
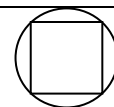


1. What is the perimeter of a rectangle whose area is 870 square units and which has one side of length 30 units? a. <b>118 units</b> b. 120 units      c. 124 units      d. 126 units      e. 128 units																							
2. If two triangles are congruent and equilateral with sides of length 3, what is the outside perimeter of the figure shown connecting the two triangles? a. 7.8      b. 9 <b>c. 12</b> d. 15      e. 18 																							
3. Evaluate $2^3 + 12 \div 3 \times 2(2 + 3^2)$ . Round to the nearest 10. The result is: a. 10      b. 30      c. 70 <b>d. 100</b> e. 150																							
4. Two angles are complementary. The measure of angle 1 is $35^\circ$ . What is the measure of angle 2? a. $55^\circ$ b. $65^\circ$ c. $145^\circ$ d. $155^\circ$ e. $325^\circ$																							
5. Four friends built a robot together. Of the total time they worked on the robot, the portion of the total work that each student contributed is given in the table in a variety of forms. Which friend did the most work?	<table border="1"><tr><td>a. <b>Abel</b></td><td><math>17/50</math></td></tr><tr><td>b. Bella</td><td>23%</td></tr><tr><td>c. Cullen</td><td>0.18</td></tr><tr><td>d. Daniel</td><td><math>1/4</math></td></tr></table>	a. <b>Abel</b>	$17/50$	b. Bella	23%	c. Cullen	0.18	d. Daniel	$1/4$														
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6. What is the value of $\frac{2}{3} - \frac{3}{5}$ , expressed as a fraction in lowest terms? a. $-\frac{1}{15}$ b. $-\frac{1}{8}$ <b>c. <math>\frac{1}{15}</math></b> d. $\frac{1}{8}$ e. $\frac{1}{5}$																							
7. If computer A has $\frac{4}{5}$ of the memory of computer B, and computer A has 600 gigabytes, how many gigabytes of memory does computer B have? a. 480      b. 540      c. 660      d. 720 <b>e. 750</b>																							
8. If you triple the side length of a square, then its area grows by a factor of _____. a. 3      b. 6      c. 8 <b>d. 9</b> e. 27																							
9. I am thinking of a positive number which, when squared, gives the same result as you would get by adding 20 to it. Which of the following is true about my number? a. It is an even number.      b. It is a square number. <b>c. It is a prime number.</b> d. It is a two-digit number.      e. It is not a whole number.																							
10. Put these shapes in order from <u>smallest area</u> to <u>largest area</u> : A. a triangle with a base of 16 and a height of 10 B. a square with a side length of 9 C. a circle with a diameter of 10 a. A, B, C      b. A, C, B      c. B, A, C <b>d. C, A, B</b> e. C, B, A																							
11. If $x = a + 2$ , which of the following is equal to $10 + 2x$ ? a. $2a + 10$ b. $2a + 12$ <b>c. <math>2a + 14</math></b> d. $4a + 10$ e. $4a + 12$																							
12. Jacaranda Middle School has 400 students. 180 of them own a musical instrument. 130 of them own a telescope. If 50 of them own both a musical instrument and a telescope, how many of them own neither a musical instrument nor a telescope? a. 40      b. 60      c. 90      d. 120 <b>e. 140</b>																							
13. You multiply together all the <b>odd</b> numbers between 1 and 100. What is the last digit of the result? a. 1      b. 3 <b>c. 5</b> d. 7      e. 9																							
14. Every day I eat either cereal or eggs for breakfast; either salad or a sandwich for lunch; and either spaghetti, or enchiladas, or a cheeseburger for dinner. How many combinations of three meals in a day are possible for me? a. 7      b. 8      c. 10 <b>d. 12</b> e. 15																							
15. The numbers of goals made by Coach Vossen's soccer team are recorded here. The average of these ten games is 6. If the two outliers are removed, which of these is closest to the average? <b>a. 3.25</b> b. 4      c. 4.55      d. 5      e. 6	<table border="1"><tr><td>Game</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>Goals</td><td>2</td><td>5</td><td>19</td><td>4</td><td>3</td><td>5</td><td>15</td><td>1</td><td>4</td><td>2</td></tr></table>	Game	1	2	3	4	5	6	7	8	9	10	Goals	2	5	19	4	3	5	15	1	4	2
Game	1	2	3	4	5	6	7	8	9	10													
Goals	2	5	19	4	3	5	15	1	4	2													

16. How many different ways are there to rearrange the letters in the word MATH ? a. 16                      b. 18                      c. 20                      d. 22 <b>e. 24</b>
17. A pair of jeans originally cost \$80, but is on sale for 30% off. There is a coupon available for an additional 10% off of the sale price. How much do the jeans cost with the coupon? a. \$21.60                      b. \$32                      c. \$40                      d. \$48 <b>e. \$50.40</b>
18. Riley cleared 12 levels on his computer game in 30 minutes. If he continues at this rate, how long will it take him to clear 40 levels? a. 1 hour, 34 min                      b. 1 hour, 36 min                      c. 1 hour, 38 min <b>d. 1 hour, 40 min</b> e. 1 hour, 42 min
19. If $x$ , $y$ , and $z$ , are three <u>different</u> whole numbers each larger than 1, then suppose $M$ is the smallest possible value of $x^2 + y^3 + z^4$ . What is the sum of the digits of $M$ ? a. 13 <b>b. 14</b> c. 15                      d. 16                      e. 17
20. Evaluate $\left(\frac{1}{5} + \frac{5}{1} + \frac{5}{20} + \frac{20}{5}\right) - \left(\frac{1}{4} + \frac{4}{1} + \frac{2}{10} + \frac{10}{2}\right)$ . <b>a. 0</b> b. 1/10                      c. 1/20                      d. 3/20                      e. 1/4
21. Which of these inequalities have the same solution set? A. $4x - 18 \leq 10$ B. $4\left(\frac{9}{2} - x\right) \leq -10$ C. $9 - 2x \geq 5$ a. A and B                      b. B and C                      c. A and C d. All three solution sets are the same <b>e. All three solution sets are different</b>
22. If the pattern MATHEMATICSMATHEMATICS... is continued, what will be the 300 <sup>th</sup> letter in the pattern? a. M                      b. A <b>c. T</b> d. H                      e. S
23. Which of the following five numbers is the largest? a. $10^{50}$ <b>b. <math>20^{40}</math></b> c. $30^{30}$ d. $40^{20}$ e. $50^{10}$
24. At the county fair, George bought a hot dog and funnel cake for \$4.25. Richard bought a hot dog and a cotton candy for \$2.55. Joel bought a funnel cake and a cotton candy for \$3.20. If Daniel bought a hot dog, a funnel cake, and a cotton candy, how much did he spend? <b>a. \$5.00</b> b. \$5.25                      c. \$5.50                      d. \$5.75                      e. \$6.00
25. For a positive whole number $n$ , the expression $n!$ (pronounced "n factorial") represents the product $1 \times 2 \times 3 \times \dots \times n$ . For example, $4! = 1 \times 2 \times 3 \times 4 = 24$ . Give the last digit of the number represented by $\frac{2017!}{2015!}$ . a. 0                      b. 1 <b>c. 2</b> d. 6                      e. 7
26. I'm thinking of two positive whole numbers $A$ and $B$ whose least common multiple is 360. Which of the following is <b>NOT</b> a possible value for their greatest common divisor? a. 1                      b. 8                      c. 9                      d. 20 <b>e. 25</b>
27. If I start with \$100 in my bank account and then increase my money by 20% in the first year, again increase my money by 20% in the second year, and then lose 50% of my money in the third year, how much money do I have left? a. \$70 <b>b. \$72</b> c. \$84                      d. \$90                      e. \$100
28. My watch runs a little fast. When 60 seconds of real time pass, my watch shows instead that 61 seconds have passed. If I want the watch to show the correct time when it's precisely 3pm on Tuesday (3:00:00pm), then what time should the watch show when the true time is exactly 2:00:00pm on Tuesday? a. 1:58:59pm <b>b. 1:59:00pm</b> c. 1:59:01pm                      d. 2:00:59pm                      e. 2:01:00pm
29. A circle with radius 10 has a square drawn inside it with each corner a point on the circle. Which is closest to the area of the square? a. 100 <b>b. 200</b> c. 300                      d. 314                      e. 400

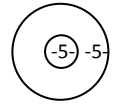


30. If  $\sqrt{20} \times \sqrt{17} = \sqrt{10} \times \sqrt{A}$ , then what is the value of  $A$ ?

- a. 19                      b. 27                      c. 31                      **d. 34**                      e. 37

31. A circular fountain with a diameter of 5 feet has a circular sidewalk surrounding it evenly at a width of 5 feet as shown. Which is closest to the area of the sidewalk, in square feet?  $A = \pi r^2$

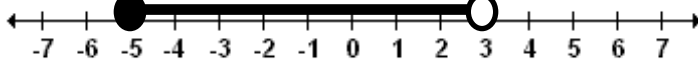
- a. 157**                      b. 177                      c. 236                      d. 295                      e. 314



32. A number is randomly chosen from integers 1 through 24. What is the probability that the number chosen will be evenly divisible by 3 or 4?

- a.  $9/24$                       b.  $5/12$                       c.  $11/24$                       **d.  $1/2$**                       e.  $7/12$

33. Which inequality has the solution set shown on the number line below?



- a.  $-3 \leq -x < 5$                       b.  $-3 < x \leq 5$                       **c.  $-3 < -x \leq 5$**                       d.  $5 \leq -x < -3$                       e.  $-5 < x \leq 3$

34. There are currently just two rabbits in Australia. Every year, the number of rabbits grows by a factor of 6. (So at the end of 1 year, there will be 12 rabbits, and so on.) At the end of  $n$  years there will be, for the first time, over **one billion** rabbits. The value of  $n$  is between...

- a. 6 and 10                      **b. 11 and 15**                      c. 16 and 20                      d. 21 and 25                      e. more than 26

35. A cow is tethered by a 100-ft. rope to the corner of a large rectangular barn which measures 50 ft. x 100 ft. The barn sits in a large field of grass. How much area of the grassy field can the cow reach for grazing?

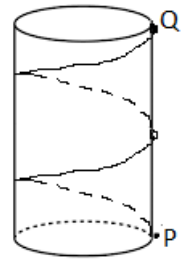
- a.  $7,500\pi$  sq. ft.                      **b.  $8,125\pi$  sq. ft.**                      c.  $8,750\pi$  sq. ft.                      d.  $9,225\pi$  sq. ft.                      e.  $10,000\pi$  sq. ft.

36. If  $x^2 = 2x + 10$ , what is the numerical value of  $x(4 - 2x)$  ?

- a. -20**                      b. -16                      c. -12                      d. -8                      e. -4

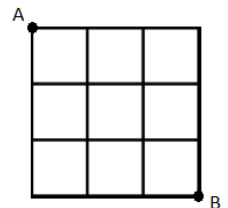
37. A cylinder is 20 cm tall with a circular base that measures 24 cm in circumference. As shown in the figure, a string is wrapped tightly around the curved vertical surface of the cylinder from a point P on the edge of the bottom base so that it goes around exactly twice before reaching the corresponding point on the top. How long is the string?

- a. 40 cm                      b. 44 cm                      c. 48 cm                      d. 50 cm                      **e. 52 cm**



38. A hungry caterpillar is crawling on the grid shown here. If she starts at the top left corner (A) and follows the grid lines, always moving either down or right, how many different paths could she take in order to reach the lower right corner of the grid (B)?

- a. 16                      b. 18                      **c. 20**                      d. 22                      e. 24



39. At OSSM a student may choose between 7 biology classes, 4 chemistry classes, and 6 physics classes. If a student must choose two science classes from different areas, in how many ways can this be done?

- a. 34                      b. 68                      **c. 94**                      d. 168                      e. 336

40. If coins came in 15, 16, 17, 18, and 19 cent denominations, what is the closest you can come to making a dollar using just these coins?

- a. you can make exactly \$1.00**                      b. within 1 cent of \$1.00                      c. within 2 cents of \$1.00  
d. within 3 cents of \$1.00                      e. within 4 cents of \$1.00

# Tie Breaker

This will only be considered in the event that there is a tie for awards.

Consider the equation  $x^2 + ay^2 = 2017$  if  $a$  is an integer between 1 and 9 (inclusive), and  $x$  and  $y$  are positive integers.

The equation has a limited number of solutions that are ordered triples  $(a, x, y)$ .

Find as many solutions as you can.