2013 SCSU MATH CONTEST

7^{th} and 8^{th} 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. A jumbo jet can travel its own length in 20 seconds. At this same speed, the jet can taxi past a 710 foot long hangar in 70 seconds. Find the length of the jumbo jet rounded to the nearest foot.

A. 100 B. 200 C. 202 D. 203 E. 270

2. The square of a positive integer is tripled. When the result is divided by five, the quotient is 15. What was the original positive integer?

A. 4 B. 5 C. 6 D. 7 E. 10

3. Set L consists of four consecutive, positive, odd integers. The sum of the greatest integer and twice the least integer is 39. Find the least integer in the set.

A. 7 B. 9 C. 11 D. 12 E. 13

4. A bag contains balls that are identical in all ways, except for their color. There are three red, four white, and six green balls in the bag. John randomly draws one ball at a time from the bag, without replacing it. The first ball drawn is white. Find the probability that the second ball drawn is red. Write the answer as a fraction in simplest form.

A. $\frac{1}{4}$ B. $\frac{3}{13}$ C. $\frac{1}{3}$ D. $\frac{3}{4}$ E. $\frac{10}{13}$

5. The sum of two prime numbers is 91. Find their product.

A. 90 B. 178 C. 1891 D. 2050 E. 20,070

6. A tablet computer can store 1024 digital books. What would be the weight in pounds of the same number of physical books if the average weight of each book is 15 ounces?

A. 480 B. 960 C. 1024 D. 1092 E. 15,360

7. Find the product of the greatest common divisor and the least common multiple of 111 and 18.

A. 74 B. 222 C. 666 D. 1332 E. 1998

8. Four students throw their coats on a counter. Their teacher randomly chooses a coat for each student. In how many different ways can the coats be distributed so that no one receives the correct coat?

A. 9 B. 10 C. 18 D. 23 E. 24

9. If $a\#b = 2a + b$ and $a \otimes b = a^2 - b$, find the value of $4\#\left[(2 \otimes 7) \otimes 12\right]$.

A. -2 B. 2 C. 5 D. 13 E. 22

10. Find the value of $\dfrac{2}{2-\dfrac{1}{2-\dfrac{1}{2-\frac{1}{2}}}}$.

A. $-\frac{1}{2}$ B. $\frac{1}{10}$ C. $\frac{4}{3}$ D. $\frac{8}{5}$ E. $\frac{5}{2}$

11. 10 cactus plants and 4 Venus flytrap plants cost $98.
3 cactus plants and 9 Venus flytrap plants cost $123.
What does it cost to purchase 1 cactus plant and 1 Venus flytrap plant?

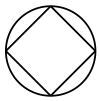
A. $7.00 B. $8.50 C. $10.25 D. $17.00 E. $17.25

12. Jackson's password consists of 8 single-digit counting numbers.
The sum of any three consecutive digits in his password is 18.
Part of the password is shown to the right. What digit does X represent?

		7				X	9

A. 2 B. 3 C. 5 D. 6 E. 7

13. A square is inscribed in a circle as shown in the figure at the right.
Approximately what percent of the circle's area is inside the inscribed square?



A. 64% B. 70% C. 74% D. 78% E. 80%

14. At Christmas, your grandmother gives one-third of the money in her purse to your mother, one-fourth of what was left to your aunt, and one-fourth of what left after that to your uncle. You and your brother each get half of what is left. What fraction of the money in grandmother's purse did you get?

A. $\frac{1}{12}$ B. $\frac{1}{8}$ C. $\frac{1}{6}$ D. $\frac{3}{16}$ E. $\frac{1}{4}$

15. Consider the following two positive binary numbers 01011 and 10101.
Their sum when expressed as a base 10 number is:

A. 16 B. 29 C. 32 D. 48 E. 64

16. Suppose Tom has change in his pocket consisting of pennies, nickels, dimes and quarters. The number of pennies is twice the number of nickels. The number of nickels is twice the number of dimes. The number of dimes is twice the number of quarters. If the value of his change is $1.46, what is the total number of quarters in his pocket?

A. 0 B. 1 C. 2 D. 3 E. 4

17. Suppose you draw 4 circles inside a larger circle of radius R.
Each of the smaller circles has a radius of $\frac{R}{2\sqrt{2}}$.
What is the ratio of the area of the larger circle to the sum of the areas of the smaller circles?

A. 1:1 B. 2:1 C. $2\sqrt{2}$:1 D. 4:1 E. 8:1

18. Suppose that in city A there are 10 inches of snow on the ground and it is snowing at the rate of 1.5 inches per hour. In city B there are 15.25 inches of snow on the ground and it is snowing there at the rate of 1 inch per hour. The rate of snowfall is expected to remain at the current rate in each of the two cities for the next 24 hours. If the time is currently 2:37 am, when will the depth of snow be equal in the two cities?

A. 5:25 am B. 6:07 am C. 10:30 am D. 12:37 pm E. 1:07 pm

19. Two different rectangles each have an area of 360 square centimeters. The length of the second rectangle is 12 centimeters greater than that of the first rectangle, and its width is 5 centimeters less than that of the first rectangle. Find the difference of the perimeters (in centimeters) of the two rectangles.

A. 0 B. 4 C. 7 D. 11 E. 14

20. How many two-digit numbers exist such that when the product of the digits is added to the sum of the digits, the result is equal to the original two-digit number?

A. 2 B. 7 C. 9 D. 14 E. 20

21. Team A and Team B are in a playoff series. The first team to win two games wins the series. The probability that Team A will win each game is twice the probability that Team B will win. What is the probability that Team B will win the series?

A. $\frac{2}{27}$ B. $\frac{4}{27}$ C. $\frac{1}{3}$ D. $\frac{7}{27}$ E. $\frac{2}{3}$

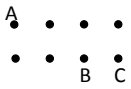
22. Noah and McKenna are playing a coin-toss game. Noah gets a point if the coin lands heads up, and McKenna gets a point if it lands tails up. The score of the game is now 9 to 8 in McKenna's favor and the first one to get to 10 points is the winner. What is the probability that McKenna will win?

A. $\frac{1}{8}$ B. $\frac{1}{4}$ C. $\frac{1}{3}$ D. $\frac{1}{2}$ E. $\frac{3}{4}$

23. The sides of a right triangle have lengths $x-y$, x, and $x+y$, where $x>y>0$. Find $\frac{x}{y}$.

A. $\frac{4}{3}$ B. $\frac{3}{2}$ C. 2 D. 3 E. 4

24. On the array of dots to the right, the vertical and horizontal distances between the dots are the same. If the measure of $\overline{AB}$ is $3\sqrt{5}$ find the measure of $\overline{AC}$.



A. $4\sqrt{5}$ B. $3\sqrt{10}$ C. $4\sqrt{10}$ D. $6\sqrt{5}$ E. $6\sqrt{10}$

25. An outfit consists of a shirt, a pair of jeans and a scarf. If any one of the three items is changed, the outfit is considered 'different.' Amanda wants to wear a 'different' outfit every day. She has three times as many shirts as pairs of jeans and twice as many scarves as shirts. How many shirts must she own to be able to wear a different outfit every day for at least three years? Assume there are 365 days in a year.

A. 6 B. 12 C. 15 D. 24 E. 48

26. Two missiles speed directly toward each other, one traveling at 9,000 mph and one at 21,000 mph. If they start 1317 miles apart, how many miles apart are they one minute before they collide?

A. 22 B. 150 C. 350 D. 500 E. 1000

27. An artist's most famous sculpture stands six feet tall. She has been commissioned to create 540 scale replicas, each one foot tall. If the original statue weighs 750 pounds, and the replicas are made of the same material as the original, what is the total weight, in pounds, of the 540 scale replicas?

A. 1875 B. 1890 C. 3240 D. 3360 E. 67,500

28. Three men can complete a job in four days. How many days will it take two men to complete the same job if they work at the same rate?

A. 6 B. 8 C. 9 D. 10 E. 24

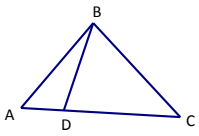
29. Each chapter test has 100 points possible. The final exam has 200 points possible. Joseph scored 76, 88, 96, and 98 on his chapter tests and his overall percentage, counting the final exam, was exactly 90 percent. What was Joseph's percentage score on the final exam?

A. 90 B. 91 C. 172 D. 180 E. Not possible

30. In 1976 Greg and Marsha purchased a house for $72,000. While living in the house they spent $10,000 to remodel the bathroom, $20,000 to remodel the kitchen, and $15,000 to landscape the backyard. In 2005, they sold the house for $510,000. Considering the money they spent for remodeling and landscaping, what was the percent appreciation of their house? Express your answer to the nearest tenth. Note: disregard inflation.

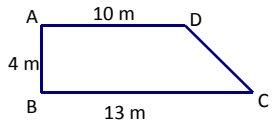
A. 3.4% B. 33.6% C. 77.1% D. 129.8% E. 335.9%

31. In the figure at the right, the area of triangle ABD is 27 square units, AD = 6 units and CD = 26 units.
Find the area of triangle BCD.



A. 22 B. 100 C. 117 D. 126 E. 144

32. In the figure at the right, $\overline{AD}$ and $\overline{BC}$ are perpendicular to $\overline{AB}$.
Find the perimeter of the figure. The drawing is not to scale.

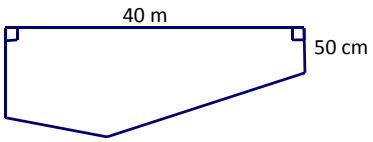


A. 30.5 m B. 31 m C. 31.5 m D. 32 m E. 32.5 m

33. The mean, median and mode of six numbers are 14, 15, and 18, respectively. Two of the numbers are 4 and 9. Find the other numbers.

A. 12, 18, 18, 20 B. 12, 18, 18, 23 C. 14, 16, 18, 18 D. 15, 15, 18, 18 E. 15, 18, 18, 20

34. The top of a swimming pool is a 40 meter by 20 meter rectangle.
The figure at the right shows a vertical cross-section of the pool with area 75 m^2.
The pool is filled with water to 50 centimeters from the top.
Find the volume of the water in the pool in m^3. The drawing is not to scale.



A. 1100 B. 1380 C. 1500 D. 2200 E. 3000

35. Jack and Jill drove in separate cars to a café, leaving at the same time from the same place. Jill drove 20% faster than Jack and arrived at the café one-half hour earlier than Jack. How many hours did it take Jack to drive to the cafe?

A. 1 B. 2 C. 3 D. 5 E. 6

36. Al and Kevin cross a 14 mile lake with one single-seat kayak. They each can paddle at 7 mph but swim at 2 mph. They start out together (one paddling, one swimming). Half way across the lake, the kayaker anchors the craft and starts swimming. When the swimmer reaches the kayak, he immediately gets in and starts paddling. The two men arrive at the opposite side of the lake at the same time. What fractional part of the journey was the kayak anchored?

A. $\frac{2}{9}$ B. $\frac{1}{3}$ C. $\frac{2}{5}$ D. $\frac{1}{2}$ E. $\frac{5}{9}$