Student Name __

OHIO GRADUATION TESTS



Mathematics

Base Test

March 2005

This test was originally administered to students in March 2005. This publicly released material is appropriate for use by Ohio teachers in instructional settings. This test is aligned with Ohio's Academic Content Standards.

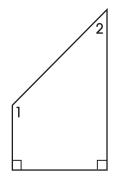


MATHEMATICS TEST

Directions: For multiple-choice questions, solve each problem, choose the correct answer, and then mark the corresponding circle in the Answer Document. If you change an answer, be sure to erase the first mark completely. Located in the math section of the answer document is grid paper that may be useful for multiple-choice items.

For written response questions, answer completely, showing all work, in the space provided in the Answer Document. You may not need to use the entire space provided. Be sure all answers are complete and appear in the Answer Document.

 Ms. Chen drew a diagram for a new patio in her backyard.



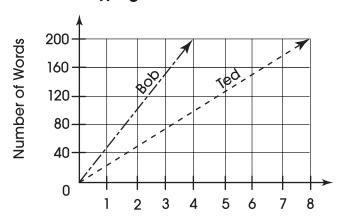
The measure of $\angle 1$ is 3 times as large as the measure of $\angle 2$.

What is the measure of $\angle 2$?

- A. 45°
- B. 67.5°
- C. 120°
- D. 135°

2. Ted and Bob each must type a 1,500-word research paper. The graph below represents their normal typing rates.

Typing Rates for Bob and Ted



Number of Minutes

Based on the information in the graph, which of these is a valid conclusion?

- A. Bob can type his research paper in half the time it takes Ted to type his paper.
- B. Ted can type his research paper in half the time it takes Bob to type his paper.
- C. Ted will take 4 minutes longer than Bob to type his research paper.
- D. Bob will take 4 minutes longer than Ted to type his research paper.

 Joseph plans to tile his kitchen floor. All the tiles will be identical regular polygons. Joseph wants three tiles to meet at each vertex with no space left over.

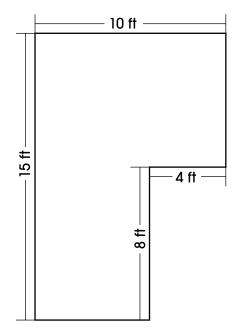
What shape of tile should he use?

- A. pentagon
- B. hexagon
- C. triangle
- D. square
- 4. Neal is selecting a new health club. The one he likes has monthly dues of \$24 and a start-up fee of \$400. He has determined that the equation y = 400 + 24x can be used to find y, the total cost of being a member at the club based on the number of months, x.

After how many months will Neal have spent exactly \$1,000 at this health club?

- A. 16
- B. 25
- C. 41
- D. 58

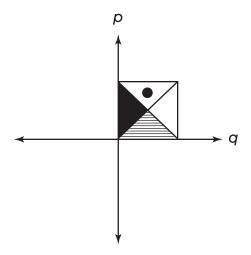
5. A diagram of the floor plan of a storage room is shown below.



If the ceiling is 12 feet above the floor, what is the capacity of the storage room, in cubic feet?

- A. 118 ft³
- B. 600 ft³
- C. 1,416 ft³
- D. 1,800 ft³

By the end of summer vacation, Callie had completed one-fourth of a quilt, as shown in the diagram below.



For question 6, respond completely in your **Answer Document**. (2 points)

To finish the quilt, Callie plans to reflect the design of the completed portion over lines p and q until all 4 portions are complete.

In your **Answer Document**, copy the diagram above. Add the reflections of the completed portion of the quilt on the same sketch to show how the entire quilt will look when it is finished.

7. Sheila collects the following statistics about baseball games played by the local Youth League team:

Youth League Statistics

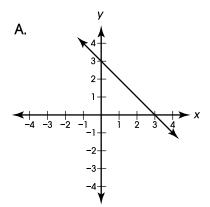
Year	Number of Wins	Average Number of Spectators Per Game	Average Number of Sodas Sold Per Game	Average Number of Hot Dogs Sold Per Game
1997	1	100	50	70
1998	3	160	70	90
1999	5	220	110	110
2000	7	280	180	130

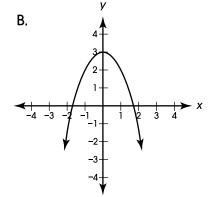
Which statistic shows a non-linear rate of increase over time?

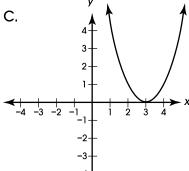
- A. number of wins
- B. average number of spectators per game
- C. average number of sodas sold per game
- D. average number of hot dogs sold per game

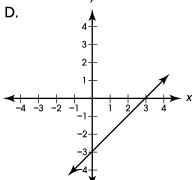
8. Which graph represents the equation

$$y=-x^2+3?$$









9. Jane has determined that 169 < x < 196. What must be true about \sqrt{x} ?

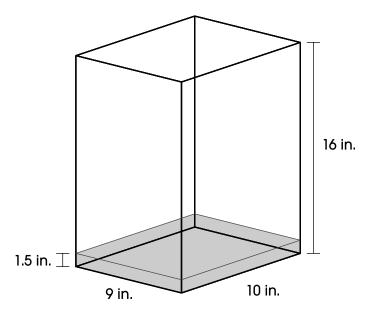
A.
$$13 < \sqrt{x} < 14$$

B.
$$84.5 < \sqrt{x} < 98.0$$

C.
$$338 < \sqrt{x} < 392$$

D.
$$28,561 < \sqrt{x} < 38,416$$

10. Lester keeps his frog in a glass container with the dimensions shown below.



He pours water into the container to a height of 1.5 inches. What is the volume of water in the container?

- A. 135 cubic inches
- B. 216 cubic inches
- C. 1,440 cubic inches
- D. 2,160 cubic inches

11. A state game warden has been observing deer during a particularly severe winter. She recorded that 14 of the 96 deer she observed throughout the state appeared to be suffering from malnutrition. The state has an estimated deer population of 600,000.

Based on her observations, approximately how many deer would she predict are suffering from malnutrition?

- A. 14,000
- B. 72,000
- C. 88,000
- D. 96,000
- 12. Brian and Caleb walked 5 kilometers north from their car to set up their tent. They hiked 3 kilometers east from their campsite to look for firewood. Then they walked 2 kilometers south. Caleb said that after they had walked the 2 kilometers south, they were the same distance from their car as they were from their tent.

In your **Answer Document**, determine whether Caleb was correct by drawing a sketch of their hike and comparing the distances. Show your work.

For question 12, respond completely in your **Answer Document**. (2 points)

13. Ms. Patrick wrote the fractions

$$\frac{0.75}{1}$$
, $\frac{1.5}{2}$, $\frac{3}{4}$, $\frac{9}{12}$

on the board. Then she asked Sabrina to describe the relationship among the numbers.

Which statement describes the relationship among the numbers?

- A. The fractions are equivalent.
- B. The fractions are in ascending order.
- C. The fractions are in descending order.
- D. The fractions are doubling from left to right.

14. Under ideal conditions, there is an inverse relationship between the pressure (*P*) and the volume (*V*) of a gas. The table shows the relationship of the experimental pressures recorded for four different volumes of the gas.

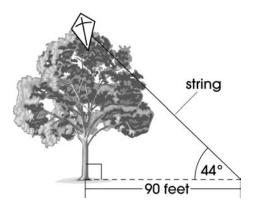
Pressure and Volume of Experimental Gas (Boyle's Law)

Volume (liters)	Pressure (kilopascals)		
1.9	50.2		
2.8	34.9		
8.7	11.5		
6.6	15.0		

Which equation shows the relationship between the pressure and the volume of this gas?

- A. $V = \frac{P}{25}$
- B. $V = \frac{25}{P}$
- $C. V = \frac{100}{P}$
- D. V = P 48

15. Susan is flying a kite behind her house. She drops her string holder, and the kite gets caught in the top of a tree.



If the string makes a 44° angle with the ground, and the holder is 90 feet from the base of the tree, how tall is the tree, rounded to the nearest whole foot?

- A. 63 feet
- B. 65 feet
- C. 74 feet
- D. 87 feet

16. The area of a right triangle is 24 square feet. A second right triangle has a base that is 2 times as long as the first triangle's base and a height that is 3 times as long as the first triangle's height.

What is the area of the second triangle?

- A. 48 square feet
- B. 72 square feet
- C. 144 square feet
- D. 864 square feet
- 17. Mara packed a blue denim shirt, a red striped shirt, a red plaid shirt, and a black tank top to take on vacation. She also packed one pair of denim shorts, one pair of white shorts and one pair of beige shorts. Mara took two different pairs of shoes with her.

How many different combinations of outfits with one shirt, one pair of shoes and one pair of shorts could Mara use on her vacation?

- A. 12
- B. 24
- C. 84
- D. 504

18. An organization distributes money to various groups in the Toledo area. This organization expects to receive a gift of 15% of a \$5.8 million grant. Sixty-seven percent of this gift will be distributed to the Toledo Arts Festival.

In your **Answer Document**, compute the amount that the Toledo Arts Festival will receive. Show or explain all steps used in finding the answer.

For question 18, respond completely in your **Answer Document**. (2 points)

- 19. Aaron wants the mean of his 5 geometry test scores to be at least 90%. His scores on the first four tests are 85%, 83%, 96%, and 91%. Which of the following is the minimum score Aaron can earn on the fifth test to meet his goal?
 - A. 89%
 - B. 90%
 - C. 95%
 - D. 100%

20. Dominic cuts out the largest possible circle from his 2-foot by 2-foot piece of art paper.

Which is a reasonable estimate of the fraction of the art paper that is left over?

- A. less than $\frac{1}{4}$
- B. between $\frac{1}{4}$ and $\frac{1}{2}$
- C. between $\frac{1}{2}$ and $\frac{3}{4}$
- D. more than $\frac{3}{4}$
- 21. Which expression is equivalent to $\frac{8^{12}}{8^3}$?
 - A. 1⁹
 - B. 8⁴
 - C. 89
 - D. 5¹²

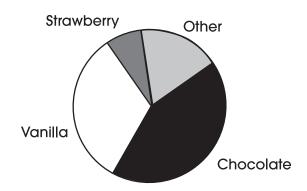
22. Ice cream vendors at the county fair gathered data about the various ages of people and their preferences for different ice cream flavors. The data are summarized in the table.

Ice Cream Preferences

Age Group	Chocolate	Vanilla	Strawberry	Other	Total
Under 12 years	30	41	4	7	82
12 to 20 years	52	39	9	21	121
21 to 45 years	31	25	12	47	115
More than 45 years	8	11	22	7	48

The circle graph below represents the flavor preferences for one of the four age groups.

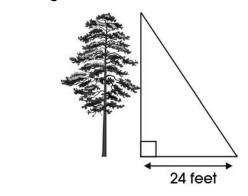
Ice Cream Flavor Preferences



Which age group's preferences are represented in the graph?

- A. under 12
- B. 12 to 20
- C. 21 to 45
- D. over 45

23. The shadow cast by a one-foot ruler is 8 inches long. At the same time, the shadow cast by a pine tree is 24 feet long.



What is the height, in feet, of the pine tree?

A. 3 feet

8 inches

- B. 16 feet
- C. 36 feet
- D. 192 feet

24. Last spring, the employees of an Akron tire company contributed to a local charity. The graphic represents the total dollar contributions as of several dates in April.



For question 24, respond completely in your **Answer Document**. (2 points)

In your **Answer Document**, determine on what date the charity could have expected to reach its goal of \$1,000, if the pattern of donations remains about the same. Show your work or provide an explanation for your answer.

- 25. Under what circumstances will the product of three numbers always be negative?
 - A. when at least one number is less than zero
 - B. when at least one number equals zero
 - C. when one number is greater than zero and the other two are less than zero
 - D. when one number is less than zero and the other two are greater than zero

26. For every lawn that she mows, Jane charges \$8 per hour for every hour that she works. For each lawn that he mows, Bob charges a fixed fee of \$20 and an additional \$5 for every hour that he works.

What is the fewest number of hours that both could work so that Jane's total pay for a lawn will be greater than Bob's?

- A. 1 hour
- B. 5 hours
- C. 6 hours
- D. 7 hours
- 27. The depth of a lake is measured at the same location and on the same day every year for a number of years. The table below shows the measurements.

Depth of Lake

Year	Depth (in feet)			
1998	60			
1999	55			
2000	48			
2001	39			

If the pattern continued, what was the depth of the lake in 2002?

- A. 30 feet
- B. 29 feet
- C. 28 feet
- D. 25 feet

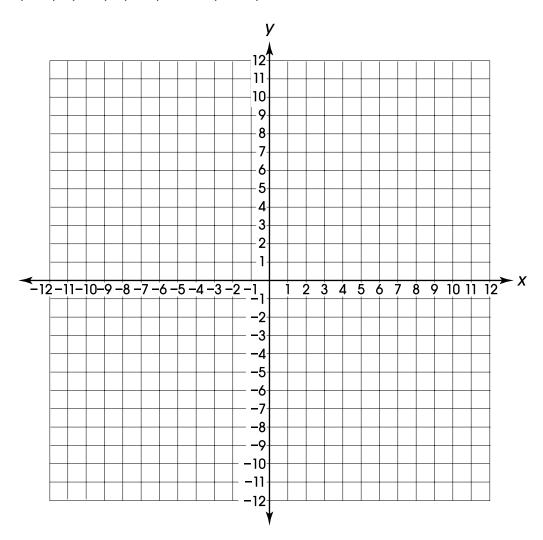
28. Susan entered a highway at 1:00. On the highway, she had driven a total of 32 miles by 1:30, 61 miles by 2:00, and 125 miles by 3:00.

Which kind of data display would be an appropriate way to show how Susan's total driving distance varied with time?

- A. line graph
- B. circle graph
- C. stem-and-leaf plot
- D. box-and-whisker plot

On the March 2005 Mathematics Ohio Graduation Test, questions 29 – 34 are field test items that are not released.

35. The vertices of a quadrilateral are (2, 2), (4, 6), (8, 2), and (10, 6).



Which describes this quadrilateral?

- A. parallelogram
- B. rectangle
- C. rhombus
- D. square

36. The average salary for all department store workers in a certain area is \$255 a week. The weekly salaries of the 7 employees in the Acme Department Store are given in the table below.

Acme Employees' Salaries

Employee Number	Salary
Employee 1	\$240
Employee 2	\$245
Employee 3	\$245
Employee 4	\$250
Employee 5	\$252
Employee 6	\$260
Employee 7	\$420

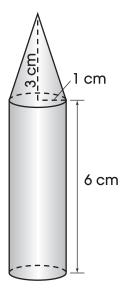
In your **Answer Document**, determine the measures of center (mean, median and mode) of the 7 salaries.

Specify which of these measures of center the management could use to represent the salaries in an argument against pay increases. Explain your answer.

Specify which of these measures of center the labor union could use to represent the salaries in an argument for pay increases. Explain your answer.

For question 36, respond completely in your **Answer Document**. (4 points)

37. Marny wants to approximate the amount of wax needed to make a crayon. The dimensions of the crayon are shown below.



About how many cubic centimeters of wax are needed to make this crayon?

- A. 18 cm^3
- B. 22 cm³
- C. 28 cm³
- D. 88 cm³
- 38. Sara ordered 2 slices of pizza and a 12-ounce cola and paid \$3.00. Sydney ordered 3 slices of pizza and 2 12-ounce colas for \$4.75.

How much does a slice of pizza cost?

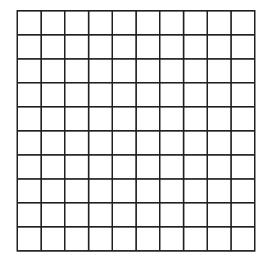
- A. \$0.50
- B. \$1.00
- C. \$1.25
- D. \$2.50

39. Jeffrey wants to determine the favorite professional sport of the students in his high school.

Which sample should Jeffrey use?

- A. a random sample of the students in the chess club
- B. a random sample of the students on the football team
- C. a random sample of the students on the official school roster
- D. a random sample of the students in the library during fifth period
- 40. The diameter of the sun is 864,000 miles. How can this value be expressed in scientific notation?
 - A. 8.64×10^5
 - B. 0.864×10^5
 - C. 86.4×10^3
 - D. 8.64×10^{-5}

41. An electronics engineer is programming the computer that controls the circuit board cutting tools. He enters the coordinates of the vertices of a rectangular circuit board. The first three coordinates are (2, 0), (2, 6) and (6, 6).



What are the coordinates of the fourth vertex?

- A. (0, 2)
- B. (0, 6)
- C. (6, 0)
- D. (6, 2)

42. The following numbers are written on individual pieces of paper and placed in a bag.

1 3 6 7 9

Four numbers are randomly drawn from the bag and are placed in the order in which they were drawn to form a four-digit number.

In your **Answer Document**, determine the probability that a number created in this way has a value greater than 6,000. Show your work or provide an explanation to support your answer.

For question 42, respond completely in your **Answer Document**. (2 points)

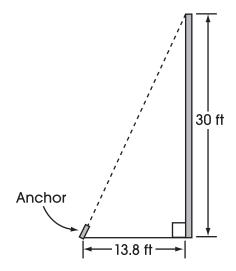
43. The approximate value of $\sqrt{34}$ is labeled by a point on the number line.



Which of the points correctly displays this value?

- A. P
- B. Q
- C. R
- D. S

44. The anchoring wire of a telephone pole has snapped and needs to be replaced. The telephone pole is 30 feet tall. The anchor for the wire is 13.8 feet from the bottom of the pole.



Which of these is approximately the minimum length necessary for the new wire?

- A. 10 ft
- B. 21 ft
- C. 35 ft
- D. 44 ft

28 STOP