Kansas City Area Teachers of Mathematics
2012 KCATM Math Competition

NUMBER SENSE
# GRADES 7-8

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.

- Letter **"E" is "None of the above"** , which is a correct answer for some of the problems.

- With circles, **exact answers** will be given in terms of π .

Student Name _____ Student Number _____

School _____

1. What is the **sum** of: 1/8 + 1/2 + 3/4?
    A.   1 1/8   B. 5/14   C. 1 3/8   D. 1 1/4   E. None of the above

2. If you walked 9/10 of a mile on Monday, and a half a mile on Tuesday, **how much more** did you walk on Monday than you walked on Tuesday?
    A. 1 2/5 mi.   B. 2/5 mi.   C. 2/3 mi.   D. 1 1/8 mi.   E. None of the above

3.   You purchased 13 feet of ribbon that you want to cut into ¼ ft. pieces. **How many pieces** would you get out of 13 ft. of ribbon?
    A.   3 ¼   B. 9   C. 26   D. 42   E. None of the above

4.   Two-thirds of ¼ of 300 is equivalent to:
    A.   20   B. 30   C. 100   D. 25   E. None of the above

5.   The fraction 5/8 is equivalent to which decimal value?
    A. 0.625   B. 0.785   C. 0.875   D. 0.580   E. None of the above

6. Find 10% of $91.50.
    A. $81.50   B. $0.92   C. $9.15   D. $91.50   E. None of the above

7. Which **fraction** represents the decimal: 4.025 ?
    A. $4\dfrac{1}{4}$ B. $4\dfrac{1}{40}$ C. $4\dfrac{1}{400}$ D. $4\dfrac{1}{15}$ E. None of the above

8.   Solve for x: $\dfrac{x}{5} = \dfrac{x+2}{10}$
    A.   1   B. 2   C. 3   D. 4   E. None of the above

9.   The ratio of three smaller lengths cut from a board is 2:3:5. If the original board was 20 ft., what is the length of the **longest piece**?
    A.   12 ft.   B. 4 ft.   C. 6 ft.   D. 10 ft.   E. None of the above

10.   Which statement is **NOT** always true about Real numbers?
    A. The absolute value of a number is always a positive number.
    B. The product of two negative numbers is always a positive number.
    C. Doubling a number is always a positive number.
    D. Squaring a number is always a positive number.
    E. None of the above

11. Write expressions for **three consecutive odd numbers**, if the first odd number is "n".
    A. n, n + 1, n + 2   B. n, n − 1, n − 3   C. n, n − 3, n − 5   D. n, n + 2, n + 4
    E. None of the above

12. What is the **next number** in the sequence: 1, 4, 9, 16, 25, ___ ?
    A.   40   B. 36   C. 44   D. 49   E. None of the above

Use the graph below for problems #13 and #14.
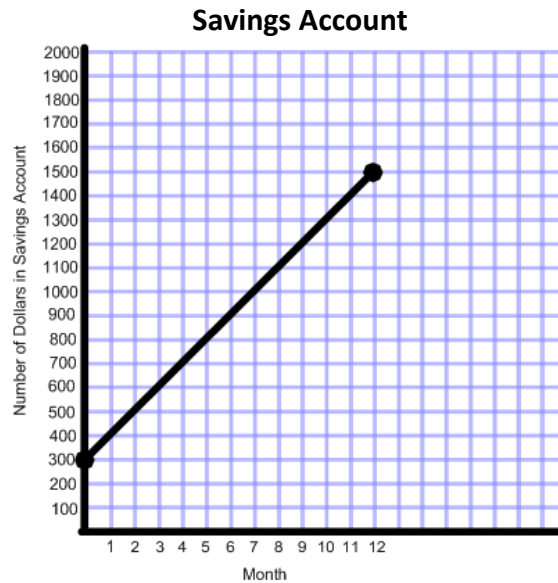
Savings Account

13. How much is the savings account going up each month *(rate of change)?*
   A. $300   B. $200   C. $150   D. $100   E. None of the above

14. Predict how much would be in the savings account in **2 years?**
   A. $3000   B. $1800   C. $2700   D. $2800   E. None of the above

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Use the Venn diagram for problems #15 and #16.
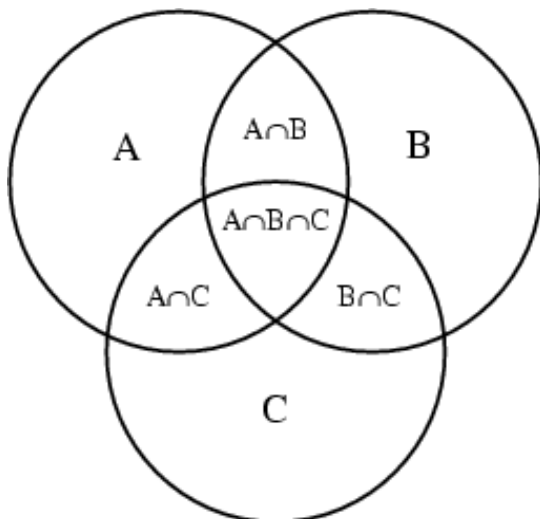
15. **What does** $A \cap B \cap C$ **mean?**
   A.   The values that belong to both A and B.
   B. The values that belong to both B and C.
   C. The values that belong to both A and C.
   D. The values that belong to all three A, B, and C.

16.   A veterinarian surveys 26 of his patrons. The veterinarian discovers that 14 have dogs, 10 have cats, and 5 have fish. Four have dogs and cats. Three have dogs and fish, and one has a cat and a fish. If no one has all three kinds of pets, **how many patrons have <u>none</u> of these pets?**
   A.   4 patrons   B. 5 patrons   C. 6 patrons   D. 3 patrons   E. None of the above

17. Analyze the graph to determine how long Ocker **stopped** and visited mates. Round your answer to the nearest ½ hour.

A.   8 hours

B.   6 ½ hours

C.   3 ½ hours
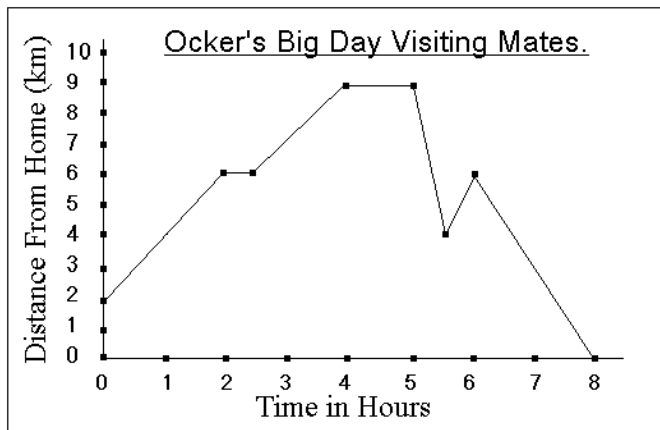
D.   1 ½ hours

E.   None of the above

Use the hierarchy of the Real Number System to help you with problems #18-20 using:
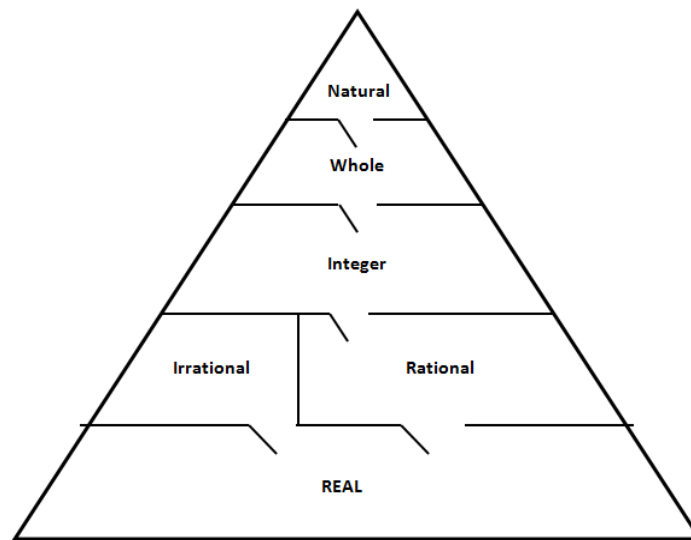
N = {Natural #}; W = {Whole #}; I = {Integers}; Irr. = {Irrational}; Rat.={Rational}; Real = {Real #}

18. The number: π is a member of which set(s)?
    A.   N   B. N,W   C. Irr., Real   D. Rat., Real   E. None of the above

19. The number: 0 is a member of which sets?
    A.   N, W   B. N,W, I, Irr., Real   C. N,W,I,Rat.,Real
    D.   W,I, Rat., Real   E. None of the above

20. The number: 7/2 is a member of which set(s)?
    A.   I, Rat.,Real   B. Rat., Real   C. Irr., Real   D. N,W   E. None of the above

21. Jaime's mother is one less than twice Jaime's age. The sum of their ages is 89. **How old is Jaime's mother?**

  A. 58   B. 59   C. 60   D. 61   E. None of the above

22. Which of the following is **NOT** equivalent to 15%?

  A. 0.15   B. 3/20   C. 15/100   D. 0.015   E. None of the above

23. Which number property is used in −(2x − 5) to simplify the expression to −2x + 5 ?

  A. Commutative Property of Addition   B. Commutative Property of Multiplication
  C. Associative Property of Multiplication   D. Distributive Property
  E. None of the above

24. In solving the multi-step problem below, **which property listed is NOT used** as a reason for a step in the process of solving the equation?

  2x + (3x + 4) = 16   *Given*
  (2x + 3x) + 4 = 16   _____
         5x + 4 = 16   _____
            5x = 14   _____
            x = 2.8   _____

  A. Associative Property of Addition   B. Identity Property of Addition
  C. Division Property of Equality   D. Subtraction Property of Equality

25. Which is the **prime factorization** of 120?

  A. 2 x 6 x 10   B. 2^4 x 3 x 5   C. 2^3 x 3 x 5   D. 2 x 3 x 5^2
  E. None of the above

26. Use "upside down" division to help you find the **LCM** *(least common multiple)* of 18 and 30.

   2 | 18   30
   3 | 9   15
         3   5

  A. 6   B. 30   C. 45   D. 90   E. None of the above

27. What is the value of **5!**

  A. 5   B. undefined   C. 10   D. 120   E. None of the above

28. Convert   1,200 g in _____ kg

  A. 1.2 kg   B. 0.12 kg   C. 0.012 kg   D. 0.0012 kg   E. None of the above

29. Convert 1 mile = 5,280 ft. is _____ yards

  A. 1670 yds.   B. 1760 yds.   C. 1,870 yds.   D. 15840 yds.   E. None of the above

30. Which number is **NOT** a prime number?

  A.   1   B. 2   C. 61   D. 117   E. None of the above

31. What is the value of $|-27|$?
   A. 9   B. 5   C. -27   D. 27   E. None of the above

32. Add: $2\sqrt{18} + \sqrt{8}$
   A. $2\sqrt{26}$ B. $8\sqrt{2}$ C. $5\sqrt{3}$ D. $4\sqrt{13}$ E. None of the above

33. Simplify the expression: $\sqrt{16} - 5 \times 2 - 7$
   A. -8   B. -13   C. 1   D. 4   E. None of the above

34. Simplify: $\dfrac{16 - (4^2 - 2 \times 3)^2}{2 - 3}$

   A. -36   B. 1   C. -6   D. 84   E. None of the above

35. Three stores have the same merchandise but advertised at different prices. Which store offers the best deal when you buy one?

Store A	3 for $3.99
Store B	2 for $2.85
Store C	5 for $6.60

   A. Store A   B. Store B   C. Store C   D. A and C   E. None of the above

36. To the nearest half dollar, tabulate a 15% tip on a family meal costing $56.
   A. $10.00   B. $$8.00   C. $9.00   D. $8.50   E. None of the above

37. Evaluate the expression when n = -2 : $5n^2 - 3n + n^0$
   A. 26   B. -17   C. -18   D. -28   E. None of the above

38. Evaluate: 5^{-3}
   A. -15   B. 1/15   C. 1/125   D. 125   E. None of the above

39. What is the value of $[(16)^{1/2}]^{1/2}$?
   A. -2   B. 2   C. 1/2   D. 4   E. None of the above

40. You have a coupon that offers an additional 20% discount after the sale price of 40% off. What is your cost of an item that originally sells for $125?
   A. $60   B. $50   C. $62.50   D. $75   E. None of the above

Shade the correct answer!   Name_____

Example: A   ●   C   D   E

School _____

1.	A	B	C	D	E	21.	A	B	C	D	E
2.	A	B	C	D	E	22.	A	B	C	D	E
3.	A	B	C	D	E	23.	A	B	C	D	E
4.	A	B	C	D	E	24.	A	B	C	D	E
5.	A	B	C	D	E	25.	A	B	C	D	E
6.	A	B	C	D	E	26.	A	B	C	D	E
7.	A	B	C	D	E	27.	A	B	C	D	E
8.	A	B	C	D	E	28.	A	B	C	D	E
9.	A	B	C	D	E	29.	A	B	C	D	E
10.	A	B	C	D	E	30.	A	B	C	D	E
11.	A	B	C	D	E	31.	A	B	C	D	E
12.	A	B	C	D	E	32.	A	B	C	D	E
13.	A	B	C	D	E	33.	A	B	C	D	E
14.	A	B	C	D	E	34.	A	B	C	D	E
15.	A	B	C	D	E	35.	A	B	C	D	E
16.	A	B	C	D	E	36.	A	B	C	D	E
17.	A	B	C	D	E	37.	A	B	C	D	E
18.	A	B	C	D	E	38.	A	B	C	D	E
19.	A	B	C	D	E	39.	A	B	C	D	E
20.	A	B	C	D	E	40.	A	B	C	D	E

Shade the correct answer!   Name_____

Example: A   ●   C   D   E

School _____

1. A B ● D E	21. A ● C D E
2. A ● C D E	22. A B C ● E
3. A B C ● E	23. A B C ● E
4. A B C D ●	24. A ● C D E
5. ● B C D E	25. A B ● D E
6. A B ● D E	26. A B C ● E
7. A B ● D E	27. A B C ● E
8. A ● C D E	28. ● B C D E
9. A B C ● E	29. A ● C D E
10. A B ● D E	30. ● B C D E
11. A B C ● E	31. A B C ● E
12. A ● C D E	32. A ● C D E
13. A B C ● E	33. A ● C D E
14. A B ● D E	34. A B C ● E
15. A B C ● E	35. A B ● D E
16. A ● C D E	36. ● B C D E
17. A B C ● E	37. ● B C D E
18. A B ● D E	38. A B ● D E
19. A B C ● E	39. A ● C D E
20. A ● C D E	40. ● B C D E

14

Dogs

14-4-0-3=
7 dogs
only

4
cat
and dog

0
all 3

3
dog
and fish

10

Cats

10-4-0-1=
5 cats only

1
cat
and fish

5-3-0-1=
1 fish only

Fish

5

26 total
patrons

X

$$7 + 4 + 0 + 3 + 1 + 5 + 1 + x = 26$$

$$21 + x = 26$$
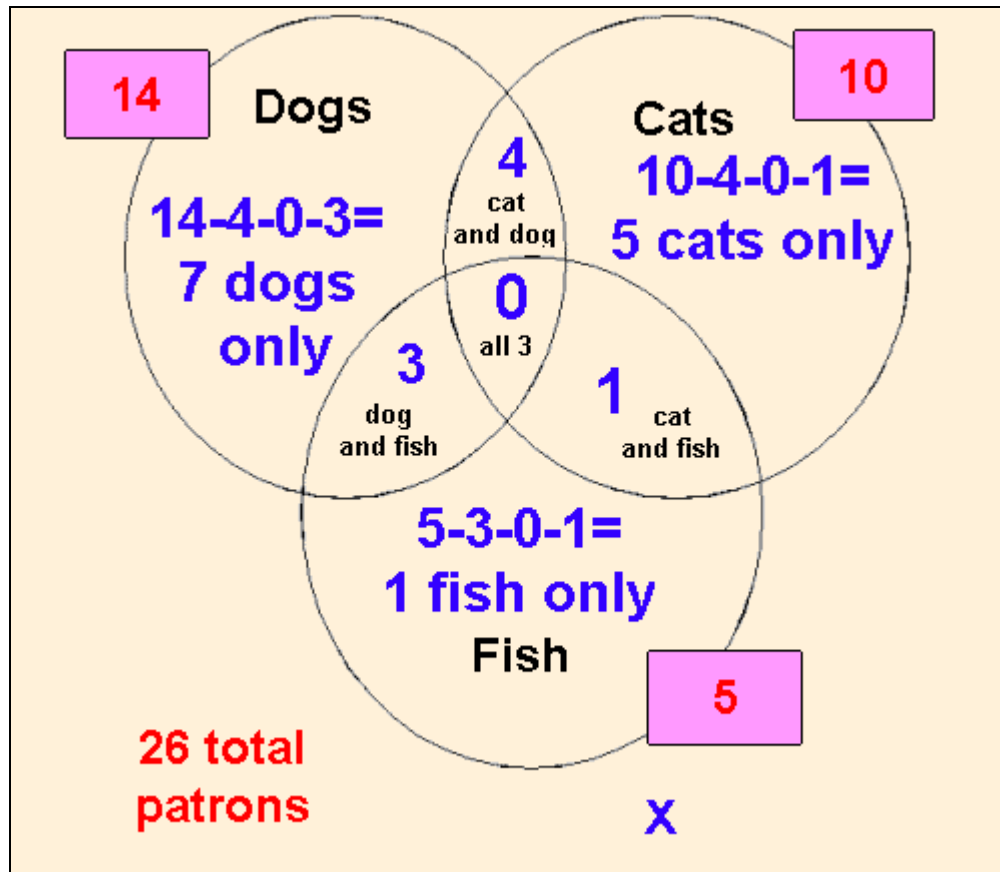
$x = 5$ **patrons have none of these animals**