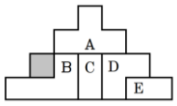
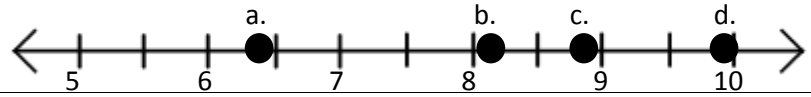
Oklahoma School of Science and Mathematics

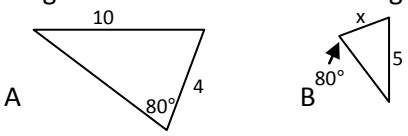
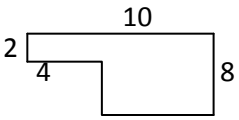
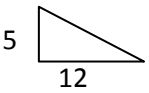
Fifteenth Annual Middle School Mathematics Contest

Round One, Spring 2017

Directions: Write the answer to each question in the box to the right of the question. Units are given in plural form even if the singular form is correct. Use scratch paper to do your work. Calculators are allowed, but not necessary.

Common fractions should be in simplest form ($\frac{a}{b}$, not mixed numbers). Figures are not drawn to scale.

1. In the figure shown (built with 16 congruent squares), one square is already shaded. Which additional region or regions should be shaded if 25% of the figure shown is to be shaded?  a. A b. B c. C d. D e. E	1. a. b. c. (d) e.
2. For the given data set, which is largest? Mean, median, or mode? 5,2,2,3,1,6,3,2,5,2 a. mean b. mode c. median	2. (a) b. c.
3. Which point is closest to the value of $2\sqrt{20}$? 	3. a. b. (c) d.
4. A right circular cone has a radius at the top of 4 cm, and a height of 20 cm. Which proportion can be used to find the radius of a similar cone that is 5 cm shorter? a. $\frac{4}{20}=\frac{x}{15}$ b. $\frac{4}{20}=\frac{x}{5}$ c. $\frac{5}{20}=\frac{4}{x}$ d. $\frac{15}{20}=\frac{4}{x}$	4. (a) b. c. d.
5. What day would yesterday be if Wednesday was three days before tomorrow? Tuesday b. Wednesday c. Thursday d. Friday	5. a. b. (c) d.
6. What is the relationship of the two expressions? $(6-4)\times 2+1$? $6-4\times(2+1)$ a. < b. > c. =	6. a. (b) c.
7. If $x=3$, what is the value of $2-x(3+2x)$?	7. -25
8. If $x>0$, and $2(x^2-9)=14$, what is value of x?	8. 4
9. If $\tau=360$, what is the value of $\frac{5}{3}\tau$?	9. 600
10. If $x=-4$ and $y=-3$, what is the value of x^2-3y	10. 25
11. The first number in a number pattern is 16. To find any other term, divide the previous term in half and add two. What is the fifth number in the pattern?	11. 4.75 or 19/4
12. Each day Kirtana adds 0.4 miles to her run. If she ran 3 miles on the first day, on which day did she run the length of a marathon (26.2 miles)?	12. 59
13. A giant pizza is cut into eight equal slices, and then each of those slices is cut into three equal parts. If you eat ten of those small parts, what fraction of the entire pizza did you eat? (Give answer as a fraction in lowest terms.)	13. $\frac{5}{12}$
14. How many square numbers are there between 101 and 399?	14. 9
15. What is the least common multiple of the first five odd numbers?	15. 315
16. Something went wrong on the student council checkbook. They know a starting balance for January 1 and an ending balance for March 30. They have all the entries but one. What type of entry (deposit or withdrawal) for what amount is missing? 1/1 Balance $212 2/12 Deposit $80 2/23 Withdrawal $109 3/1 Deposit $28 3/30 Balance $250	16. Deposit $39

17. If figure A and B are similar triangles, what is the length of x? 	17. 2
18. If Jenna travels straight south from latitude $35°33'0"$ to $35°31'50"$, then how much did her position change in minutes and seconds? $1° = 60'$ (one degree = 60 minutes), and $1' = 60"$ (one minute =60 seconds)	18. 1'10"
19. Zagblorxians have three different coins—the jenny is worth 3 cents, the rickle is worth 5 cents, and the grime is worth 7 cents. What are all possible prices (in positive whole number of cents), which you CANNOT pay using some combination of jennies, rickles, and grimes?	19. 1,2,4 cents
20. A totally sweet math poster costs \$14.55 and you pay with a \$20 bill. Unfortunately, the cashier only has nickels to give you change. How many nickels does she give you?	20. 109
21. Yellow flowers cost \$8 and pink flowers cost \$10. If you buy a bouquet of flowers that costs \$60, and it contains both yellow and pink flowers, how many yellow flowers did you buy?	21. 5
22. What is the area of the given figure (with the lengths of four of the six sides labeled in meters) in square meters (m^2)? 	22. 56 m^2
23. What is the perimeter of the right triangle shown? 	23. 30
24. What equation of a line ($y = mx + b$) could represent the data in the table. x: -4, 0, 2, 6 y: -4, -2, -1, 1	24. $y = \frac{1}{2}x - 2$
25. If $E = mc^2$, $E = 2.7 \times 10^{17}$, and $c = 3.0 \times 10^8$, then what is m?	25. 3.0
26. If $\frac{n^{10}}{n^7} = 27$, then what is the value of $\frac{n^6}{n^4}$?	26. 9
27. If $10 + 20 + 30 + 40 + 50 + 60 + 70 + 80 + 90 = N \times (9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1)$, then $N = ?$	27. 10
28. What is the smallest prime number that contains the digit 8?	28. 83
29. A certain triangle has angles which measure $x°$, $2x°$, and $3x°$, for some number x. What is x?	29. 30 °
30. If $\sqrt{x} + \sqrt{4x} = a\sqrt{x}$, then what is the numerical value of a?	30. 3