

Class Test (I) – WK3 (Winter 2019)

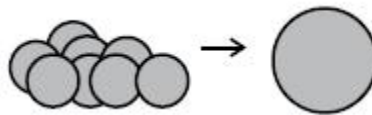
Mathcounts Practice

1. What is the value of expression $\left(2\frac{1}{2}\right)\left(4\frac{2}{3}\right) + 2\frac{1}{3} + 4\frac{2}{3} + 1$ when expressed as a mixed number?
2. A smaller rectangular box has a length and width of 10 cm each and a height of 1 cm. A larger box is twice the length, three times the width and 10 times the height of the smaller box. What is the greatest number of the smaller boxes that can fit inside one of the larger boxes?
3. The students in a class tried to guess the age of their teacher and recorded the results in the stem-and-leaf graph shown, where $3 | 8$ represents 38 years. The teacher's actual age was 35 years. What is the positive difference between the teacher's actual age and the median guess of the students in the class?

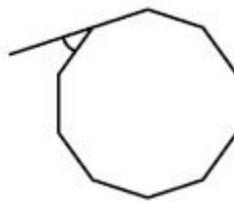
Teacher's Age

2		5	5	6	7	9	9			
3		0	1	2	2	4	5	5	5	8
4		0	1	1	2	5				

4. Erika, who is 14 years old, flips a coin whose sides are labeled 10 and 20, and then she adds the number on the top of the flipped coin to the number she rolls on a standard die. What is the probability that the sum equals her age in years? Express your answer as a common fraction.
5. A number is called perfect if the sum of all of its divisors, except itself, is equal to the original number. What is the sum of the two perfect numbers between 2 and 30?
6. The same amount of steel used to create eight solid steel balls, each with a radius of 1 inch, is used to create one larger steel ball. What is the radius of the larger ball?

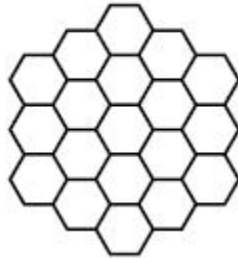


7. What is the measure of any exterior angle of a regular decagon?



8. For a positive number x , we know $(x^2)^3 = \frac{1}{64}$. What is the value of x ? Express your answer as a common fraction.

9. What is the single discount that is equivalent to the two successive discounts of 10% off followed by 20% off the discounted price?
10. What is the fewest number of colors that can be used to color the 19 hexagonal pieces so that no two of the hexagonal pieces sharing a side are the same color?



11. A light-year is 9.5×10^{12} km. A star in the Andromeda Galaxy is estimated to be 2.0×10^6 light-years away. How many kilometers away is that star? Express your answer in scientific notation.
12. One right triangle has sides of length 3 cm, 4 cm and 5 cm. Another right triangle has two sides of length 3 cm and 4 cm, but it is not congruent to the first triangle. What is the length of the third side of this triangle? Express your answer in simplest radical form.
13. A carpenter draws a $1/10$ -size scale drawing of the top view of a coffee table's rectangular top. The scale drawing of the table's top has an area of 3 square inches. What is the actual area of the table's top going to be?
14. In an algebra class, half of the students are boys. One-third of the students are wearing glasses. Half the boys are wearing glasses. What fraction of the girls is wearing glasses? Express your answer as a common fraction.
15. At a new job, Bob's starting monthly salary is \$1000, and he gets a \$20 raise each succeeding month. In total, how much does Bob earn in his first year at this job?
16. Xinran walks 3 miles per hour (mph) uphill, 4 mph on a flat surface and 5 mph downhill. If he hikes one mile uphill, then one mile on the level and then returns by the same route to his starting point, how many minutes does he walk?
17. During a party, a total of 78 handshakes occurred. If each person shook hands once with each of the other people, how many people were at the party?

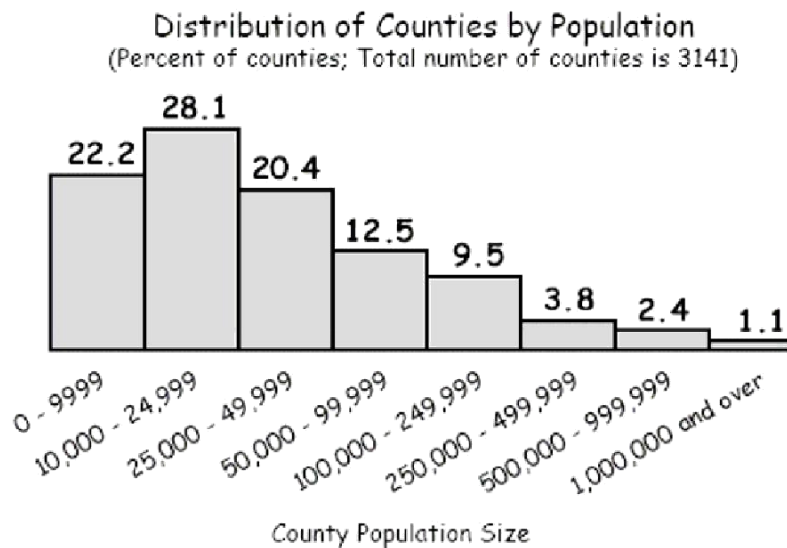
18. A wooden cube measures 3 feet long on each edge. The cube is painted orange on all exterior faces. The cube is then cut horizontally and vertically (parallel to the faces) into 27 congruent one-foot cubes. How many of these one-foot cubes are painted orange on exactly two faces?

19. Given the following two equations, what is the value of three pentagons?

$$\begin{array}{c} \text{pentagon} \\ \text{pentagon} \end{array} + \begin{array}{c} \text{circle} \\ \text{circle} \\ \text{circle} \end{array} = 45 \qquad \begin{array}{c} \text{pentagon} \\ \text{pentagon} \\ \text{pentagon} \\ \text{pentagon} \\ \text{pentagon} \end{array} + \begin{array}{c} \text{circle} \\ \text{circle} \\ \text{circle} \\ \text{circle} \\ \text{circle} \end{array} = 97$$

20. Two cars head toward each other from opposite ends of a highway 444 km long. The speed of the first car is 85 km/hr. The speed of the second car is 100 km/hr. In how many minutes will they meet?
21. What is the distance between (3, 4) and (3.8, 5.5) in the Cartesian plane? Express your answer as a decimal to the nearest tenth.
22. A used bookstore paid \$10 for an old book. The store added $x\%$ to the price, resulting in a new price of \$12.50. When the store could not sell the book, the store applied a discount of $y\%$, resulting in a price of \$10 again. What is the value of $x - y$?
23. What are the last two digits in the sum of the factorials of the first 100 positive integers?
24. A picture measures 6 inches by 8 inches. If a copy machine increases each of the two dimensions by 30%, by what percent is the area of the original picture increased?
25. This coffee tin is a right circular cylinder with a radius of three inches, and it can hold exactly three pounds of coffee when it is full. Thirteen ounces of coffee fill a space of 60 cubic inches, and there are 16 ounces in one pound. How tall is the coffee tin? Express your answer as a decimal to the nearest tenth.
26. How many factors of 8000 are perfect squares?
27. A circle of radius one meter circumscribes a regular hexagon, as shown. What is the area of the total shaded region? Express your answer as a decimal to the nearest tenth.

28. According to the graph, 22.2% of the counties have a population of 0-9999 people. How many counties have a population of one-quarter million or more? Express your answer to the nearest whole number.



29. The electric company charges Elka 11 cents per kwh for the first 320 kwh, 13 cents per kwh for the next 100 kwh and 17 cents per kwh for anything over that. By how much does Elka's electric bill go up if her usage increases from 350 kwh to 450 kwh?
30. The product of two positive integers x and y is equal to $3x + 4y$. What is the largest possible value of x ?