricula in the United States?
- a) Overemphasis on algebra, geometry, and number skills.
 - b) Overemphasis on algebra and a deficiency in number skills and geometry.
 - c) Overemphasis on geometry and a deficiency in algebra and number skills.
 - d) Overemphasis on number skills and a deficiency in algebra and geometry.
 - e) Deficiency in algebra, geometry, and number skills.
8. Results of the TIMSS-R achievement test in 1999 indicated which of the following about students in the United States?
- a) Performance of 8th graders was higher than when the same students were in 4th grade.
 - b) Performance of 8th graders was about the same as when the same students were in 4th grade.
 - c) Performance of 12th graders was lower than when the same students were in 8th grade.
 - d) Performance of 8th Graders was lower than when the same students were in 4th grade.
 - e) Performance of students at all levels was about the same as the same students in 1995.
9. A generalized result of the Trends in International Mathematics and Science Study between 1995 and 2015 indicated which of the following?
- a) Student achievement at fourth and eighth grade showed a marked decline.
 - b) Student achievement at fourth and eighth grade showed a slight decline.
 - c) Student achievement at fourth and eighth grade remained about the same.
 - d) Student achievement at fourth and eighth grade increased overall.
 - e) Student achievement at fourth and eighth grade continually placed the U.S. in the top three performing countries.
10. In which year did U.S. students begin to participate in the Program for International Student Assessment (PISA)?
- a) 1995.
 - b) 1999.
 - c) 2000.
 - d) 2003.
 - e) 2007.

11. Which of the following refers to a “grading scale that allows student responses to be placed into categories”?
- a) Categorization.
 - b) Standard.
 - c) Rubric.
 - d) Scale.
 - e) Classification.
12. The NAEP (National Assessment of Educational Progress) mathematics scores between 2000 and 2017 indicated which of the following?
- a) White students scored higher than African American, Hispanic, or Native American students at all tested grade levels.
 - b) White students scored higher than African American, Hispanic, or Native American students at Grade 12 but not at Grades 4 and 8.
 - c) White students scored higher than African American, Hispanic, or Native American students at Grades 8 and 12 but not at Grade 4.
 - d) White students did not score significantly higher than their African American, Hispanic, or Native American peers at any grade level.
 - e) Hispanic students outperformed White, African American, and Native American students at Grades 4 and 8.
13. Which of the following is a widely held belief about mathematics but is not supported by research?
- a) Some people have naturally inherited mathematical ability, and some do not.
 - b) Every person has the potential to become mathematically literate.
 - c) Some people will understand a mathematical concept despite a poor teacher.
 - d) Most people only develop mathematically in an atmosphere created by knowledgeable teachers.
 - e) Some people understand mathematical content because of the way that it is presented.
14. Which of the following sparked the mathematics reform movement known as the New Math?
- a) Assassination of John F. Kennedy.
 - b) Increased communication through media.
 - c) Launching of *Sputnik* satellites.
 - d) Decreased student accomplishment.
 - e) Excess in National Science Foundation money.
15. Which of the following was NOT a reason why the New Math reform movement proposed a change in the topics studied in the mathematics curriculum?
- a) The content of the courses hadn't changed in hundreds of years.
 - b) There was a need for mathematicians and scientists to compete on a global level.
 - c) There was a desire to introduce additional topics to "all students".
 - d) The topics in the curriculum were sequenced in an undesirable manner.
 - e) There was a fear that the U.S. was falling behind the rest of the world.

16. It has been said that the New Math movement catered primarily to which group of students?
- a) All students.
 - b) Low-average students.
 - c) Average students.
 - d) Above-average students.
 - e) Average and above-average students.
17. The two main topics covered in New Math that were previously only explored at the college level, as discussed in the text, are which of these?
- a) Discrete mathematics and set theory.
 - b) Non-Euclidean geometry and probability.
 - c) Non-Euclidean geometry and set theory.
 - d) Probability and set theory.
 - e) Discrete mathematics and non-Euclidean geometry.
18. Which of the following is NOT a reason why New Math was replaced by the "back to basics" movement in the 1970's?
- a) The new topics didn't seem to coincide with skills needed for most professions.
 - b) The majority of students would not become mathematicians.
 - c) The public was confused about the New Math's intent.
 - d) The New Math catered to the top students.
 - e) The NCTM released the *Agenda for Action* document.
19. The reform efforts that began in the 1980s in mathematics suggested, through *An Agenda for Action*, that the focal point of the curriculum should be which of the following?
- a) Problem solving.
 - b) Measurement.
 - c) Number skills.
 - d) Use of technology.
 - e) Symbol manipulation.
20. The contents of *Principles and Standards for School Mathematics* were updated and refined from which of these documents?
- a) NCTM Assessment Standards, Curriculum and Evaluation Standards, and Agenda for Action.
 - b) NCTM Curriculum and Evaluation Standards, Professional Teaching Standards, and Assessment Standards.
 - c) NCTM Curriculum and Evaluation Standards, Agenda for Action, and Professional Teaching Standards.
 - d) NCTM Professional Teaching Standards, Assessment Standards, and TIMSS Study.
 - e) NCTM Assessment Standards, Agenda for Action, and TIMSS Study.

21. Which of the following statements most accurately characterizes the underlying philosophy of the NCTM *Principles and Standards for School Mathematics*?
- a) Mathematics is for all students.
 - b) Mathematics is in our curriculum to produce a nation of top-level scientists that can compete on an international scale.
 - c) A Standards-based mathematics program should make teaching easier.
 - d) Mathematics is more about what students "know" than what they can "do."
 - e) Mathematics education depends on students being able to solve problems "by hand", before learning to use technology.
22. In which year were the *Common Core State Standards for Mathematics* released?
- a) 1997.
 - b) 2000.
 - c) 2005.
 - d) 2008.
 - e) 2010.
23. Which of these is NOT considered a Twenty-First Century Skill?
- a) Content Knowledge.
 - b) Life and Career Skills.
 - c) Information, Media, and Technology Skills.
 - d) Empirical Knowledge.
 - e) Learning and Innovation Skills.
24. Skills such as creativity, problem solving, and collaborating with others fall under which of the following Twenty-First Century Skills?
- a) Content Knowledge.
 - b) Life and Career Skills.
 - c) Information, Media, and Technology Skills.
 - d) Leadership Skills.
 - e) Learning and Innovation Skills.
25. The relationship between problems and exercises in mathematics is which of these?
- a) A problem has no immediate solution, and an exercise is for practice.
 - b) A problem is for practice, and an exercise has no immediate solution.
 - c) A problem is open-ended, and an exercise has a specific solution.
 - d) A problem has a specific solution, and an exercise is open-ended.
 - e) The terms "exercise" and "problem" have the same meaning in the mathematics classroom.

26. In his book, George Polya describes problem solving as a four-step process. Which of the following is NOT one of his steps?
- a) Understand the problem.
 - b) Make a reasonable estimate of the answer to the problem.
 - c) Devise a plan to find a solution.
 - d) Implement the plan.
 - e) Make sure the answer makes sense and determine if another plan would be more effective.
27. An effective mathematics problem may have which of the following characteristics?
- a) The problem does not have an obvious solution.
 - b) The problem lends itself to several different strategies to solve it.
 - c) Students can relate the new problem to previously solved problems.
 - d) The problem invites students to compare solutions and approaches.
 - e) All of these.
28. Problem solving, as envisioned in *Principles and Standards for School Mathematics* and the *Common Core State Standards for Mathematics*, is most accurately described by which of the following?
- a) Problem solving should provide meaningful experiences that develop “strategies” that can be used to solve other problems.
 - b) Problem solving should be routine for primary and middle grades, with an emphasis on developing “strategies” in the high school grades.
 - c) Problem solving should be routine for primary grades, with an emphasis on developing “strategies” in the middle and high school grades.
 - d) The primary emphasis of problem solving should be to provide experiences with word (“story”) problems at all grade levels.
 - e) Problem solving should be approached by assigning word problems at the end of each chapter or unit.
29. Consider the following: Solve for x when . This equation is an example of which of the following?
- a) An exercise because it has a definite way to get the answer.
 - b) An exercise because it does not have just one way to get the answer.
 - c) A problem because it has a definite way to get the answer.
 - d) A problem because it does not have just one way to get the answer.
 - e) Either a problem or an exercise depending on the background of the student.
30. Which of the following is NOT an example of a powerful problem-solving strategy as stated in the text?
- a) Act out the problem.
 - b) Guess-and-check.
 - c) Look for a pattern.
 - d) Use a computer app.
 - e) Work backwards.
31. When presenting the class with a problem to solve, which of the following are teachers NOT advised to do?
- a) Solve the problem individually or in small groups.

- b) Share solutions.
 - c) Share strategies.
 - d) Ensure that the whole class can implement the same strategy.
 - e) Explore other strategies that might help in solving future problems.
32. “The process of choosing and using appropriate mathematics and statistics to analyze empirical situations” is the definition in the *Common Core State Standards for Mathematics* for which of the following?
- a) Problem Solving.
 - b) Reasoning.
 - c) Modeling.
 - d) Connecting.
 - e) Practicing.
33. Mathematical problem solving, as emphasized in the NCTM documents and the *Common Core State Standards for Mathematics*, is used for which of the following?
- a) Problem solving allows students to practice skills.
 - b) Problem solving helps students to solve future problems.
 - c) Problem solving helps students to learn new skills.
 - d) Problem solving develops strategies.
 - e) All of these.
34. A teacher who emphasizes mathematical reasoning is likely to most frequently use which of the following questions?
- a) Why?
 - b) When?
 - c) Where?
 - d) Who?
 - e) Which?
35. When a student engages in formulating valid arguments for why they believe statements are true in the mathematics classroom, he/she is engaging in which of the following?
- a) Mathematical Problem Solving.
 - b) Mathematical Deduction.
 - c) Mathematical Reasoning.
 - d) Mathematical Investigation.
 - e) Mathematical Induction.

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36. Which classroom strategy generally promotes mathematical communication the LEAST?
- a) Journals.
 - b) Presentations.
 - c) Projects.
 - d) Worksheets.
 - e) Responses to essay questions.
37. If Mrs. Voltz has students write in their journals weekly for the purpose of validating their thinking process on a problem, then which of the following processes is primarily being measured?
- a) Problem Solving.
 - b) Reasoning and Proof.
 - c) Communication.
 - d) Connection.
 - e) Representation.
38. If Mrs. Voltz has students write in their journals weekly, then the act of writing to explain their thinking in their journals emphasizes which process skill?
- a) Problem Solving.
 - b) Reasoning and Proof.
 - c) Communication.
 - d) Connection.
 - e) Representation.
39. Using the skills of reading, listening, and talking through one's thinking to analyze and evaluate mathematical thinking emphasizes which process skill?
- a) Problem Solving.
 - b) Reasoning and Proof.
 - c) Communication.
 - d) Connection.
 - e) Representation.
40. A student claims that "dividing by two-thirds is the same thing as multiplying by three-halves." This student is deficient in which of the following Standards for Mathematical Practice?
- a) Making Sense of Problems.
 - b) Attending to Precision.
 - c) Modeling.
 - d) Using Appropriate Tools.
 - e) Constructing a Viable Argument.

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41. Viewing mathematics as "a coherent whole" refers most closely to which of the following?
- a) Problem Solving.
 - b) Reasoning.
 - c) Constructing Viable Arguments.
 - d) Connections.
 - e) Modeling.
42. Which Standard for Mathematical Practice is involved when a student recognizes that $(x + 3)(x - 5) = (x - 5)(x + 3)$ for the same reason that $7 \times 3 = 3 \times 7$?
- a) SMP #1: Make sense of problems.
 - b) SMP #3: Reason abstractly.
 - c) SMP #4: Model with mathematics.
 - d) SMP #6: Attend to precision.
 - e) SMP #7: Make use of structure.
43. The connections Standard stresses which of the following processes?
- a) Connecting among different mathematical ideas and connecting mathematics to other subject areas.
 - b) Connecting with peers to determine a "strategy" and connecting among different mathematical ideas.
 - c) Connecting with the teacher to determine a "goal" and connecting mathematics to other subject areas.
 - d) Connecting with the teacher to determine a "goal" and connecting among different mathematical ideas.
 - e) Connecting with the teacher to determine a "goal" and connecting with peers to determine a "strategy".
44. Problems that bring together several mathematical topics into a single investigation emphasize which mathematical process?
- a) Problem Solving.
 - b) Reasoning.
 - c) Communication.
 - d) Connections.
 - e) Tools.
45. Which of the following is a typical middle school practice that promotes mathematical connections?
- a) Use of block scheduling.
 - b) Common planning time for teachers in the school.
 - c) Use of common textbooks among teachers in the school.
 - d) Bi-weekly faculty meetings after school.
 - e) Use of technology in all classes.

46. Some students prefer to solve a given problem by drawing a graph; whereas, other students would rather write an equation or use hands-on materials. Which of the following mathematical processes emphasizes the importance of students viewing the same problem with multiple approaches?
- a) Problem Solving.
 - b) Reasoning.
 - c) Communication.
 - d) Connections.
 - e) Representation.
47. The Standards for Mathematical Practice address the use of tools in the classroom. Which of the following would NOT necessarily be considered a tool?
- a) Worksheets.
 - b) Calculators.
 - c) Protractors.
 - d) Graphs.
 - e) Rulers.
48. Which of the following words describes the use of “tools” in the mathematics classroom?
- a) Required.
 - b) Technological.
 - c) Appropriate.
 - d) Daily.
 - e) Optional.
49. Which of the following factors tends to most significantly impact a teacher’s ability to incorporate the mathematical processes and practices in the classroom?
- a) The teacher’s mathematics content background.
 - b) The ability level of students in the class.
 - c) The textbook used to teach the class.
 - d) The type of homework problems assigned to students.
 - e) The teacher’s understanding of child psychology.
50. Mr. James had his class select an authentic example of a linear function that they have encountered in their lives. By having students submit written papers about their functions he was stressing which mathematical process?
- a) Problem Solving
 - b) Reasoning.
 - c) Communication.
 - d) Connection.
 - e) Representation.

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51. Surveys from industry indicate that employers are looking for a workforce that has skills in which of the following?
- a) Arithmetic and problem solving.
 - b) Basic algebra and communication.
 - c) Problem solving and communication.
 - d) Independent thinking and arithmetic.
 - e) Independent thinking and basic algebra.
52. Which of the following might be considered the most accurate description of what it means to “do,” to “teach,” and to “learn” mathematics?
- a) Mathematics is all about memorizing rules and procedures.
 - b) Mathematics primarily involves students learning to manipulate symbols, such as numbers and variables.
 - c) Mathematics is a process with very little content to be learned.
 - d) Mathematics is a verb – something that one does – as well as a large body of content to be learned.
 - e) Mathematics only exists inasmuch as it connects to other subjects, such as biology or social studies.

ESSAY

1. Describe some of the most significant results of the TIMSS, NAEP, and PISA reports. Based on the findings, state some suggestions for improving our mathematics education system. ©Daniel Brahier 2020. For instructor use only.
2. Compare and contrast the overriding mathematics education views of the New Math movement, back-to-basics movement, and the current reform efforts, which use the *Principles and Standards for School Mathematics*, and *Common Core State Standards for Mathematics* as a guide.
3. Give an example of a question you could pose to a group of secondary or middle school mathematics students and explain why it could be considered a “problem” to some students but an “exercise” to others.
4. Give an example of a “rich” problem that could be given to a group of students at the grade level of your choice. Demonstrate at least three ways of solving the problem using the strategies stated in Chapter 1.
5. Pick two of the eight mathematical practices from the *Common Core State Standards for Mathematics* and describe their importance in the secondary or middle school mathematics curriculum.
6. Describe three uses for Pascal’s triangle and explain why it is important to make these types of connections in the mathematics curriculum.

PERFORMANCE TASKS

1. Read the sections on either grades 7 and 8 (Population 2) or grade 12 (Population 3) from the first TIMSS report and write a short paper that summarizes the differences in performances between the United States and other countries. Give your interpretation of the findings and what the U.S. can do to improve its standing. Research more recent TIMSS results and discuss the changes in U.S. performance on the achievement tests since 1995.
2. The NCTM *Principles and Standards for School Mathematics* (2000) and the *Common Core State Standards* (2010) documents have several practices and processes in common. Select two of these processes/practices, read about them in both documents, and write a report that compares and contrasts the information from the two documents. Reflect on how the NCTM's thinking about these processes changed between 1989 and 2000. Make a presentation on your findings to a small group of classmates.
3. Interview three people who are currently teaching mathematics and ask them to describe what it means to "do", to "teach" and to "learn" mathematics. Compile your findings in a three-to-five-page paper, which also includes your views on the same issues.

MULTIPLE CHOICE TEST BANK SOLUTIONS:

- | | | | |
|-------|-------|-------|-------|
| 1. A | 14. C | 27. E | 40. B |
| 2. E | 15. D | 28. A | 41. D |
| 3. C | 16. D | 29. E | 42. E |
| 4. C | 17. C | 30. D | 43. A |
| 5. B | 18. E | 31. D | 44. D |
| 6. D | 19. A | 32. C | 45. B |
| 7. D | 20. B | 33. E | 46. E |
| 8. D | 21. A | 34. A | 47. A |
| 9. D | 22. E | 35. C | 48. C |
| 10. C | 23. D | 36. D | 49. A |
| 11. C | 24. E | 37. B | 50. C |
| 12. A | 25. A | 38. C | 51. C |
| 13. A | 26. B | 39. C | 52. D |

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