Kansas City Area Teachers of Mathematics
2018 KCATM Math Competition

NUMBER SENSE
GRADE 8

NO CALCULATOR

INSTRUCTIONS

- **Do not open this booklet** until instructed to do so.
- Time limit: **20 minutes**
- You **may NOT use calculators**.
- Mark your answer on the Scantron sheet by **FILLING in the oval**.
- You **may not use rulers, protractors, or other measurement devices** on this test.
- With circles, **exact answers** will be given in terms of π.

Student Name _____ Student Number _____

School _____

1. You have 6.75 lbs of flour. If a recipe that makes 21 cookies calls for $\frac{3}{4}$ lbs of flour, how many dozens of cookies can you make?

   A. 8.75 B. 13.5 C. 15.75 D. 189 E. None of the above

2. What is the sum of the natural numbers from 33 to 103 (33 + 34 + 35 + … + 102 + 103)?

   A. 307 B. 4,795 C. 5,356 D. 10,712 E. None of the above

3. What is the greatest common factor of 36, 90, and 117?

   A. 1 B. 3 C. 6 D. 18 E. None of the above

4. At 11 years old, Samantha's height in inches is 14 less than 3 times as tall as she was at 2 years old. Which equation represents this? (*s* = current height, *h* = height at age 2)

   A. $s = 14 - 3h$ B. $11s = 2h$ C. $h = 14 - 3s$ D. $s = 3h - 14$ E. None of the above

5. Twenty-two percent of kids at a particular school are involved in track. If there are 750 students at the school, how many do not participate in track?

   A. 165 B. 585 C. 615 D. 728 E. None of the above

6. What is $\sqrt{182}$ in simplest radical form?

   A. $\sqrt{182}$ B. $9\sqrt{2}$ C. $2\sqrt{91}$ D. 16 E. None of the above

7. What is the solution to the following? $\frac{3}{4} + 2\frac{1}{6}\left(3 - \frac{9}{4}\right) - 2\frac{1}{3}$

   A. $\frac{1}{24}$ B. $-\frac{7}{48}$ C. $-\frac{1}{24}$ D. $\frac{7}{48}$ E. None of the above

8. What is the greatest common factor of 9! and 6^3?

   A. 1 B 3 C. 36 D. 216 E. None of the above

9. A taxi charges \$3.45 per segment + \$.25 per $\frac{1}{8}$ mile of the trip. If you need to get a ride to and from school which is 3.25 miles away, how much does the trip cost?

   A. \$3.70 B. \$7.40 C. \$9.95 D. \$19.90 E. None of the above

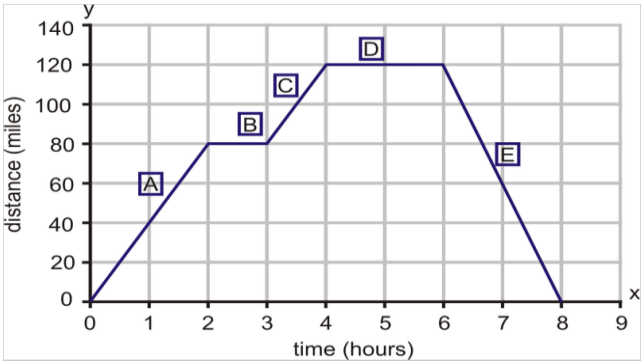
10. Rick has half as many roses and Mary. Mary has two fewer than three times as many as John. If Rick has eleven roses, how many roses do they have in total?

A. 22 B. 33 C. 41 D. 43 E. None of the above

11. The perfect pizza has seven pepperonis for every two slices of mushrooms on the pizza. Which of the following equations represents the relationship between mushrooms (m) and pepperonis (p)?

A. $p + 7 = m + 2$ B. $\frac{p}{m} = \frac{7}{2}$ C. $7p - 2m = 0$ D. $p + m = 9$
E. None of the above

12. The following graph shows the distance from your house during a family road trip. Which segment represents the greatest rate of speed and what rate is it?



A. Segment A, 80 mph
B. Segment A, 40 mph
C. Segment C, 120 mph
D. Segment E, 120 mph
E. None of the above

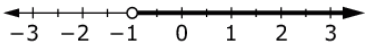
13. What is the value of: $\left[-\frac{26}{6} + \left(3\frac{1}{3}\right)\right](-6)$

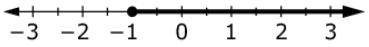
A. -32 B. -6 C. 0 D. 6 E. None of the above

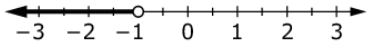
14. Riding on your bike, you are able to travel 8.4 km in 25 minutes. What is your speed in km per hour rounded to the nearest tenth?

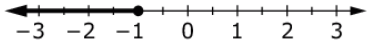
A. .3 km/h B. 33.6 km/h C. 20.2 km/h D. 19.7 km/h
E. None of the above

15. What is the solution to the inequality: $-12x - 8 \geq -3x + 1$

A. 

B. 

B. 

D. 

E. None of the above

16. What is the multiplicative inverse of a number *n*?

A. $-n$ B. 0 C. $\frac{1}{n}$ D. $-\frac{1}{n}$ E. None of the above

17. Which of the following numbers is not a rational number?

A. 89.9871233 B. $\sqrt{\frac{1}{4}}$ C. $\frac{37}{119}$ D. $\sqrt{32}$ E. None of the above

18. A country has a population of 100,000. The next year the population decreases by 20%. What percent increase is necessary to return to the original population (rounded to the nearest tenth)?

A. 16.7% B. 20.0% C. 25.0% D. 200.0% E. None of the above

19. When painting a previously unpainted wall, you can paint 250 sq. ft per gallon. If you are repainting a wall, you can paint 400 sq. ft per gallon. Which of the following are you able to paint?

A. An unpainted wall that is 30’ long by 9’ tall
B. A painted wall that is 25’ long by 18’ tall
C. A first and second coat on a wall that is 20’ long by 10’ tall
D. Two coats on a painted wall that is 21’ long by 10’ tall
E. None of the above

20. Simplify $(8.472 \times 10^{8})(7.43 \times 10^{-11})$ and write in standard notation.

A. 629.4696 B. .06294696 C. .006294696 D. 6.294696
E. None of the above

21. The eighth grade class of a certain school has 400 students. When doing a fundraiser for the school, 350 of the students each donated $1. How much would each of the remaining students have to donate so the donations averaged $3?

A. $3.00 B. $5.00 C. $17.00 D. $24.00 E. None of the above

22. The Richter scale is a base 10 logarithmic scale. If Wichita has a 3.0 earthquake and Oakland has a 6.0 earthquake, which of the following is true?

A. The Oakland earthquake was 1000 times as strong
B. The Kansas earthquake was one eighth as strong
C. The Oakland earthquake was twice as strong
D. The Oakland earthquake was 30 times as strong
E. None of the above

23. Proper factors are all the factors of a number except for the number itself. What is the sum all proper factors of 81?

A. 10 B. 40 C. 49 D. 81 E. None of the above

24. What is the next number in the sequence if the pattern continues? 2, 10, 30, 68, ___

A. 130 B. 168 C. 210 D. 1,426 E. None of the above

Use the table to of values for problems #25 through 27.

Student	Exam Pts	Homework Pts	Project Pts
A	150	15	60
B	190	30	50
C	160	20	60
D	90	40	70
E	170	40	40
Total			

25. Assuming that at least one person got the maximum number of points possible in each category, how many points were possible in this class?

A. 260 B. 270 C. 300 D. 310 E. None of the above

26. Which student got exactly 75% of the possible points?

A. Student **A** B. Student **B** C. Student **C** D. Student **D** E. Student **E**

27. Which statement is **NOT** true based on the data?

A. Fewer than two-thirds of the points earned by the students were on exams.
B. Student C had eight-ninths the number of points as Student B.
C. Student D has half as many points as Student C.
D. Students D has four-fifths as many points as Student E.
E. All of the statements are correct.

28. Starting with the third term, each term of a sequence is the sum of the previous two terms. What is the sum of the fifth and seventh terms if the first two terms are -12 and 7

A. -7 B. -4 C. -3 D. 1 E. None of the above

Use the graph for problems #29-31. To the right is a graph relating the length of a baby to its age in weeks.

29. Which of the following is true about the graph?
   A. The relationship is neither linear nor proportional.
   B. The relationship is linear but not proportional.
   C. The relationship is proportional but not linear.
   D. The relationship is both proportional and linear.
   E. It is linear but we cannot tell whether it is proportional.

30. What does the point (8,22) mean?
   A. The baby grows 22 inches in eight weeks.
   B. After eight weeks, the baby is 22 inches long.
   C. Every eight weeks, the baby will add 22 inches in length.
   D. In twenty-two weeks, the baby has added 8 inches in length.
   E. None of the above

31. What is the constant of proportionality?
   A. $\frac{1}{4}$ B. 1 C. 4 D. Does not exist E. None of the above

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32. A series of consecutive odd numbers starts with the number *n*. What is the sum of the first five terms?

A. $n + 8$ B. $n + 10$ C. $5n + 5$ D. $5n + 20$ E. None of the above

33. When you take the square root of a positive real number, it is …

A. Always greater B. Always lesser C. Never greater D. Never lesser
E. None of the above

34. What is .068 when written as a fraction in simplest form?

A. $\frac{1}{68}$ B. $\frac{34}{500}$ C. $\frac{17}{25}$ D. $\frac{6}{8}$ E. None of the above

35. Which of the following is the greatest?

A. $8.\overline{9}$ B. 3^2 C. $\sqrt{82}$ D. $\frac{999}{112}$ E. 2.9 • 3.1

36. For how many integers *n* is $-1000 \leq n^3 \leq 1000$ true?

A. 18 B. 19 C. 20 D. 21 E. None of the above

37. Where *a* and *b* are both negative integers, a^b is always…

A. Negative B. A fraction C. Rational D. All of the above E. None of the above

38. Simplify : $(((((10^5)^4)^3)^2)^1)^0$

A. 10^{15} B. 10^{120} C. 1 D. 0 E. None of the above

39. Simplify: $\frac{4}{5} \div \frac{6}{7} - \frac{1}{12} \bullet \frac{3}{2}$

A. $\frac{21}{11}$ B. $4\frac{1}{6}$ C. $\frac{97}{120}$ D. $1\frac{11}{40}$ E. None of the above

40. What is one-fifth of one-fourth of one-third of one-half of 720?

A. 6 B. 120 C. 12 D. 30 E. None of the above