

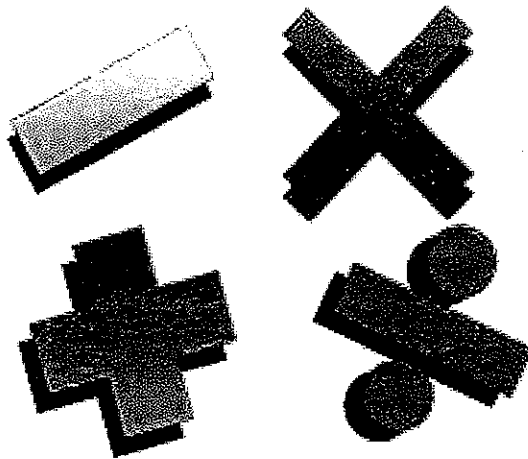
Place Contestant ID Label HERE
BEFORE Contest Begins.



Mathematics

DISTRICT Contest

Grades 6, 7, & 8



2017

Score: _____

(Please do not open test until the signal is given to begin.)

PSIA – Mathematics Test – Grades 6-8
District Test – 2017

Directions: Choose the best answer to each problem. For answers not listed as choices, choose “E. NOT” for “None of these”.

1. $487 + 675 + 838 =$

- A. 2000 B. 2010 C. 1990 D. 1980 E. NOT

2. How many quarts are there in 18 gallons?

- A. 144 B. 108 C. 72 D. 36 E. NOT

3. $6\frac{1}{4} \times 48 =$

- A. 360 B. 300 C. 288 D. 312 E. NOT

4. $(5^2 - 2 \times 7) - (7^2 - 2 \times 5) =$

- A. -28 B. -74 C. -36 D. -91 E. NOT

5. A car is traveling at 45 miles per hour. How long will it take to travel 75 miles?

- A. $1\frac{1}{2}$ hours B. $1\frac{5}{6}$ hours C. $1\frac{2}{3}$ hours D. $1\frac{3}{4}$ hours E. NOT

6. MDCLXXX – MCCXLV =

- A. DCXXXV B. CDXXXV C. DCLXXXV D. CDLXXXV E. NOT

7. Dax has 80 coins and Ralph has 44 coins. How many coins should Dax give to Ralph so that they have the same number of coins?

- A. 22 B. 16 C. 24 D. 18 E. NOT

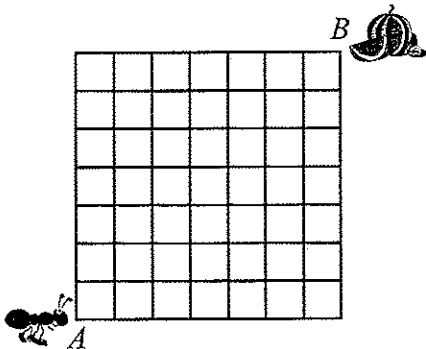
8. What property is demonstrated by the equation $4 \times \frac{1}{4} = 1$?
- A. multiplicative identity B. multiplicative inverse C. associative D. commutative E. NOT
9. $0.7111\dots =$ _____ (fraction)
- A. $\frac{13}{18}$ B. $\frac{32}{45}$ C. $\frac{71}{99}$ D. $\frac{64}{99}$ E. NOT
10. The area of a rectangle is 90 cm^2 . If the width is 1 cm shorter than the length, what is the perimeter of the rectangle?
- A. 21 cm B. 42 cm C. 19 cm D. 38 cm E. NOT
11. How many positive integral divisors does 21 have?
- A. 8 B. 2 C. 6 D. 4 E. NOT
12. If $N = 3$, then $N^2 + 4N + 4 =$
- A. 9 B. 25 C. 36 D. 18 E. NOT
13. $4^0 + 2^0 + 2^{-1} + 4^{-1} =$
- A. $\frac{17}{4}$ B. $\frac{3}{4}$ C. $\frac{11}{4}$ D. $\frac{15}{4}$ E. NOT
14. $8\frac{2}{3} \div 4\frac{1}{3} =$
- A. $1\frac{1}{2}$ B. $2\frac{1}{2}$ C. $2\frac{1}{3}$ D. $1\frac{2}{3}$ E. NOT

15. If a dozen hot dogs cost \$7.80, how much will 20 hot dogs cost?
- A. \$14.20 B. \$15.60 C. \$11.60 D. \$13.00 E. NOT
16. Lori bought a new pair of shoes. Normally the shoes cost \$60.00, but she had a coupon and saved 15%. What did she pay for the shoes (before taxes)?
- A. \$51.00 B. \$45.00 C. \$54.00 D. \$48.00 E. NOT
17. A pair of dice are tossed. What is the probability of getting a sum of 9 or 10?
- A. $\frac{11}{36}$ B. $\frac{7}{36}$ C. $\frac{1}{4}$ D. $\frac{2}{9}$ E. NOT
18. 1210 (base 3) = _____ (base 10)
- A. 48 B. 53 C. 51 D. 45 E. NOT
19. Define the operation $A \triangle B$ to be $\frac{A+1}{B-1}$. Find the value of $(3 \triangle 2) \triangle 6$.
- A. $\frac{6}{5}$ B. $\frac{4}{5}$ C. 2 D. 1 E. NOT
20. Set $J = \{2, 4, 5, 7, 8, 9\}$ and $K = \{1, 2, 3, 5, 6, 9\}$. How many elements are in $J \cap K$?
- A. 8 B. 9 C. 4 D. 3 E. NOT
21. $2\frac{1}{11} + 4\frac{2}{11} + 6\frac{3}{11} + \dots + 20\frac{10}{11} =$
- A. 130 B. 125 C. 115 D. 120 E. NOT
22. A regular polygon has an interior angle that measures 160° . How many sides does the polygon have?
- A. 20 B. 24 C. 16 D. 18 E. NOT

23. A wall is 12 feet tall. What is the shortest possible length of rope required to reach from the top of the wall to a point on the ground 5 feet from the wall?
- A. 14 feet B. 16 feet C. 13 feet D. 17 feet E. NOT
24. If $(x - 4)(x + 2)(3x - 2) = Ax^3 + Bx^2 + Cx + D$, find AB .
- A. -48 B. 48 C. -24 D. 24 E. NOT
25. The vertex of the parabola $y = -2x^2 - 12x + 5$ is (h, k) . Find h .
- A. 49 B. -49 C. 3 D. -3 E. NOT
26. $7\frac{2}{5} \times 3\frac{2}{5} =$
- A. $27\frac{4}{25}$ B. $25\frac{4}{25}$ C. $23\frac{4}{25}$ D. $21\frac{4}{25}$ E. NOT
27. Find the area of the triangle whose vertices are $(2, 3)$, $(7, 10)$, and $(9, 7)$.
- A. 14 B. 14.5 C. 15 D. 15.5 E. NOT
28. How many zeros are at the end of the number $62!$?
- A. 16 B. 15 C. 14 D. 13 E. NOT
29. Simplify $\frac{1 + \frac{5}{9}}{1 - \frac{5}{9}}$ to a fraction.
- A. $\frac{9}{2}$ B. $\frac{7}{2}$ C. $\frac{5}{2}$ D. $\frac{3}{2}$ E. NOT

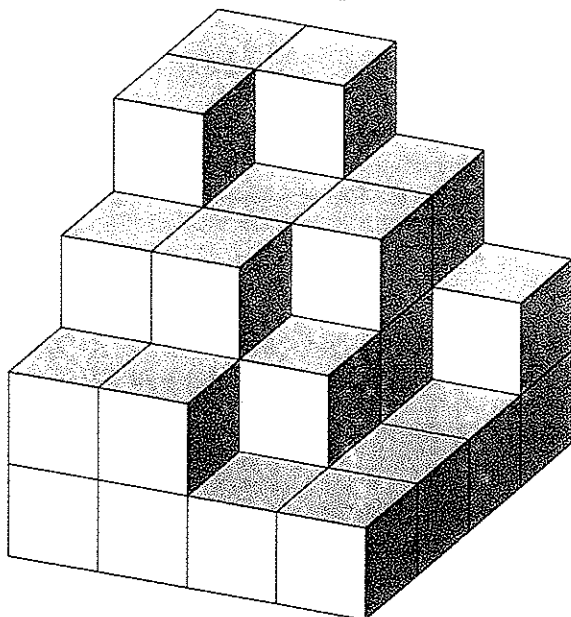
30. The y -intercept of the line $3x - 2y = -24$ is
- A. 8 B. -8 C. 12 D. -12 E. NOT
31. Solve for v : $5(v + 3) - 8[2(4v + 5) - 3(7 - v)] = 9v$
- A. $\frac{125}{88}$ B. $\frac{97}{78}$ C. $\frac{113}{72}$ D. $\frac{103}{92}$ E. NOT
32. $0.32 \div (0.2)^7 =$
- A. 7500 B. 12500 C. 5000 D. 25000 E. NOT
33. What transformations are used to change $y = x^7$ to $y = (x - 3)^7 + 4$?
- A. 3 right; 4 up B. 3 left; 4 up C. 3 down; 4 right D. 3 up; 4 right E. NOT
34. 7 square miles = _____ acres
- A. 5680 B. 4480 C. 3680 D. 2880 E. NOT
35. If $\frac{2x - 7}{3} = 0.45$, what is the value of $\frac{2x - 1}{3}$?
- A. -2.55 B. 1.45 C. 2.45 D. -1.55 E. NOT
36. How many faces does an icosahedron have?
- A. 20 B. 30 C. 12 D. 8 E. NOT
37. Jess can clean the house in $2\frac{1}{2}$ hours. Cassi can clean the house in $3\frac{1}{2}$ hours. Approximately how long will it take them to clean the house if they work together?
- A. 1.85 hours B. 1.65 hours C. 1.45 hours D. 1.25 hours E. NOT

38. The ratio of two positive numbers is 7 : 5. If the sum of the squares of the numbers is 1850, what is the larger number?
- A. 28 B. 35 C. 42 D. 49 E. NOT
39. If 84% of 96 is 72% of x , what is 36% of x ?
- A. 40.32 B. 42.96 C. 38.24 D. 41.92 E. NOT
40. Solve for x : $8^{4x-7} = 2$
- A. $\frac{4}{3}$ B. $\frac{5}{3}$ C. $\frac{13}{6}$ D. $\frac{11}{6}$ E. NOT
41. How many distinct ways can the letters in the word ALGEBRA be re-arranged?
- A. 5040 B. 2520 C. 1260 D. 3760 E. NOT
42. An ant must start at point A, stay on the grid by moving only right or up, and reach the food at point B. How many different paths can the ant take to reach his destination?



- A. 3092
B. 3216
C. 3432
D. 3648
E. NOT

43. The structure sits on a table. How many of the blocks shown have exactly 3 faces exposed (able to be seen)? [Sides against the top of the table cannot be seen.]



- A. 9
- B. 10
- C. 11
- D. 12
- E. NOT

44. The volume of a right circular cylinder is $80\pi \text{ cm}^3$. A new cylinder is created with double the radius and triple the height. What is the volume of the new cylinder?

- A. $960\pi \text{ cm}^3$
- B. $480\pi \text{ cm}^3$
- C. $1920\pi \text{ cm}^3$
- D. $2880\pi \text{ cm}^3$
- E. NOT

45. Assume x and y are both positive numbers. If $xy = 12$, what is the smallest possible sum of $3x$ and y ?

- A. 12
- B. 9
- C. 8
- D. 16
- E. NOT

Modular Arithmetic

46. Reduce $[78]_7$ to the smallest positive representative of this class.

- A. $[6]_7$
- B. $[4]_7$
- C. $[1]_7$
- D. $[3]_7$
- E. NOT

47. Find the remainder for $(88 \times 47 + 59) \div 12$.

- A. 7 B. 5 C. 3 D. 1 E. NOT

48. If $11x + 5 \equiv 4 \pmod{13}$ and $0 \leq x \leq 12$, what is x ?

- A. 8 B. 3 C. 10 D. 7 E. NOT

49. Find the remainder of $17^{26} \div 13$.

- A. 1 B. 3 C. 7 D. 11 E. NOT

50. The smallest positive value of x such that $x \equiv 7 \pmod{9}$ and $x \equiv 2 \pmod{11}$ is between which two integers?

- A. 76 and 90 B. 61 and 75 C. 46 and 60 D. 31 and 45 E. NOT

PSIA Mathematics 6-8 Contest

Contestant Answer Sheet

CONTESTANT ID#: _____

GRADE LEVEL: _____

INSTRUCTIONS: Place the PRINTED CAPITAL letter of each answer choice (A, B, C, or D) in the blank corresponding to the test item number. **SCORING:** +5 for each correct answer; -2 for each incorrect answer; no deduction is taken for skipped or unanswered items. Visible erasures and mark-outs constitute a 2-point deduction ONLY if a correct answer is not written in the answer space.

- | | | |
|-----------|-----------|-----------|
| 1. _____ | 18. _____ | 35. _____ |
| 2. _____ | 19. _____ | 36. _____ |
| 3. _____ | 20. _____ | 37. _____ |
| 4. _____ | 21. _____ | 38. _____ |
| 5. _____ | 22. _____ | 39. _____ |
| 6. _____ | 23. _____ | 40. _____ |
| 7. _____ | 24. _____ | 41. _____ |
| 8. _____ | 25. _____ | 42. _____ |
| 9. _____ | 26. _____ | 43. _____ |
| 10. _____ | 27. _____ | 44. _____ |
| 11. _____ | 28. _____ | 45. _____ |
| 12. _____ | 29. _____ | 46. _____ |
| 13. _____ | 30. _____ | 47. _____ |
| 14. _____ | 31. _____ | 48. _____ |
| 15. _____ | 32. _____ | 49. _____ |
| 16. _____ | 33. _____ | 50. _____ |
| 17. _____ | 34. _____ | |

SCORE Initials

Grader 1: _____

Grader 2: _____

Grader 3: _____

OFFICIAL SCORE: _____

Contest Director ONLY: Match school & name AFTER tests are scored:

PSIA Mathematics Contest
Grades 6, 7, & 8 DISTRICT—2017
Answer Key

Scoring: +5 for each correct answer; -2 for each incorrect answer; no points are deducted for skipped or unanswered items. Erasures/Mark-outs not resulting in a correct answer constitute 2-point deductions.

- | | | |
|-----------|-------|-------|
| 1. A | 18. A | 35. C |
| 2. C | 19. D | 36. A |
| 3. B | 20. D | 37. C |
| 4. A | 21. C | 38. B |
| 5. C | 22. D | 39. A |
| 6. B | 23. C | 40. D |
| 7. D | 24. C | 41. B |
| 8. B | 25. D | 42. C |
| 9. B | 26. B | 43. A |
| 10. D | 27. B | 44. A |
| 11. D | 28. C | 45. A |
| 12. B | 29. B | 46. C |
| 13. C | 30. C | 47. A |
| 14. E (2) | 31. D | 48. D |
| 15. D | 32. D | 49. B |
| 16. A | 33. A | 50. A |
| 17. B | 34. B | |