#10149
THE SAT I MATH BRAIN POWER: PROBABILITY

CEREBELLUM CORPORATION, 2002
Grade Level: 9-12
27 mins.

DESCRIPTION

Gives suggestions for solving probability, quantitative comparison, and angle/ triangle problems in the math portion of the SAT. Covers "both or neither" probability questions, what to do with the "ugly" problems, and how to eliminate some of the multiple choices to improve your chances. Reviews angle and triangle basics.

ACADEMIC STANDARDS

Subject Area: Mathematics

- Standard: Uses a variety of strategies in the problem-solving process
    - Benchmark: Uses a variety of strategies (e.g., identify a pattern, use equivalent representations) to understand new mathematical content and to develop more efficient solution methods or problem extensions (See INSTRUCTIONAL GOALS 2, 3, and 4.)
    - Benchmark: Uses formal mathematical language and notation to represent ideas, to demonstrate relationships within and among representation systems, and to formulate generalizations (See INSTRUCTIONAL GOALS 2, 4, and 5.)
- Standard: Understands and applies basic and advanced properties of the concepts of geometry
    - Benchmark: Uses the Pythagorean theorem and its converse and properties of special right triangles (e.g., 30-60-90 triangle) to solve mathematical and real-world problems (See INSTRUCTIONAL GOALS 6, 7, and 8.)
    - Benchmark: Uses inductive and deductive reasoning to make observations about and to verify properties of and relationships among figures (e.g., the relationship among interior angles of parallel lines cut by a transversal (See INSTRUCTIONAL GOALS 4.)
- Standard: Understands and applies basic and advanced concepts of probability
    - Benchmark: Determines probability using mathematical/theoretical models (e.g., table or tree diagram, area model, list, counting procedures, sample space) (See INSTRUCTIONAL GOALS 1.)

INSTRUCTIONAL GOALS

1. To point out how to find the probability of outcomes.
2. To explain how to solve both or neither questions.
3. To suggest hints for solving problems involving quantitative comparison.
4. To introduce the process of elimination as a way to find the answer.
5. To review definitions of terms used in geometry.
6. To show how the Pythagorean theorem is used to solve problems involving right triangles.
7. To point out examples of Pythagorean triplets.
8. To review the properties of 30-60-90 and 45-45-90 right triangles.

BACKGROUND INFORMATION

This video covers probability, basic geometric information, and triangles in depth. The majority of the geometry material is covered in CMP #10148, *The SAT 1 Math Brain Power: Circles and Rectangles*, including perimeter, area, circumference, volume, coordinate graphing and slopes, and quantitative comparisons for geometry.

VOCABULARY

1. bisect
2. both or neither questions
3. calculation
4. common sense
5. drawn to scale
6. educated guess
7. eliminate
8. equilateral
9. hypotenuse
10. isosceles
11. manipulate
12. probability
13. Pythagorean theorem
14. Pythagorean triplet
15. quantitative comparison
16. techniques

BEFORE SHOWING

1. Discuss the meaning of standardized tests and why they are important. List some standardized tests given in the local school district.
2. Explain the difference between the SAT 1 and SAT 2. What are the scores on the SATs used for?
3. Review evaluating expressions by replacing variables with numbers.
4. Review solving equations where the variable is subtracted ($12 + 23 - n = 8$).
5. Obtain a poster or video cover of the Clint Eastwood movie *The Good, The Bad, And The Ugly*.
   a. Briefly summarize the plot.
   b. Explain that this video uses the movie as an analogy by labeling questions on the SAT as good, bad, or ugly.

DURING SHOWING

1. View the video more than once, with one showing uninterrupted.

2. Pause after the section showing how to solve probability problems. Discuss how to find the probability of:
   a. The chances of an even number appearing on both of the die.
   b. The probability of the first draw of two piles of a standard deck of 52 cards being a queen.
3. Pause after the section explaining how to solve "both" and "neither" questions.
   a. What is the reason for adding the number that is in the neither category?
   b. What is the reason for subtracting the number that is found in both groups?
   c. Obtain examples of these questions from algebra textbooks. Identify the two groups and the numbers in the neither and both categories. Use the formula to solve.
4. Pause after the section on quantitative comparison.
   a. Discuss why it is not always necessary to use calculations to find the answer.
   b. Write examples of problems where the side that looks larger is really not.
   c. Review the advice given for tackling the good, the bad, and the ugly questions.
   d. Discuss certain situations where D can never be the answer.
5. Stop after the section introducing the first geometry problem. Write this question on the overhead or on poster board so that it can easily be seen.
   a. Emphasize the importance of knowing geometry definitions to help find the value of the unknowns.
   b. Discuss the process of elimination as a useful tool in attempting to find the answer.
   c. Discuss possible ways to solve this problem before proceeding with the video.
6. Pause after the section about the Pythagorean theorem.
   a. Point out the three examples of Pythagorean triplets mentioned in the video, and show how being familiar with them can save time on the test.
   b. Discuss the properties of the 30-60-90 and 45-45-90, and show how recognizing them can save time on the test.
   c. Discuss how the phrase "figures not drawn to scale" can be misleading.

AFTER SHOWING

Discussion Items and Questions

1. How are simple probability problems solved?
2. Explain what both and neither questions are. Where do they show up on an SAT test? What is the formula for solving these questions?
3. When should a person guess on SAT questions?
4. Where are all the formulas for the geometry section of the test?
5. Why is it important to know that all of the geometric drawings are done to scale?
6. Identify the geometry definitions that people need to know for the SAT.

Applications and Activities

1. Research and report on the history of the SAT.
2. The term SAT is not considered to be an initialism or an acronym. Report on the difference between initialisms and acronyms. List examples of each.

3. Report on other college admission tests.
4. Divide the class into two groups. Develop worksheets and activities that use spinners, die, decks of cards, and coins to find probability.
5. Develop activities for solving both and neither questions:
   a. Make an illustrated slide show of word problems similar to the ones in the video. Use real-life examples. Present to the class, and solve as a group.
   b. Draw Venn diagrams to show the quantities in each category.
   c. Divide the class into two teams. Set up a competition to see which team can solve the most problems in the shortest time.
6. Research textbooks and online sites for quantitative comparison questions.
   a. Write the questions on poster board, and solve individually or as a group.
   b. Make note of tips used to save time.
7. Obtain copies of SAT prep books sold in most bookstores.
   a. Select questions at random, and classify them as good, bad, or ugly.
   b. Justify classifying them as such.
   c. Work on the problems in groups.
8. Report on the history of the Pythagorean theorem.
9. Compile a list of ten Pythagorean triplets. Write five multiples of each.
10. Develop activities that promote the understanding of special right triangles.
    a. Obtain a drawing of a square.
       i. Make two 45-45-90 triangles by drawing a diagonal inside the square.
       ii. Measure the sides of the triangles with a ruler.
       iii. Rewrite the measurements of the sides using variables.
    b. Obtain a drawing of an equilateral triangle.
       i. Make two 30-60-90 triangles by drawing a line from the vertex to the midpoint of the opposite side.
       ii. Measure the sides of the triangles with a ruler.
       iii. Rewrite the measurements of the sides using variables.
    c. Draw a 45-45-90 triangle on poster board and label the sides correctly as x, x, and $x\sqrt{2}$.
       i. Substitute several values for x and label the sides with numerical values.
       ii. Laminate the poster, and post it to use as a reference.
    d. Draw a 30-60-90 triangle and label the short leg as x, the long leg as $x\sqrt{3}$, and the hypotenuse as $2x$.
       i. Substitute several values for x and label the sides with numerical values.
       ii. Laminate the poster board, and post it to use as a reference.
11. Make a chart of definitions of geometric terms. Make copies and distribute to keep in a notebook.

CMP RELATED RESOURCES

- *Bill Nye the Science Guy: Probability* #9569
- *The SAT 1 Math Brain Power: Circles and Rectangles* #10148
- *The SAT 1 Prep Game* #3511
- *The Pythagorean Theorem* #3285
- *All About Angles* #3205

Captioned Media Program

World Wide Web

The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **STANDARD DEVIANTS**

http://www.standarddeviants.com/pls/brain/cerebellum.show_department?p_dept_id=5

Includes downloadable tests, interactive quizzes, helpful cards, and puzzles for algebra, basic math, geometry, prealgebra, and the SAT.

- **SAT PREP CENTER**

http://www.collegeboard.com/student/testing/sat/prep_one/prep_one.html

Includes free practice questions, a mini SAT download, a mathematics review, and a list of test-taking tips.

- **COLLEGE SAT ENTRANCE TEST**

http://www.campusprogram.com/reference/en/wikipedia/s/sa/sat_college_entrance_test.html

Contains information about the history and name change of the SAT, criticisms and concerns about the test, and links to other college board tests.

- **ASK DR. MATH**

http://mathforum.org/dr.math/

Contains an archive of questions and answers about math, including probability and geometry.