

Kansas City Area Teachers of Mathematics
2014 KCATM Math Competition

**NUMBER SENSE
GRADE 8**

NO CALCULATOR

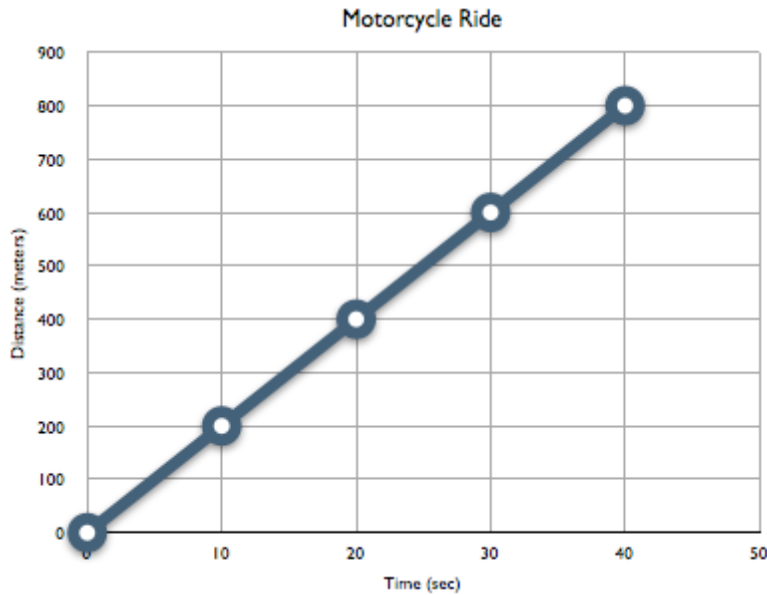
INSTRUCTIONS

- **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.
- Letter **“E” is “None of the above” or “None of these”**, which is a correct answer for some of the problems.
- With circles, **exact answers** will be given in terms of π .
- Select the most simplified form of a number, unless directed otherwise.

Student Name _____ Student Number _____

School _____

Use the graph below for problems #1 and #2.



- How much distance is travelled each second (*rate of change*)?
 - A. 200 m/s B. 100 m/s C. 10 m/s D. 20 m/s E. None of these
- What will the distance travelled be after 50 seconds?
 - A. 200 m B. 900 m C. 10 m D. 1000 m E. None of these

- Which number property is used in $5z^2 - 15z$ to simplify the expression to: $5z(z - 3)$?
 - A. Commutative Property of Addition B. Commutative Property of Multiplication
 - C. Associative Property of Multiplication D. Distributive Property
 - E. None of these

- 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?

$$(5d - 8) - 2d = d - 28 \quad \textit{Given}$$

$$(5d - 2d) - 8 = d - 28$$

$$3d - 8 = d - 28$$

$$3d = d - 20$$

$$2d = -20$$

$$d = -10$$

- A. Associative Property of Addition B. Subtraction Property of Equality
 - C. Division Property of Equality D. Addition Property of Equality
 - E. All these properties were used.
- Which is the **prime factorization** of 196?
 - A. $2^2 \times 7^2$ B. 4×49 C. $2^3 \times 7^2$ D. $2 \times 2 \times 2 \times 7 \times 7$ E. None of these

6. What is the **sum** of: $\frac{1}{4} + \frac{1}{2} + \frac{5}{6}$?
- A. $1\frac{1}{2}$ B. $\frac{7}{12}$ C. $1\frac{7}{12}$ D. $\frac{7}{6}$ E. None of these
7. You weigh 46,200 g, how many kilograms do you weigh?
- A. 4,62 kg B. 462 kg C. 4,620 kg D. 46.2 kg E. None of these
8. **Convert:** 5 km = _____ mm
- A. 5,000,000 mm B. 500,000 mm C. 50,000 mm D. 5,000 mm E. None of these
9. If you walked 1.7 km each day M-F, and 3.6 km on both Saturday and Sunday, **how many km** did you walk that week?
- A. 15.7 km B. 12.1 km C. 9 mi. D. 9.9 mi. E. None of these
-

Use the notation below for problems 10-12.

N = {Natural #}; W = {Whole #}; I = {Integers}; Irr. = {Irrational}; Rat.={Rational}; Real = {Real #}

10. The number: $\frac{22}{7}$ is a member of which set(s)?
- A. I, Rat., Real B. N,W C. Irr., Real D. Rat., Real E. None of these
11. The number: 0 is a member of which sets?
- A. W,I, Rat., Real B. N,W, I, Irr., Real C. N,W,I,Rat.,Real
D. N, W E. None of the above
12. The number: 11.111111... is a member of which set(s)?
- A. N B. N,W C. Rat., Real D. Irr., Real E. None of these
-
13. Shelves were made to replace a shelf in an old cabinet. The shelves were 3' 4" long. How many can be cut from a 15 foot board and how many cuts will be needed.
- A. 5, 5 B. 5, 4 C. 4, 5 D. 4, 4 E. None of these
14. Three-fourths of $\frac{2}{3}$ of 96 is equivalent to:
- A. 108 B. 36 C. 48 D. 60 E. None of these
15. The fraction $\frac{11}{9}$ is equivalent to which decimal value?
- A. 1.222 B. 1.2 C. 1.223 D. 1 r 2 E. None of these

16. Find 15% of \$37.40.

- A. \$43.01 B. \$ 3.70 C. \$ 5.60 D. \$ 5.61 E. None of these

17. Which **fraction** represents the decimal: 18.025 ?

- A. $18\frac{1}{4}$ B. $18\frac{1}{40}$ C. $18\frac{1}{400}$ D. $18\frac{1}{4000}$ E. None of these

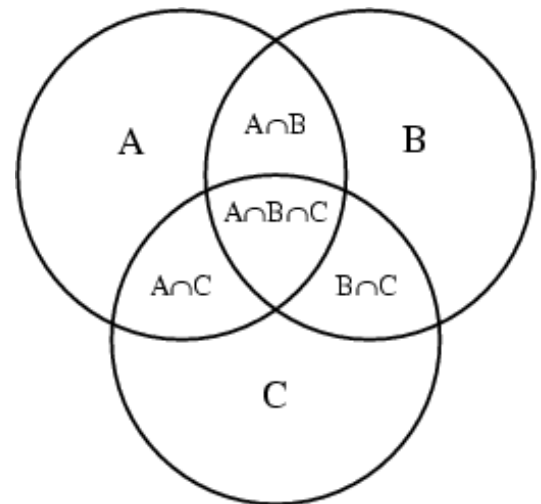
18. What is the **next number** in the sequence: 4, 11, 25, 53, ___ ?

- A. 106 B. 104 C. 108 D. 107 E. None of these

Use the Venn diagram for problems #19 and #20.

All the members of a group of 30 teenagers belong to at least one club.
There are 3 clubs, chess (A), drama (B), and art (C).

- 6 of the teenagers belong to only the art club.
- 5 of the teenagers belong to all 3 clubs.
- 2 of the teenagers belong to the chess and art clubs but not to the drama club.
- 15 of the teenagers belong to the art club.
- 2 of the teenagers belong only to the chess club.
- 3 of the teenagers belong only to the drama club.



19. How many of the group do chess and drama but not art?

- A. 10students B. 9 students C. 8 students
D. 7 students E. None of the above

20. What does $A \cap B \cap C$ **mean specific to this question?**

- A. The students who belong to chess and drama.
B. The students who belong to drama and art.
C. The students who belong to art and chess.
D. The students who belong to chess, drama, and art.
E. None of the above

21. Solve for k: $\frac{k}{6} = \frac{k-5}{9}$

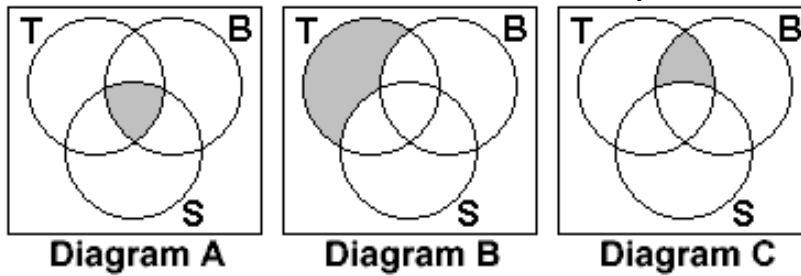
- A. 7.5 B. -7.5 C. 10 D. -10 E. None of these

22. The ratio of three measures is 2 : 5 : 9 . If the measures have a sum of 48 m., what is the length of the **middle measure**?

- A. 15 m B. 12 m C. 10 m D. 3 m E. None of the above

Use these diagrams to answer Questions #21, 22, & 23.

Note: T = Tennis, B = Badminton, S = Squash



Decide **which diagram** has the shading which represents:

23. Those who play tennis and badminton, but not squash

- A. Diagram A B. Diagram B C. Diagram C D. None of these

24. Those who play all three sports

- A. Diagram A B. Diagram B C. Diagram C D. None of these

25. Those who play only tennis

- A. Diagram A B. Diagram B C. Diagram C D. None of these

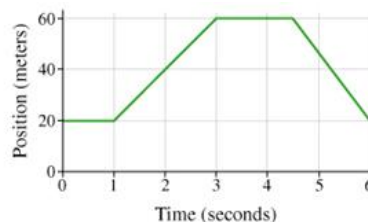
26. Which statement is **NOT** always true about Real numbers?

- A. The product of odd numbers is odd.
 B. The product of even numbers is even.
 C. The sum of odd numbers is even.
 D. The sum of even numbers is even.
 E. All are correct.

27. Write expressions for the next **three consecutive even numbers** on a number line when "n", is odd.

- A. $n - 1, n + 1, n + 3$ B. $n, n + 1, n - 3$ C. $n - 1, n, n + 1$
 D. $n + 1, n + 2, n + 3$ E. None of the above

Use the graph for problems #28 and 29.



28. Analyze the graph to estimate the length of time when the person is walking toward their original position?

- A. 6 seconds B. 2 seconds C. 1.5 seconds D. 3 seconds E. None of these

29. How fast is the person walking in Section from 1-3 seconds?

- A. 20 m/s B. 18 m/s C. 12 m/s D. 10 m/s E. None of these

30. In five years, Jenny will be three times as old as Sharyn is now. The sum of their current ages is 43. **How old is Jenny now?**

- A. 21 B. 31 C. 26 D. 12 E. None of these

31. Which of the following is **NOT** equivalent to 44%?

- A. $22/50$ B. $11/25$ C. $44/100$ D. 0.44 E. None of these

32. What is the **LCM** (*least common multiple*) of 56 and 112?

- A. 224 B. 168 C. 112 D. 280 E. None of these

33. What is the value of **5!/3!**

- A. 2! B. 10 C. 20 D. 30 E. None of these

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

- A. 2 B. 2 C. 53 D. 117 E. All are true

35. What is the value of $|-54|$?

- A. -54 B. 54 C. 108 D. -108 E. None of these

36. $4\sqrt{32} + \sqrt{8} =$

- A. $4\sqrt{40}$ B. $9\sqrt{2}$ C. $18\sqrt{2}$ D. $18\sqrt{2}$ E. None of the above

37. Simplify the expression: $3(-2) + 6 - 5 - \sqrt{49}$

- A. 2 B. -12 C. 0 D. 12 E. None of the above

38. Simplify: $\frac{2(2^2 - 3 \times 2)^2 + 27}{2 - 7}$

- A. -5 B. 5 C. 7 D. -7 E. None of the above

39. Evaluate: $(1/3)^{-3}$

- A. 1 B. -1 C. $1/27$ D. 27 E. None of the above

40. What is the value of $[(256)^{1/2}]^{1/2}$?

- A. 4 B. 2 C. 8 D. 16 E. None of the above

Shade the correct answer!Example: A C D E

Name _____

School _____

1. A B C D E

2. A B C D E

3. A B C D E

4. A B C D E

5. A B C D E

6. A B C D E

7. A B C D E

8. A B C D E

9. A B C D E

10. A B C D E

11. A B C D E

12. A B C D E

13. A B C D E

14. A B C D E

15. A B C D E

16. A B C D E

17. A B C D E

18. A B C D E

19. A B C D E

20. A B C D E

21. A B C D E

22. A B C D E

23. A B C D E

24. A B C D E

25. A B C D E

26. A B C D E

27. A B C D E

28. A B C D E

29. A B C D E

30. A B C D E

31. A B C D E

32. A B C D E

33. A B C D E

34. A B C D E

35. A B C D E

36. A B C D E

37. A B C D E

38. A B C D E

39. A B C D E

40. A B C D E

Shade the correct answer!Example: A C D E

Name _____

School _____

ANSWER KEY1. A B C E2. A B C E3. A B C E4. A B C D E5. B C D E6. A B D E7. A B C E8. A C D E9. B C D E10. A B C E11. B C D E12. A B D E13. A B C E14. A B D E15. B C D E16. A B C E17. A C D E18. A B C D E19. B C D E20. A B C E21. A B C E22. B C D E23. A B D E24. B C D E25. A C D E26. A B C D E27. B C D E28. A B D E29. A B C E30. A C D E31. B C D E32. A B D E33. A B D E34. A B C E35. A C D E36. A B C E37. A C D E38. A B C E39. A B C E40. B C D E