

DO NOT OPEN UNTIL INSTRUCTED TO DO SO



Don Bosco Technical Institute
proudly presents the



45th Annual Mathematics Contest

5th/6th Grade Test

February 4, 2017

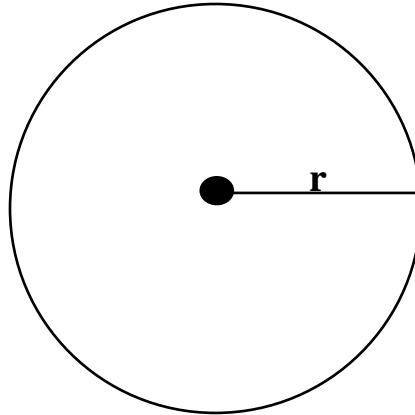
Directions:

- This test contains 30 questions.
- You have ONE HOUR to complete this test.
- Solve each problem, choose the best answer, and mark the corresponding letter on your SCANTRON answer sheet.
- Each question is worth one point. Your score will be the number of correct answers. There is no partial credit nor penalty for wrong answers.
- You may write on this test and/or separate the pages. It is yours to take home.
- No calculators may be used on this test.
- Communicating with other contestants is not permitted.

1151 San Gabriel Blvd. ♦ Rosemead, CA 91770 ♦ (626) 940-2011 ♦ www.boscotech.edu

DO NOT OPEN UNTIL INSTRUCTED TO DO SO

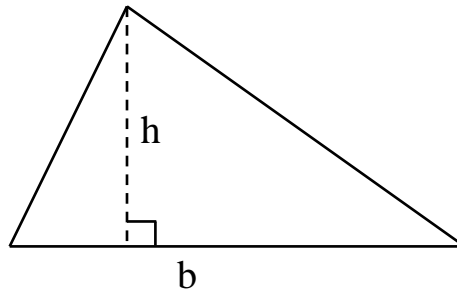
Formulas



Radius of a Circle: r

Area of a Circle: πr^2

Circumference of a Circle: $2\pi r$



Area of a Triangle = $\frac{1}{2}$ x base x height = $\frac{1}{2}bh$

1. A standard, six-sided die has sides numbered 1, 2, 3, 4, 5, and 6 (note: in this case, “die” is the singular of dice). What is the probability the number rolled is greater than 2 and less than 5?
- a. $\frac{1}{2}$
 - b. $\frac{1}{3}$
 - c. $\frac{2}{3}$
 - d. $\frac{1}{4}$
 - e. $\frac{1}{6}$
2. Which number is $\frac{3}{5}$ of the way from $-\frac{4}{7}$ to $1\frac{1}{8}$?
- a. $\frac{31}{40}$
 - b. $\frac{95}{56}$
 - c. $\frac{93}{280}$
 - d. $\frac{25}{56}$
 - e. $\frac{57}{40}$
3. A drawer contains yellow and blue pencils. If the number of yellow pencils is $\frac{2}{3}$ the number of blue pencils, then the ratio of yellow pencils in the drawer is:
- a. 1:2
 - b. 2:3
 - c. 3:5
 - d. 1:3
 - e. 2:5

4. 504 minutes is what percent of one day?
- 20
 - 25
 - 30
 - 35
 - 40
5. Sarah and John both went to the Science Center today. Sarah goes to the Science Center every 54 days. John goes to the Science Center every 26 weeks. They will both visit the Science Center on the same day in
- 2,106 days
 - 4,914 days
 - 6,234 days
 - 9,828 days
 - None of the above
6. A boy buys 3 apples for \$1. He then sells them at 5 for \$2. In order to make a profit of \$10, he must sell:
- 75 apples
 - 100 apples
 - 125 apples
 - 150 apples
 - None of these

7. Victor has used his lucky eraser for n years. If he uses it for 6 more years, he will have used this eraser for n^2 years. What is n ?
- 2
 - 3
 - 4
 - 6
 - 9
8. During a game, Bosco scored one-sixth of its points in the first quarter, one-fourth in the second quarter, one-third in the third quarter, and the remaining points in the fourth quarter. If Bosco scored a total of 48 points in all, how many points did they score in the fourth quarter?
- 6
 - 8
 - 10
 - 12
 - 16
9. The value of $(1 + \frac{1}{2})(1 + \frac{1}{3})(1 + \frac{1}{4})(1 + \frac{1}{5})(1 + \frac{1}{6})(1 + \frac{1}{7})$
- $1\frac{1}{120}$
 - 1
 - 3
 - $3\frac{17}{60}$
 - 4

10. There are 8 sections of seats in an auditorium. Each section contains at least 150 seats, but fewer than 200 seats. Which of the following could be the number of seats in this auditorium?

- a. 900
- b. 1,000
- c. 1,300
- d. 1,600
- e. 1,800

11. What is the value of x in $3x + 7 = 1 - 2x$?

- a. $-\frac{6}{5}$
- b. $\frac{1}{5}$
- c. $\frac{6}{5}$
- d. $-\frac{7}{6}$
- e. $\frac{7}{6}$

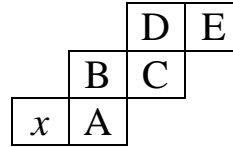
12. Which of these numbers is the largest?

- a. $\frac{1}{3}$
- b. $\frac{3}{10}$
- c. $\frac{333}{1000}$
- d. $\frac{7}{20}$
- e. 0.33

13. The largest possible circle is cut from a square piece of cardboard. If one side of the square measures 5 inches, what is the area of the remaining cardboard (assume $\pi = \frac{22}{7}$)
- a. $\frac{65}{14} \text{ in.}^2$
 - b. $\frac{75}{14} \text{ in.}^2$
 - c. 12 in.^2
 - d. 16 in.^2
 - e. 45 in.^2
14. Two sides of a right triangle are 5 and 12 centimeters long. Find the length of the hypotenuse to the nearest tenth of a centimeter.
- a. 7.0 cm
 - b. 10.9 cm
 - c. 13.0 cm
 - d. No such triangle is possible
 - e. Not enough information to solve
15. In the final game of a basketball tournament, only 7 players from the team played. The scoring average of all 7 players in the final game was 13. The scoring average of everyone but the point guard was 12. How many points did the point guard score in the final game?
- a. 16
 - b. 19
 - c. 21
 - d. 22
 - e. 24

16. The figure to the right can be folded into the shape of a cube. In the resulting cube, which of the lettered faces is opposite the face marked x ?

- a. A
- b. B
- c. C
- d. D
- e. E



17. Christine has 7 gray balls, 4 white balls, and 3 black balls in a bag. What is the least number of balls she must take out of the bag, with her eyes closed, to make sure that she took out at least one ball of each color?

- a. 4
- b. 8
- c. 11
- d. 12
- e. 14

18. Chandler wants to buy a mountain bike for \$500. For his birthday, his grandparents send him \$50, his aunt sends him \$35, and his cousin gives him \$15. He earns \$16 per week for his paper route. He will use all of his birthday money and all the money he earns from the paper route.

What is the earliest he will be able to buy the mountain bike?

- a. 24 weeks
- b. 25 weeks
- c. 26 weeks
- d. 27 weeks
- e. 28 weeks

19. The average age of 5 people in a room is 30 years. An 18-year-old person leaves the room. What is the average age of the four remaining people?
- a. 25
 - b. 26
 - c. 29
 - d. 33
 - e. 36

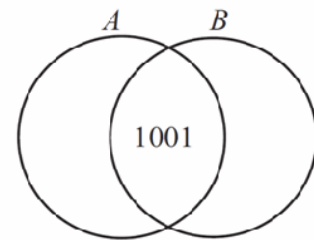
20. To complete the grid below, each of the digits 1 through 4 must occur once in each row and once in each column. What number will occupy the lower right-hand square?

- a. 1
- b. 2
- c. 3
- d. 4
- e. Cannot be determined

1		2	
2	3		
			4

21. Sets A and B , shown in the Venn diagram, have the same number of elements. Their union has 2,007 elements and their intersection has 1,001 elements. Find the number of elements in A .

- a. 503
- b. 1,006
- c. 1,504
- d. 1,507
- e. 1,510



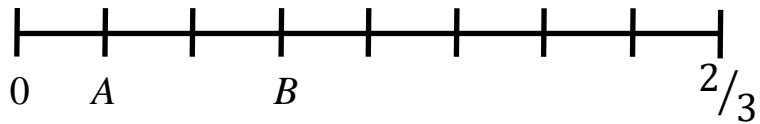
22. Let a , b , and c be numbers so that $0 < a < b < c$. Which of the following is impossible?
- a. $(a + c) < b$
 - b. $(a \cdot b) < c$
 - c. $(a + b) < c$
 - d. $(a \cdot c) < b$
 - e. $\frac{b}{c} = a$
23. A haunted house has six windows. In how many ways can a ghost enter the house by one window and leave by a different window?
- a. 12
 - b. 15
 - c. 18
 - d. 30
 - e. 36
24. The weight of a box with 30 identical chocolates is 21 ounces. When 6 chocolates are removed and eaten, the weight of the box and remaining chocolates is 17.4 ounces. In ounces, what is the weight of the empty box?
- a. 2.2
 - b. 2.4
 - c. 2.8
 - d. 3
 - e. 3.2

25. ∇ and \cup are two distinct operations from the set: $\{+, \times, -, \div\}$

If $\frac{9 \nabla 6}{2 \cup 6} = 45$, what is the value of $\frac{6 \nabla 3}{12 \cup 8}$?

- a. $\frac{3}{16}$
- b. 6
- c. 12
- d. 15
- e. 20

26.



On the number line, what is the sum of A and B? (Assume equal intervals)

- a. $\frac{5}{12}$
- b. $\frac{1}{2}$
- c. $\frac{2}{3}$
- d. $\frac{1}{3}$
- e. $\frac{7}{12}$

27. In this addition problem, each letter represents a different digit from 0 through 9.

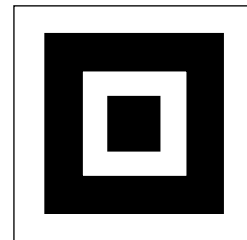
Compute the sum of $L + R + V$.

- a. 13
- b. 15
- c. 16
- d. 17
- e. 20

$$\begin{array}{r} L \quad R \quad L \\ + \quad R \quad V \\ \hline R \quad L \quad L \end{array}$$

28. A target consists of four concentric squares of side lengths 1, 3, 5, and 7. What percent of the target is shaded? Round to the nearest percent.

- a. 33%
- b. 35%
- c. 38%
- d. 43%
- e. 53%



29. If $\frac{a}{d+b+c} = \frac{4}{3}$ and $\frac{a}{b+c} = \frac{3}{5}$, then $\frac{d}{a} =$

a. $\frac{6}{7}$

b. $\frac{7}{6}$

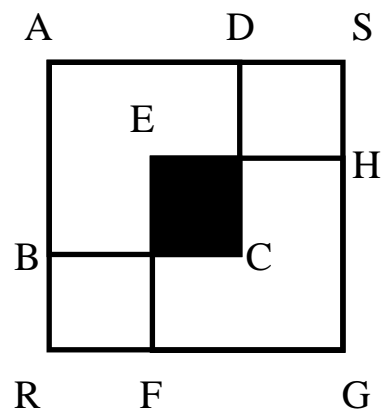
c. $\frac{7}{11}$

d. $-\frac{11}{12}$

e. $-\frac{12}{11}$

30. In the figure, the squares $ABCD$ and $EFGH$ have equal areas. The area of the shaded square is $\frac{1}{9}$ of the area of the square $ABCD$. Find the area of the square $ARGS$ if the area of the shaded square is 49 in^2 .

- a. 1176 in^2
- b. 1225 in^2
- c. 1274 in^2
- d. 1372 in^2
- e. 1470 in^2



**DO NOT TURN OVER UNTIL
INSTRUCTED TO DO SO.**

Answer Key

- | | | | | |
|------|-------|-------|-------|-------|
| 1. B | 7. B | 13. B | 19. D | 25. B |
| 2. D | 8. D | 14. C | 20. B | 26. D |
| 3. E | 9. E | 15. B | 21. C | 27. D |
| 4. D | 10. C | 16. C | 22. A | 28. B |
| 5. B | 11. A | 17. D | 23. D | 29. D |
| 6. D | 12. D | 18. B | 24. D | 30. B |