2005 SCSU MATH CONTEST
7^{th} and 8^{th} Grade Test

1. Dave has a stack of 100 music CDs. Each CD contains 700 minutes of music. Rounding to the nearest day, how many days will it take Dave to listen to all of the music on the CDs? Assume that he listens to the music for 24 hours per day.

A. 45 days B. 46 days C. 47 days D. 48 days E. 49 days

2. Suppose I have $2.00 in nickels, dimes, and quarters. If I have the same number of each type of coin, how many coins do I have?

A. 6 B. 9 C. 12 D. 15 E. 18

3. It takes a man one hour to dig a hole 2 meters long, 2 meters wide, and 2 meters deep. How many hours would it take the same man to dig a hole 4 meters long, 4 meters wide, and 4 meters deep, assuming that he digs at the same rate of speed?

A. 2 B. 4 C. 6 D. 8 E. 16

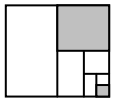
4. An island has no currency; it instead has the following exchange rate:
50 bananas = 20 coconuts, 30 coconuts = 12 fish, and 100 fish = 1 hammock
How many bananas equal one hammock?

A. 250 B. 625 C. 875 D. 1200 E. 1350

5. Joni travels 14 blocks east, then 3 blocks south, then 19 blocks west, and then 3 blocks north. How many blocks is she from where she started?

A. 39 B. 27 C. 11 D. 8 E. 5

6. A square is divided into two halves. One half is then divided into half again. This process continues, resulting in the figure to the right. What fraction of the original square is shaded?



A. $\frac{13}{64}$ B. $\frac{15}{64}$ C. $\frac{17}{64}$ D. $\frac{19}{64}$ E. $\frac{21}{64}$

7. Find the sum of all the common factors of 32 and 64.

A. 63 B. 62 C. 31 D. 30 E. 38

8. A triangle drawn on a map has sides of lengths 8 cm, 10 cm, and 15 cm. The shortest of the corresponding real-life distances is 113 km. Find the longest of the real-life distances, rounded to the nearest tenth km.

A. 221.9 km B. 211.9 km C. 141.3 km D. 141.2 km E. 131.2 km

9. A square piece of paper is folded in half vertically. If the resulting figure has a perimeter of 18 cm, what was the area of the original square?

A. 9 cm^2 B. 18 cm^2 C. 24 cm^2 D. 36 cm^2 E. 81 cm^2

10. A bag contains a total of 14 balls: 4 red balls, 3 blue balls and 7 white balls. Two balls are drawn at random without replacement. What is the probability that both balls are red?

A. $\frac{6}{91}$ B. $\frac{9}{182}$ C. $\frac{6}{92}$ D. $\frac{12}{92}$ E. $\frac{9}{196}$

11. In the figure to the right, both circles have the same center, and the radius of the larger circle is *R*.
If the radius of the smaller circle is 3 units less than *R*, which of the following represents the area of the shaded region?

A. πR^2 B. $\pi[R^2-(R-3)^2]$ C. $\pi(3^2)$ D. $\pi(R-3^2)$ E. $\pi(R-3)^2$

12. On a map, $\frac{3}{8}$ inch represents 72 miles. How many miles does $1\frac{2}{3}$ inches represent?

A. 360 B. 320 C. 192 D. 120 E. 115.2

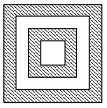
13. Through how many degrees of arc will the **second** hand of a clock travel over the course of 365 days?

A. $86{,}400^o$ B. $87{,}600^o$ C. $864{,}000^o$ D. $3{,}153{,}600^o$ E. $189{,}216{,}000^o$

14. Tom drives at a constant speed of 60 mph for 6 hours and then at a constant speed of 40 mph for 4 hours.
Find his average speed (in mph) for the 10 hours.

A. 10 B. 20 C. 50 D. 52 E. $55\frac{2}{3}$

15. Squares of sides 2, 3, 4, and 5 inches respectively are shown in the figure to the right.
Find the sum of the areas of the shaded regions.



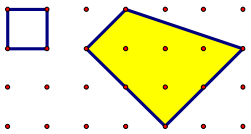
A. 41 B. 34 C. 14 D. 4 E. None of these

16. A rectangular solid and a right circular cylinder have the same volume and the same height. The base of the rectangular solid is a square. Which of the following statements are true?

(i) The rectangular solid and the cylinder have the same base area.
(ii) The base area of the rectangular solid is greater than the base area of the cylinder.
(iii) The side length of the square base of the rectangular solid is equal to the diameter of the cylinder.
(iv) The side length of the square base of the rectangular solid is less than the diameter of the cylinder.

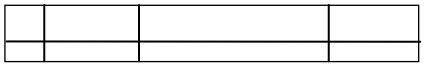
A. (i) and (iii) B. (ii) C. (i) and (iv) D. (ii) and (iii) E. (iii)

17. The area of the square on the left is 1 square unit. Find the area of the polygon on the right.



A. 12 B. 10 C. 8 D. 6.5 E. 6

18. How many different rectangles of all sizes are in this figure?

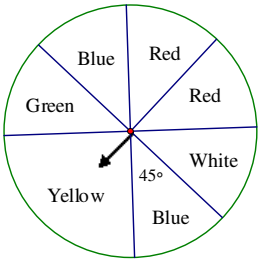


A. 30 B. 20 C. 18 D. 10 E. 8

19. A small town has an adult population of 100. The mean yearly salary of these 100 adults is $74,750. One adult is a multimillionaire who makes 5 million dollars a year. What is the mean yearly salary of the other 99 adults?

A. $24,000 B. $24,500 C. $25,000 D. $26,000 E. $26,500

20. Assume that when the arrow is spun, it stops in one of the seven regions of the spinner shown. The arrow is spun once. Find the probability (as a fraction in simplest form) that the arrow will stop in a region that is <u>not</u> labeled blue.



A. $\frac{1}{4}$ B. $\frac{2}{5}$ C. $\frac{5}{7}$ D. $\frac{2}{7}$ E. $\frac{3}{4}$

21. If a woman is 80 centimeters plus half of her own height tall, how tall is she?

A. 80 cm B. 100 cm C. 120 cm D. 160 cm E. 180 cm

22. A common antibiotic is prescribed in a liquid suspension composed of part antibiotic and part water. In one formulation of the antibiotic suspension, there are 150 mg of the antibiotic in 3 cm^3 of the liquid suspension. A physician prescribes 100 mg per day. How much of the antibiotic liquid suspension should be administered to achieve the recommended dosage?

A. 18 cm^3 B. 6 cm^3 C. 4.5 cm^3 D. 2 cm^3 E. 0.18 cm^3

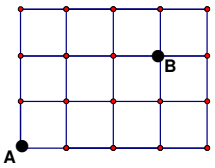
23. A running track has straight parallel sides and semicircular ends. Each lane is one meter wide. How much head start should the runner in the outside lane receive over the runner in the second lane from the outside so that they will each cover the same distance in one lap around the track?

A. 1 meter B. 2 meters C. π meters D. $\frac{3}{2}\pi$ meters E. 2π meters

24. Suppose there is a moving sidewalk that is 300 meters long. It moves from east to west at the rate of 0.25 meters per second. Assume that Bob and Jill get on the sidewalk at the same time but at opposite ends. Bob gets on at the east end and walks toward the west at the rate of 0.5 meters per second. Jill gets on at the west end and walks towards the east at the rate of 1meter per second. How far from the eastern end do they meet?

A. 50 meters B. 100 meters C. 150 meters D. 200 meters E. 250 meters

25. Walter walks from Point A to Point B, always moving closer to B. He must stay on the grid lines. In how many different ways can he walk from A to B?



A. 12 B. 10 C. 6 D. 4 E. None of these

26. The pitch of a screw is the distance between threads. With each complete rotation of the screw, it goes in or out a distance equal to its pitch. How far will a screw with a pitch of $\frac{2}{45}$ in. go into a piece of wood when it is turned 10 complete rotations clockwise?

A. $\frac{1}{225}$ in. B. $\frac{9}{4}$ in. C. $\frac{4}{9}$ in. D. $\frac{1}{9}$ in. E. 9 in.

27. A bag contains six small straws of the following lengths: 2 cm, 3 cm, 5 cm, 7 cm, 11 cm, 13 cm
Three straws are drawn at random. What is the probability that a triangle can be formed with the straws that are drawn?

A. $\frac{1}{10}$ B. $\frac{3}{20}$ C. $\frac{1}{5}$ D. $\frac{3}{10}$ E. $\frac{1}{4}$

28. Suppose that the electricity bill is determined only by multiplying the number of kilowatt hours used by the cost per kilowatt hour. Last February Ben's electric bill was $50. This February the number of kilowatt hours used was 20% higher and the rate per kilowatt hour was 8% lower. To the nearest percent, select the percentage by which his electric bill has changed.

A. 12% increase B. 10% increase C. 0% D. 10% decrease E. 12% decrease

29. If x is 250 percent of y, then what percent of x is $2y$?

A. 25% B. 40% C. 60% D. 75% E. 80%

30. Ann, Bob, Cal, and Don all worked out on the treadmill. Their times (in no particular order) were 16, 18, 23, and 25 minutes. Cal worked out two minutes more than Bob. Don worked out fewer minutes than Ann but more minutes than Cal. Who worked out 25 minutes?

A. Ann B. Bob C. Cal D. Don E. not enough information given

31. Consider the following pattern of zeros and ones. The number of digits in each row is equal to the row number, with the row number of the first row being 1. If ones are used to signify that the row number is prime, how many ones will appear in the pattern if it is extended to a total of 25 rows?

0
11
111
0000
11111

A. 77 B. 83 C. 89 D. 100 E. 129

32. Points F (2, 1) and G (4, 5) are plotted in the Cartesian Coordinate Plane. What is the distance of line segment FG?

A. $2\sqrt{5}$ B. 3 C. $\sqrt{13}$ D. 6 E. 9

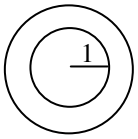
33. Consider the operation # such that $a \# b = -3a + b^2$. Find $(-2 \# 3) \# 6$.

A. –9 B. 9 C. 15 D. 27 E. 45

34. A cube measuring 4 inches on a side is painted. It is then cut into 64 one-inch cubes. One of the smaller cubes is tossed and it is noted that none of the 5 faces showing is painted. How many of the 64 cubes could have this result?

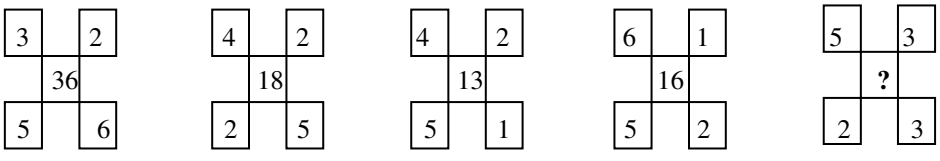
A. 8 B. 9 C. 24 D. 32 E. 33

35. Two concentric circles are drawn as shown to the right. The radius of the smaller circle is one unit. If the smaller circle and the ring formed have the same area, find the radius of the larger circle.



A. $\sqrt{2}$ units B. $\frac{3}{2}$ units C. 2 units D. π units E. $\pi\sqrt{2}$ units

36. Each figure below follows the same logic to determine the number in the middle. Find the missing number in Figure V.



A. 18 B. 19 C. 20 D. 21 E. 22