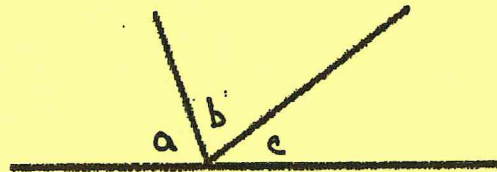
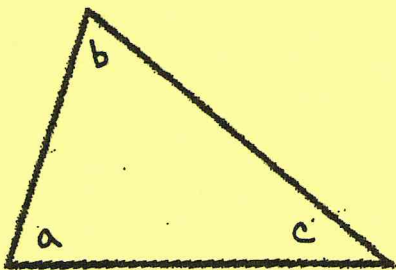


Dick Schaff Math Superbowl XLII  
Level 2: 8<sup>th</sup> Grade Blitz – 2015

- Directions:** (1) Select the most correct answer for each question and mark it on your answer form.  
(2) No calculators of any sort are allowed.  
(3) Note that N.O.T. means "None of these."

1. Which of the following expressions is equivalent to  $(9^{-2})^7$ ?
- a)  $9^6$                       b)  $\frac{1}{9^6}$                       c)  $\frac{1}{9^{14}}$                       d)  $81^7$                       e) N.O.T.
2. What is  $5 \times 10^{-4}$  written in standard notation?
- a) 0.00005                      b) 0.0005                      c) 5,000                      d) 50,000                      e) N.O.T.
3. Which statement about  $\sqrt{2}$  and  $\frac{\pi}{2}$  is true?
- a) Since half of 2 is 1 and half of 3 is 1.5, it follows that  $\sqrt{2} < \frac{\pi}{2}$ .  
b) Since half of 2 is greater than half of 3.14, it follows that  $\sqrt{2} > \frac{\pi}{2}$ .  
c) We know  $\sqrt{2}$  is slightly less than 1.5 and half of  $\pi$  is slightly more than 1.5, so  $\sqrt{2} < \frac{\pi}{2}$ .  
d) We know  $\sqrt{2}$  is slightly greater than 1 and half of  $\pi$  is slightly less than 2, so  $\sqrt{2} > \frac{\pi}{2}$ .  
e) N.O.T.

4. Which property of triangles do the following figures demonstrate?



- a) The Triangle Inequality Theorem.  
b) The Pythagorean Theorem.  
c) The sum of the measures of two remote interior angles is equal to the measure of the exterior angle.  
d) The sum of the measures of the interior angles of a triangle is  $180^\circ$ .  
e) N.O.T.
5. The number  $\sqrt{5}$  is an example of what type of number?
- a) Rational number                      b) Integer                      c) Fraction  
d) Whole number                      e) N.O.T.

6. Which of the following decimals accurately represents  $0.\overline{17}$ ?

- a)  $\frac{17}{100}$       b)  $\frac{17}{99}$       c)  $\frac{171}{990}$       d)  $\frac{1717}{10000}$       e) N.O.T.

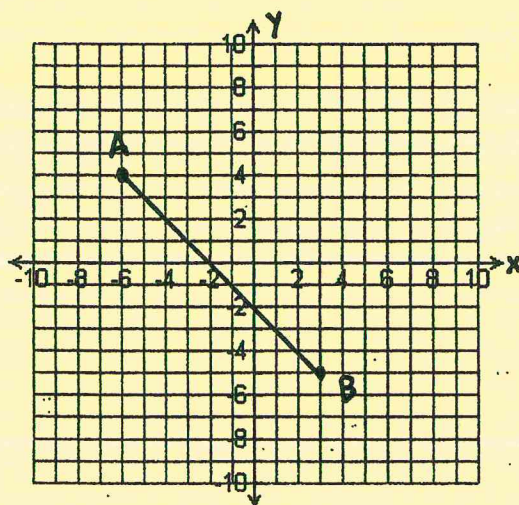
7. Solve the equation  $3(1 + x) - 9x = 10 - 6(x + 1)$ .

- a)  $x = 1$       b)  $x = 0$       c) All real numbers      d) No solution      e) N.O.T.

8. Emily has saved \$50 to buy a new bicycle. She is saving her weekly allowance of \$6 to earn the remainder of the money she needs. If  $A$  represents the amount of money saved and  $n$  represents the number of weeks of allowance she has earned, which equation accurately models the total amount of money that Emily has saved for the bicycle?

- a)  $A = 6n + 50$       b)  $n = 50A + 6$       c)  $A = 50n + 6$       d)  $n = 6A = 50$       e) N.O.T.

9. Find the distance between points  $A$  and  $B$  indicated in the figure.



- a)  $9\sqrt{2}$       b) 18      c) 81      d)  $9\sqrt{3}$       e) N.O.T.

10. Rewrite the following expression without exponents:  $\frac{3^8}{3^4} \times 3^{-3} \div 3^2$ .

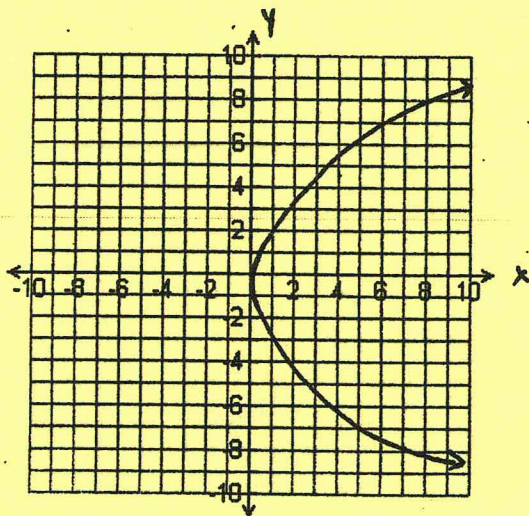
- a) 27      b) 243      c)  $\frac{1}{27}$       d)  $\frac{1}{3}$       e) N.O.T.

11. Find the equation of the line that passes through the points (4, 0) and (0, 7)

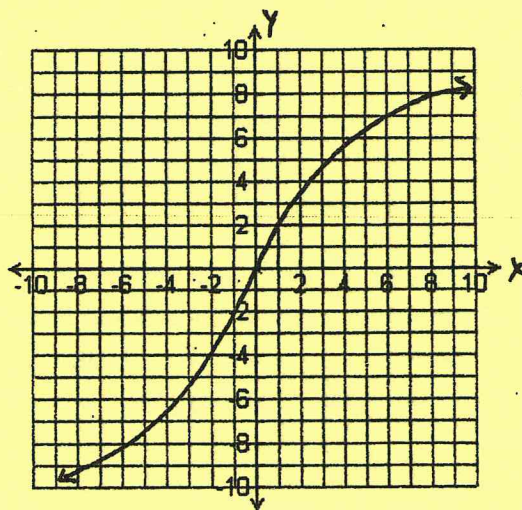
- a)  $y = -\frac{7}{4}x + 7$       b)  $y = -\frac{4}{7}x + 7$       c)  $y = -\frac{7}{4}x + 4$       d)  $y = -\frac{4}{7}x + 4$       e) N.O.T.

12. Which of the following most accurately describes the graph of  $y = \frac{1}{5}x - 3$ ?
- A horizontal line 3 units below the  $x$ -axis.
  - A vertical line 3 units to the left of the  $y$ -axis.
  - A line moving upward and to the right as it is traced out from left to right.
  - A line moving downward and to the right as it is traced out from left to right.
  - N.O.T.

13. Which of the following graphs represents a function?



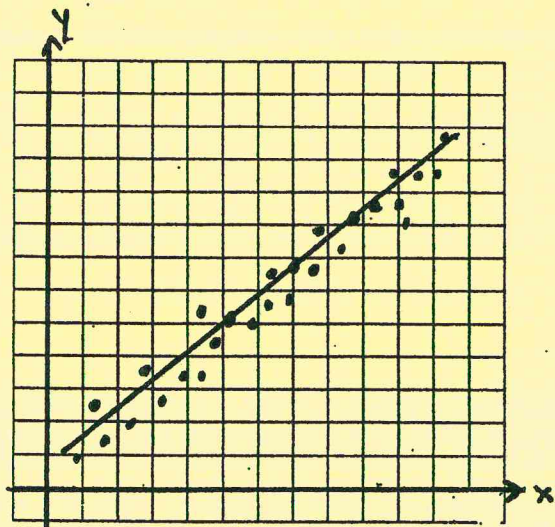
Graph #1



Graph #2

- Graph #1
  - Graph #2
  - Both
  - Neither
  - Can't tell
14. The relationship between temperature and cricket chirps can be represented by the linear model  $F = c - 40$ , where  $c$  represents the number of chirps in 14 seconds and  $F$  represents the temperature in degrees Fahrenheit. Identify the  $c$ -intercept and explain what the  $c$ -intercept of the model means in context.
- The  $c$ -intercept occurs when  $c = 40$  and indicates the number of cricket chirps in 14 seconds when the temperature is  $0^\circ$  F.
  - The  $c$ -intercept occurs when  $c = 40$  and indicates the temperature when there are zero cricket chirps in 14 seconds.
  - The  $c$ -intercept occurs when  $c = 14$  and indicates the number of cricket chirps in 14 seconds when the temperature is  $0^\circ$  F.
  - The  $c$ -intercept occurs when  $c = 14$  and indicates the temperature when there are zero cricket chirps in 14 seconds.
  - N.O.T.

15. Is the linear model shown in the graph a good fit for the data in the scatter plot?



- a) Yes, because the model touches several points.
- b) Yes, because the model is a straight line.
- c) No, because the model touches several points.
- d) No, because there are many more points below the line than above the line.
- e) N.O.T.

16. Determine the rate of change of the linear function that passes through the points  $(11, -7)$  and  $(19, 5)$ .

- a)  $-\frac{2}{3}$
- b)  $-\frac{3}{2}$
- c)  $-\frac{1}{15}$
- d)  $\frac{3}{13}$
- e) N.O.T.

17. Which of these numbers is the largest?

- a)  $3\sqrt{2}$
- b) 3.6
- c)  $\sqrt{13}$
- d)  $2\sqrt{3}$
- e) They are all the same number.

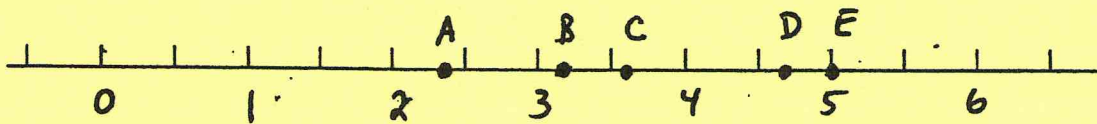
18. Compute  $\frac{4.8 \times 10^{27}}{9.6 \times 10^5}$  so that the result is written in scientific notation.

- a)  $5 \times 10^{21}$
- b)  $2 \times 10^{22}$
- c)  $0.5 \times 10^{22}$
- d)  $5 \times 10^{23}$
- e) N.O.T.

19. Solve the system of linear equations  $\begin{cases} 5x - y = 9 \\ 3x + 2y = 34. \end{cases}$

- a)  $(x, y) = (4, 11)$
- b)  $(x, y) = (11, 4)$
- c)  $(x, y) = (-4, -11)$
- d)  $(x, y) = (-11, -4)$
- e) N.O.T.

20. Which point on the number line is approximately  $\sqrt{10}$ ?

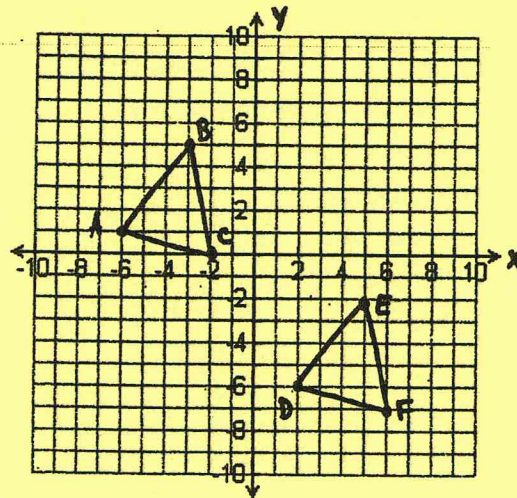


- a) Point A      b) Point B      c) Point C      d) Point D      e) Point E

21. How tall is a cylinder whose volume is  $63\pi$  cubic meters and radius is 3 meters?

- a) 21 meters      b) 11.5 meters      c)  $\sqrt{21}$  meters      d) 7 meters      e) N.O.T.

22. What sequence of transformations can be performed on  $\triangle ABC$  to obtain  $\triangle DEF$ ?



- a) Translations of 8 units to the right and 7 units down.  
 b) Reflection across the  $y$ -axis and translation of 7 units down.  
 c) Translations of 8 units to the left and 7 units up.  
 d) Reflection across the  $x$ -axis and translation of 7 units to the right.  
 e) N.O.T.

23. Determine all real solutions to the equation  $x^3 = -8$ .

- a)  $x = 2$       b)  $x = \pm 2$       c)  $x = -2$   
 d) No real solutions      e) N.O.T.

24. Which of the following is equivalent to  $\frac{1}{3}$ ?

- a) 0.3      b) 0.33      c)  $0.\bar{3}$       d)  $0.0\bar{3}$       e) N.O.T.

25. A beam of infrared light has a wavelength of  $6 \times 10^{-5}$  meters. A beam of ultraviolet light has a wavelength of  $2 \times 10^{-7}$  meters. How do the wavelengths of the light beams compare?

- a) The ultraviolet wavelength is  $\frac{1}{3}$  the infrared wavelength.
- b) The ultraviolet wavelength is  $\frac{1}{100}$  the infrared wavelength.
- c) The infrared wavelength is 300 times the ultraviolet wavelength.
- d) The infrared wavelength is 400 times the ultraviolet wavelength.
- e) N.O.T.

26. Jonathan has 8 sacks of flour. Some of his sacks weigh 3 pounds, and the others weigh 7 pounds. The total weight of his flour is 36 pounds. How many 7-pound sacks of flour does he have?

- a) 2 sacks
- b) 3 sacks
- c) 4 sacks
- d) 5 sacks
- e) N.O.T.

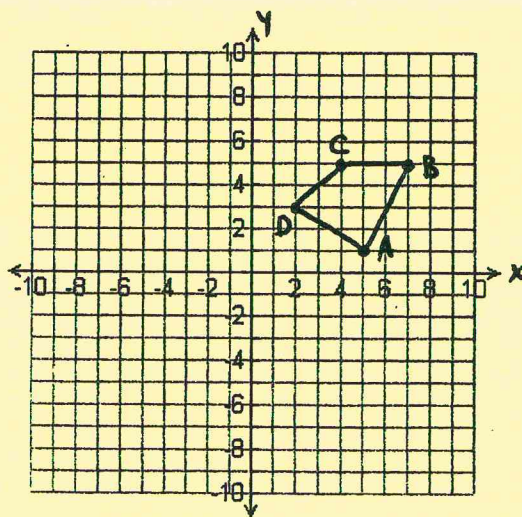
27. Consider the following points in the  $xy$ -plane:

$$(2, 3), (4, 1), (-1, 2), (3, 3), (-2, 4)$$

Which statement is true about the relation between  $x$  and  $y$ ?

- a)  $x$  is a function of  $y$ , but  $y$  is not a function of  $x$ .
- b)  $y$  is a function of  $x$ , but  $x$  is not a function of  $y$ .
- c)  $x$  is a function of  $y$ , and  $y$  is a function of  $x$ .
- d) Neither variable is a function of the other.
- e) N.O.T.

28. Quadrilateral  $A'B'C'D'$  is obtained from quadrilateral  $ABCD$  in the figure below by a reflection across the  $y$ -axis and then a translation of 3 units down. Which of the following points is a vertex of quadrilateral  $A'B'C'D'$ ?



- a)  $(5, -4)$
- b)  $(0, 2)$
- c)  $(-7, 8)$
- d)  $(-4, 2)$
- e) N.O.T.



37. A sequence of transformations was applied to an equilateral triangle in a coordinate plane. The transformations used were rotations, reflections, and translations. Which statement about the resulting figure is true?
- a) It must be an equilateral triangle with the same side lengths as the original triangle.
  - b) It must be an equilateral triangle, but the side lengths may differ from the original triangle.
  - c) It may be a scalene triangle, and all the side lengths may differ from the original triangle.
  - d) It may be an obtuse triangle with at least one side the same length as a side in the original triangle.
  - e) N.O.T.

38. Rectangle  $R$  in the  $xy$ -plane undergoes a dilation with scale factor 0.5 and then a reflection over the  $y$ -axis. The resulting image is Rectangle  $S$ . Which statement about Rectangles  $R$  and  $S$  is true?
- a) They are congruent and similar.
  - b) They are similar but not congruent.
  - c) They are congruent but not similar.
  - d) They are neither congruent nor similar.
  - e) N.O.T.

39. The table below shows the cost of different numbers of goldfish at a pet store.

Number of Goldfish	5	10	15	20
Cost	\$1.50	\$3.00	\$4.50	\$6.00

The cost is a linear function of the number of goldfish. Which statement describes the rate of change of this function?

- a) The cost increases \$6.00 each time 5 goldfish are added.
  - b) The cost increases \$3.00 each time 1 goldfish is added.
  - c) The cost increases \$1.50 each time 1 goldfish is added.
  - d) The cost increases \$0.30 each time 5 goldfish are added.
  - e) N.O.T.
40. Which two integers does  $\sqrt{33}$  fall between?
- a) 4 and 5
  - b) 5 and 6
  - c) 6 and 7
  - d) 7 and 8
  - e) N.O.T.
41. Suppose three days ago was Tuesday. What day of the week will it be 90 days from today?
- a) Saturday
  - b) Sunday
  - c) Monday
  - d) Tuesday
  - e) N.O.T.
42. Sarah took her brother out to dinner. The service was exceptional, so when she receives the bill, she decides to give a 20% tip. How much is the tip if the bill was \$24?
- a) \$20.00
  - b) \$2.40
  - c) \$4.00
  - d) \$4.80
  - e) N.O.T.

43. Three adults take 15 children to a science museum. The total amount spent on tickets to the museum is \$75, and adult tickets are \$10 each. How much does one student ticket cost?

- a) \$4.50                      b) \$3.00                      c) \$15.00                      d) \$5.00                      e) N.O.T.

44. Mr. Wilson is 81 years older than his great-grandson, Kevin. In three years, Mr. Wilson will be four times as old as Kevin. How old is Kevin now?

- a) 21 years old                      b) 22 years old                      c) 24 years old                      d) 26 years old                      e) N.O.T.

45. Jonathan's score on a Social Studies test was 84%. If the test had 50 questions, how many questions did Jonathan answer incorrectly?

- a) 42                      b) 34                      c) 16                      d) 8                      e) N.O.T.