

1. What is the original price of a 1 terabyte external hard drive that was purchased during a 20% off sale for \$100.00 before tax?

- a) \$20.00                      b) \$80.00                      c) \$120.00                      d) \$125.00                      e) \$100.20

2. During a scuba diving expedition, you collect samples from the coral reef to examine for scientific research on the stability of the reef. You have collected 42 samples of red coral, 56 samples of torch coral, and 70 samples of star coral. Identical groups of coral samples are given to various research labs. If all of the coral is used, what is the greatest number of labs that can receive identical groups of the coral samples?

- a) 2                                      b) 7                                      c) 14                                      d) 248                                      e) not given

3. Starting at the top and moving down, how many ways can you spell OCEAN ?

O  
C C  
E E E  
A A  
N

- a) 2                                      b) 3                                      c) 4                                      d) 5                                      e) not given

4. If  $x - 1 = \frac{7}{8}y$ , then  $1 - x$  equals

- a)  $\frac{7}{8}y$                                       b)  $y$                                       c)  $-\frac{7}{8}y$                                       d)  $-\frac{6}{7}y$                                       e)  $\frac{8}{7}y$

5. A bottlenose dolphin is 58 inches long. A spotted dolphin is 4.75 feet long. An hourglass dolphin is 1.5 yards long. Which is the longest?

- a) bottlenose                      b) spotted                      c) hourglass                      d) all the same length                      e) not enough information

6. Four friends found a box of cookies. Dave took  $\frac{1}{2}$  of the cookies, Jim took 20% less than Ed and Ed took  $\frac{1}{2}$  of the number that Dave took. If Larry ended up with the remaining 6 cookies, how many were in the box at the start?
- a) 36                      b) 80                      c) 100                      d) 108                      e) 120
7. Steve is taking a test that has 30 questions and he answers each one. He earns 9 points for every correct answer and loses 5 points for every wrong answer. If Steve's score is 18, how many questions did he answer correctly on the test?
- a) 9                      b) 12                      c) 15                      d) 18                      e) 21
8. An angle has a degree measure such that its complement is  $\frac{1}{4}$  of its supplement. Determine the angle's complement?
- a) 30                      b) 60                      c) 120                      d) 150                      e) not given
9. Simplify:  $p - (p - q) - (q - r) - (r - s) - (s - t)$
- a)  $t$                       b)  $-t$                       c)  $p - t$                       d)  $-2q - 2r - 2s - t$                       e)  $-2q - 2r - 2s$
10. An ocean liner, the *SS Let's Have Fun*, left Nassau at noon traveling at a rate of 20 mph. Joe Tourist was busy buying souvenirs and missed the ship's departure. Joe hired a speed boat to follow and catch the ship on its way out to sea. If the speed boat that Joe was on left port at 12:30 pm and traveled at a rate of 45 mph, at what time did he catch up with the *SS Let's Have Fun*?
- a) 12:54 pm                      b) 12:55 pm                      c) 1:24pm                      d) 12:24 pm                      e) 1:15 pm

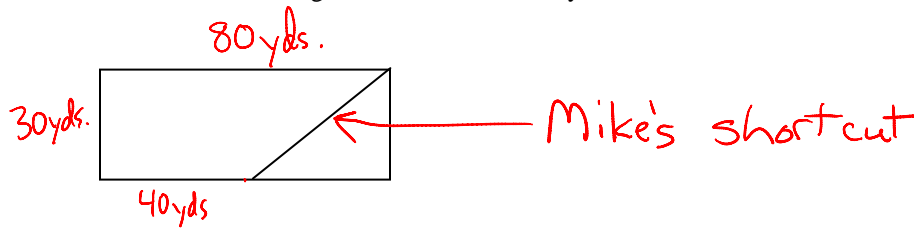
11. 16 teams are in a tournament. One loss and the team is eliminated. No games end in ties. Which expression is equivalent to the number of games that must be played until only one team remains?

- a)  $2^{4-1}$                       b)  $4^2$                       c)  $2^4+1$                       d)  $\sqrt{256} - 1$                       e)  $2^{4+1}$

12. A cone shaped cup with a diameter of 10 cm and a height of 15cm is filled with water to 80% of its capacity. If water weighs one gram per cubic centimeter, give the number of kilograms of the weight (to the nearest tenth of a kilogram) of water in the cup.

- a) 0.1                      b) 0.3                      c) 0.5                      d) 0.9                      e) 1.2

13. Dave and Mike stay in shape by running around a rectangular neighborhood block. However, sometimes Mike takes a shortcut around the block (shown below). Dave and Mike run at the same rate. If Mike's time is 60 seconds while using the shortcut, how many seconds will it take Dave to run around the entire block?

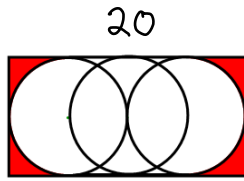


- a) 60                      b) 64                      c) 66                      d) 72                      e) not given

14. In which of the following can the symbol  $\ni$  be correctly replaced by only one of the symbols  $+$ ,  $-$ ,  $\times$ , or  $\div$ ?

- a)  $2 \ni 2 = 4$                       b)  $1 \ni 1 = 1$                       c)  $3 \ni 0 = 3$                       d)  $-1 \ni 1 = -1$                       e)  $0 \ni -3 = -3$

15. Three circles just fit inside a rectangle as shown below. The length of the base of the rectangle is 20. The middle circle's edge goes through each of the other circles' center, and each of the end circles goes through the center of the middle circle. Give the area in square centimeters of the shaded region in terms of  $\pi$ .



- a)  $200 - 25\pi$       b)  $200 - 10\pi$       c)  $100 - 6.25\pi$       d)  $100 - 10\pi$       e)  $100 - 25\pi$

16. If  $(a^x)^{\frac{2}{3}} = \frac{1}{a^3}$  what is the value of  $x$ ?

- a)  $\frac{1}{2}$       b)  $-2$       c)  $-\frac{9}{2}$       d)  $-4$       e)  $-9$

17. A rectangle is 10 cm longer than it is wide. A line segment cuts the area enclosed into two pieces, one of which is a square. The area of the original rectangle is 118 square centimeters more than the area of the square. What is the width of the original rectangle?

- a) 11.8 cm      b) 21.8 cm      c) 118 cm      d) 128 cm      e) not enough information

18. The points A (2, -3), B (3, 7), and C (3, 2) are plotted on a rectangular coordinate system. Then the sign of each x-coordinate is changed and the 3 new points (called A', B', and C') are graphed. If the points are connected (A to B to C to A) and (A' to B' to C' to A'), then which of the following statements is true.

- a) The figures have the same perimeter but different areas.  
b) The figures have the same area but different perimeters.  
c) The figures have the same perimeter and the same area.  
d) The figures have different perimeters and different areas.  
e) None of the above

19. What is the first number that is divisible by all natural numbers from 1 to 10?

- a) 2520                      b) 3628800                      c) 362880                      d) 7200                      e) 2430

20. How many of the integers from 1 to 121 that have a units digit of 1 are prime?

- a) 3                      b) 5                      c) 6                      d) 7                      e) 8

21. The greatest integer function is denoted by  $[[x]]$  and is defined as follows:

$[[x]]$  = the greatest integer less than or equal to  $x$ .

For example,  $[[0.50]] = 0$

$[[ -3.00]] = -3$

$[[ -1.48]] = -2$

Assuming  $x$  and  $y$  are decimal numbers with only two decimal places, find the sum of the maximum value for  $x$  and the minimum value for  $y$  if

$$[[x]] = -5 \text{ and } [[y]] = 4.$$

- a) 7.99                      b) -0.01                      c) -0.99                      d) -1.99                      e) 0

22. What is the unit's digit of  $2^{2011}$ ?

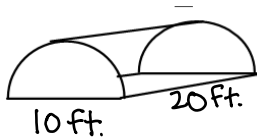
- a) 0                      b) 2                      c) 4                      d) 6                      e) 8

23. If for every real number  $x$ ,  $x^*$  is defined to be  $x + 3$ , which of the following is (are) equal to  $((x + 3)^*)^*$ ?

I.  $(x + 6)^*$                       II.  $x^* + 3^*$                       III.  $x + 9$

- a) I only                      b) III only                      c) I and II only                      d) I and III only                      e) I, II, and III

24. What is the minimum amount of paint needed (in square feet) to cover the entire half cylinder shown with two coats of paint? (use 3.14 for  $\pi$ .)



- a) 557                      b) 592.5                      c) 785                      d) 1185                      e) 1413

25. Consider the number:

.0345600345600034560000345600003456....

What digit will be located in the 198<sup>th</sup> place after the decimal point?

- a) 0                      b) 3                      c) 4                      d) 5                      e) 6

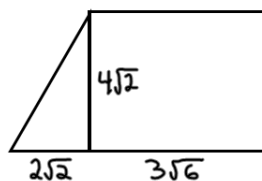
26. Consider the two sequences shown below.

What is the average of the first 5 numbers that occur in both sequences?

0,1,3,6,10,15,21,...

1,5,9,13,17,..

27. A right triangle (shown below) has legs of  $4\sqrt{2}$  and  $2\sqrt{2}$ . Three new polygons (a rectangle, square, and regular hexagon) are attached, with each side of the triangle also being a side of one of the new polygons. The rectangle has been attached to the right triangle as shown below. The square is attached to the other leg of the right triangle, and the regular hexagon is attached to the hypotenuse of the triangle. None of the polygons overlap. Find the combined area of all of the polygons. Give your answer in standard radical form.



28. The sum of 10 positive numbers is what percent of the average of the same 10 numbers?
29. Two boats leave islands A and B respectively at the same time. It takes the boat leaving A seven days to reach island B and the boat leaving island B nine days to reach island A. If they are sailing in a straight line, how many days will it take for the two boats to pass each other? Express your answer as a decimal.
30. Simplify the expression and write your answer as a common fraction:

$$\frac{6!+2!}{5! \cdot 3!} + 1$$