

2016 SCSU MATH CONTEST
7th and 8th Grade Test

DIRECTIONS: Select the BEST completion or response from among those given. Scientific and graphing calculators are allowed. Symbolic calculators are not allowed.

1. The following sequence of symbols is written a total of 60 times: # % % # # \$ # # \$
How many more # symbols than % symbols are written?

A. 60 B. 120 C. 180 D. 240 E. 300

2. George averaged 68 miles per hour on a 390 mile automobile drive.
If he started at 7:40 AM, when did he complete his drive? Round your answer to the nearest minute.

A. 1:14 PM B. 1:24 PM C. 1:40 PM D. 1:41 PM E. 2:14 PM

3. The date of the second Wednesday of a month is a square number. What is the date of the last Monday of this month?

A. 27 B. 28 C. 29 D. 30 E. 31

4. Both a and b are positive, neither of them is divisible by 10, and $ab = 10,000$. Find $a + b$.

A. 205 B. 240 C. 641 D. 1258 E. 2504

5. As a train began to pass, Manuel counted 12 cars in the first 15 seconds. It took the train 2 minutes 45 seconds to clear the crossing at a constant speed. All cars were the same length. How many cars were in the train?

A. 120 B. 127 C. 132 D. 185 E. 189

6. The points $A(-1, 2)$ and $B(3, 2)$ are graphed on a coordinate plane. Point C is the reflection of point A over the x -axis. What is the area of the triangle ABC ?

A. 4 sq. units B. 8 sq. units C. 10 sq. units D. 12 sq. units E. 16 sq. units

7. 256^{256} is equivalent to

A. 2^{2048} B. 16^{240} C. 8^{264} D. 2^{128} E. None of these

8. In the table shown,

$$f(x) = \frac{3x-1}{2}.$$

What is the value of t ?

x	$f(x)$
1	1
s	4
t	$t + 4$

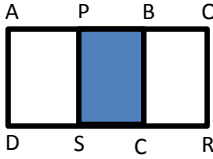
A. 11 B. 10 C. 9 D. 7 E. 3

9. $n! - (n - 1)!$ is equivalent to:

A. $(n + 1)(n - 1)!$ B. $n(n - 1)!$ C. n D. $(n - 1)(n - 1)!$ E. None of these

10. Consider the numbers $-10, -7, -4, 0, 2,$ and 5 . From these six numbers, select 3 different numbers for the values of x, y and z in order to make the expression $x(y - z)$ as large as possible. What is the largest possible value of $x(y - z)$?

A. 60 B. 85 C. 90 D. 105 E. 120

11. Amanda weighed the seven watermelons from her garden. The mean weight was 5.30 pounds. The two watermelons that Amanda gave Josh weighed 3.10 pounds and 8.10 pounds. What is the mean weight (in pounds) of the remaining five watermelons?
- A. 5.00 B. 5.11 C. 5.18 D. 5.50 E. 5.60
12. Consider the two-digit decimal number $0.AB$ where the digits A and B are different digits chosen from 0 to 9. How many such numbers satisfy $\frac{1}{3} < 0.AB < \frac{3}{4}$?
- A. 37 B. 38 C. 39 D. 40 E. 41
13. Each weekday Beth drives 60 miles to work in the morning and drives 60 miles home in the evening. She drives at an average speed of 50 mph and does this for 50 weeks per year for 12 years. How many hours did Beth spend driving to and from work?
- A. 300 B. 600 C. 1440 D. 7200 E. None of these
14. Megan wants to arrange her 5 books on a shelf. Two of the books are math books. How many ways can she arrange the books if the two math books have to be side-by-side?
- A. 240 B. 120 C. 60 D. 48 E. 24
15. Chuck and Dana agree to meet in Chicago for the weekend. Chuck travels 183 miles in the same time that Dana travels 174 miles. If Chuck's speed is 3 mph faster than Dana's, what is Chuck's speed?
- A. 55 mph B. 61 mph C. 65 mph D. 67 mph E. 70 mph
16. In a triangle, the measure of one of the angles is 45° . The measures of the other two angles in the triangle are in the ratio 4:5. What is the measure of the largest angle in the triangle?
- A. 75° B. 80° C. 85° D. 90° E. 100°
17. Two congruent squares, $ABCD$ and $PQRS$, have side length 15. They overlap to form the 15 by 25 rectangle $AQRD$ as shown. What percentage of the area of rectangle $AQRD$ is shaded? (Figure not drawn to scale!)
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- A. 15 B. 18 C. 20 D. 24 E. 25
18. The population increases by 20% one year and then decreases by 20% the next year. What is its total change of the population over the 2-year period?
- A. -4% B. -10% C. 0% D. $+4\%$ E. $+10\%$
19. Suppose you have a cylindrical hole in your backyard that you need to fill with dirt. The cylinder's base is a circle with a diameter of 54 feet. The cylinder's height is 8 inches. If we ignore possible compression of the dirt, how many cubic yards of dirt are needed to fill the hole?
- A. 9π B. 18π C. 72π D. 216π E. None of these

20. The numbers 1 through 25 are arranged into 5 rows and 5 columns in the table shown.

1	2	3	4	5
10	9	8	7	6
11	12	13	14	15
20	19	18	17	16
21	22	23	24	25

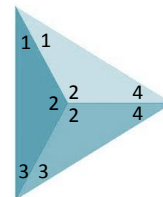
What is the largest possible sum that can be made using five of these numbers such that no two numbers come from the same row and no two numbers come from the same column?

- A. 65 B. 68 C. 71 D. 73 E. 75
21. The list of integers $3, 3, x, y, 12$ has been arranged from least to greatest. How many different possible ordered pairs (x, y) are there so that the average (mean) of these five integers is itself an integer?
Note: x and y do not have to be different numbers.
- A. 7 B. 8 C. 9 D. 10 E. 11
22. The lengths of the sides of a triangle are three consecutive integers. The length of the shortest side is 30% of the perimeter. What is the length of the longest side?
- A. 7 B. 8 C. 9 D. 10 E. 11
23. If the ratio of $2x - y$ to $x + y$ is $2:3$, what is the ratio of $x:y$?
- A. $2:3$ B. $3:2$ C. $3:5$ D. $5:4$ E. $4:5$
24. A survey of 50 students found that 30 had cats, 25 had dogs, and 5 had gerbils. Only one student had all three kinds of pets, but 16 had both cats and dogs, 4 had both dogs and gerbils, and 2 had both cats and gerbils.
How many surveyed students had no pets of these types?
- A. 11 B. 10 C. 9 D. 8 E. 7
25. A and B are both positive integers. When A is divided by B , the quotient is Q and the remainder is R . Determine the quotient and remainder when $A + 3BQ$ is divided by B .
- A. Quotient: $4Q$ Remainder: R B. Quotient: $3Q$ Remainder: R C. Quotient: $4Q$ Remainder: $3R$
D. Quotient: $3Q$ Remainder: $4R$ E. Quotient: $3Q$ Remainder: $3R$
26. How many different positive integers can you form using only the digits 1, 2, 3, and 4 if each digit can be used at most once in any number?
- A. 12 B. 24 C. 48 D. 64 E. 72
27. Suppose that $ab = 18$, $bc = 24$ and $ac = 48$. Find $a + b + c$.
- A. 11 B. 17 C. 19 D. 25 E. 35
28. One-third the length of a rectangle and three times the width of the same rectangle will result in a square with perimeter P . What is the perimeter of the original rectangle?
- A. P B. $3P$ C. $\frac{1}{3}P$ D. $\frac{5}{6}P$ E. $\frac{5}{3}P$
29. The ratio of cats to dogs to squirrels in my neighborhood is $4:5:12$, and the ratio of squirrels to opossums to raccoons is $10:3:6$. What is the ratio of dogs to raccoons?
- A. $25:36$ B. $36:25$ C. $1:4$ D. $4:1$ E. $4:25$

30. Amanda had a bag of jelly beans and ate one-third of them. Allie found the remaining jelly beans and ate some until only one-fifth of the original number of jelly beans remained. What fraction of the jelly beans that Allie found did she eat?

A. $\frac{3}{10}$ B. $\frac{3}{5}$ C. $\frac{1}{2}$ D. $\frac{5}{7}$ E. $\frac{7}{10}$

31. A fair tetrahedral die has four faces and four vertices. Each vertex is numbered and each vertex is equally likely to land "up". We have two such dice. On one die, the vertices are labeled 1, 2, 3 and 4, and on the other die the vertices are labeled 2, 3, 4, and 5. When these two dice are rolled, what is the probability that the sum of the two "up" vertices is at least 7?

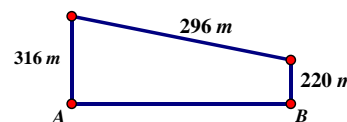


A. $\frac{1}{16}$ B. $\frac{1}{8}$ C. $\frac{3}{16}$ D. $\frac{1}{4}$ E. $\frac{3}{8}$

32. Suppose three janitors are mopping the floor of a school. Working alone, Adam can complete the job in 8 hours, Bob can complete the job in 4 hours and Chad can complete the job in 2 hours. All three janitors worked together at the same time to mop the entire floor. What fraction of the floor did Bob mop?

A. $\frac{2}{5}$ B. $\frac{1}{3}$ C. $\frac{1}{8}$ D. $\frac{2}{7}$ E. None of these

33. Consider the trapezoidal region shown. (Figure is not drawn to scale!) If the angles at points A and B are right angles, what is the area (in square meters) of the region?



A. 93,536 B. 79,328 C. 77,642 D. 75,040 E. 65,120

34. The length of a rectangle is three times the width. A new rectangle is created by decreasing the length of the original rectangle by 9 feet and increasing its width by 4 feet. The area of the new rectangle is the same as the area of the original rectangle. What is the perimeter (in feet) of the new rectangle?

A. 43 B. 48 C. 86 D. 98 E. 432

35. The chart shown gives the cost of installing carpet in four rectangular rooms of various sizes. The cost per square yard of installing carpet is always the same. What is the value of z ?

	Width (yards)	
	10	y
Length (yards)	15	\$397.50
	x	\$742.00
		z

A. \$331.25 B. \$463.75 C. \$476.00 D. \$1261.40 E. \$1815.25

36. I had 1.5 gallons of 100% pure cranberry juice. After using 0.3 gallons of juice, I mixed 0.3 gallons of water with the remaining juice. Then I drank 0.3 gallons of the resulting mixture. Finally I mixed 0.3 gallons of water with what remained. What percent of this final resulting liquid is pure cranberry juice?

A. 45% B. 64% C. 75% D. 80% E. 92%