CONTESTANT ID #: _____

GRADE LEVEL :_____

Place Contestant ID label here BEFORE Contest Begins

PSIA

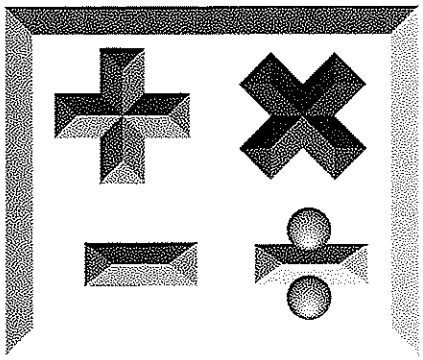
25 YEARS

Inspiring Student Achievement

Mathematics

District Contest

Grades 6-8



2022

FINAL SCORE: _____

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

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

1. Evaluate: $(4 \times 5)^2 \div 40 + 6$

   A. 12 B. 8 C. $8\frac{1}{2}$ D. 16 E. NOT

2. How many inches are there in $2\frac{1}{2}$ feet?

   A. 26 B. 28 C. 30 D. 32 E. NOT

3. $2\frac{1}{2} + 5\frac{1}{6} =$

   A. $7\frac{1}{4}$ B. $7\frac{2}{3}$ C. $8\frac{2}{3}$ D. $8\frac{1}{4}$ E. NOT

4. The diameter of a hydrogen atom is 1.76 femtometers. Use the metric chart to find the diameter of hydrogen in nanometers.

Prefix	Exponential Form
milli (m)	10^{-3}
micro (μ)	10^{-6}
nano (n)	10^{-9}
pico (p)	10^{-12}
femto (f)	10^{-15}

   A. 0.000 001 76
   B. 0.000 017 6
   C. 0.000 176
   D. 0.000 000 176
   E. NOT

5. XXXIV – XIX = _____ (Roman numerals)

   A. XXV B. XVI C. XIV D. XV E. NOT

6. What percent of 60 is 36?

   A. 50% B. 60% C. 75% D. 24% E. NOT

7. A new garden is rectangular, 36 feet by 40 feet. How big is the garden?

A. 152 ft^2 B. 720 ft^2 C. 1440 ft^2 D. 1860 ft^2 E. NOT

8. What is the sum of all prime numbers between 6 and 15?

A. 24 B. 31 C. 40 D. 37 E. NOT

9. The set below is bimodal. What is the sum of the modes?

$$\{8, 12, 7, 13, 7, 8, 12, 7, 13, 16, 2, 5, 12, 18, 9\}$$

A. 21 B. 25 C. 20 D. 19 E. NOT

10. A bag contains 30 chips numbered 1 through 30. A single chip is drawn out. What is the probability the number is a multiple of 5?

A. $\frac{1}{12}$ B. $\frac{1}{8}$ C. $\frac{1}{6}$ D. $\frac{1}{5}$ E. NOT

11. $1 + 2 + 3 + 4 + 5 + \ldots + 13 =$

A. 91 B. 98 C. 78 D. 71 E. NOT

12. $\frac{7}{15} =$ _____ %

A. $43\frac{1}{3}$ B. $46\frac{2}{3}$ C. $44\frac{4}{9}$ D. $42\frac{1}{2}$ E. NOT

13. If $p = -8$, find the value of $p^2 + 16p + 64$.

A. 64 B. 128 C. −64 D. −128 E. NOT

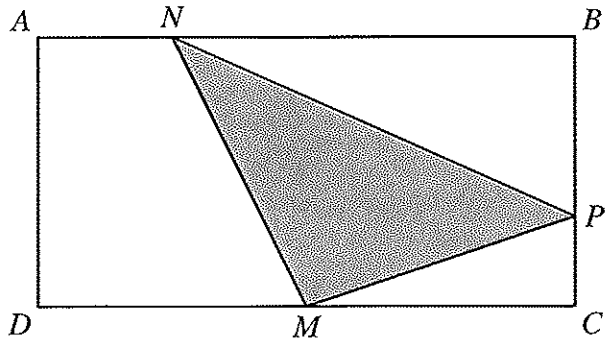
14. What is the smallest integer greater than 2022 that is evenly divisible by 18?

A. 2034 B. 2032 C. 2030 D. 2029 E. NOT

15. $16\frac{1}{5} \times 15\frac{1}{8} =$

A. $245\frac{1}{40}$ B. $242\frac{1}{40}$ C. $248\frac{1}{40}$ D. $240\frac{1}{40}$ E. NOT

16. In rectangle $ABCD$, $AN = 3$, $BP = 4$, $DA = 6$, and $MC = 6$. M is the midpoint of $\overline{DC}$. Find the shaded area.



A. 21
B. 22
C. 19
D. 20
E. NOT

17. Alaina has 6 more quarters than nickels. All together, she has \$6.00. How many nickels does she have?

A. 12 B. 15 C. 18 D. 21 E. NOT

18. The yardage run by a professional football running back is given in the chart. Which game represents an outlier for the running back?

Game	Yardage
1	123
2	107
3	43
4	115

A. 1
B. 2
C. 3
D. 4
E. NOT

19. 413 (base 6) = _____ (base 10)

A. 153 B. 151 C. 149 D. 147 E. NOT

20. What is the least common multiple between 32 and 36?

A. 272 B. 312 C. 242 D. 288 E. NOT

21. A car drove 350 miles in $6\frac{1}{4}$ hours. What was its average speed?

A. 50 mph B. 52 mph C. 54 mph D. 56 mph E. NOT

22. $0.1777\ldots =$ _____ (fraction)

A. $\frac{17}{99}$ B. $\frac{11}{30}$ C. $\frac{1}{6}$ D. $\frac{8}{45}$ E. NOT

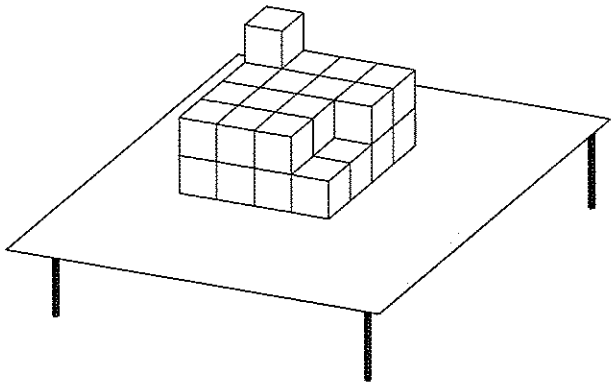
23. The angles of a triangle are $(2x+30)^\circ$, x°, and 36°. Which term correctly classifies this triangle?

A. acute B. right C. obtuse D. isosceles E. NOT

24. Define the operation $X \oplus Y$ to be $\frac{X^2 - Y^2}{X + Y}$. Find the value of $(25 \oplus 20) \oplus (-18)$.

A. -13 B. 13 C. 23 D. -23 E. NOT

25. The cubes shown are sitting on a table. Find the surface area of the cubes that can be seen by walking around the table. [Each cube is 1-cm^3. The faces against the table cannot be seen and do not count.]



A. 44 cm^2
B. 48 cm^2
C. 58 cm^2
D. 52 cm^2
E. NOT

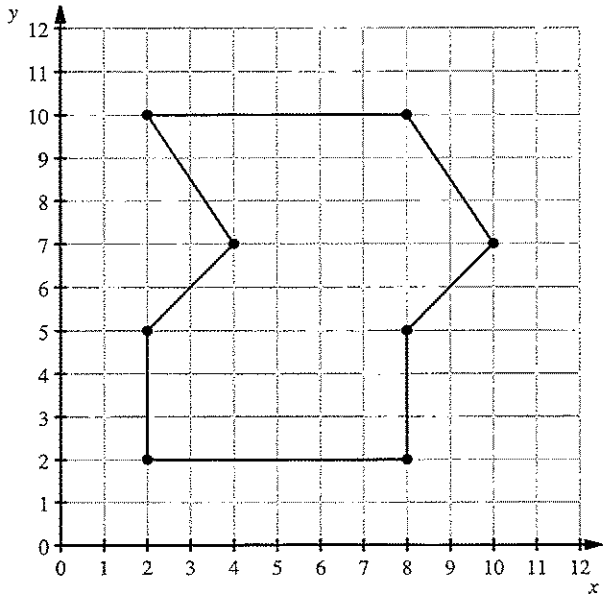
26. What is the unit's digit of $16^{12} \times 3^7$?

A. 2 B. 4 C. 6 D. 8 E. NOT

27. A spoon holds 1 teaspoon. A scoop holds 4 teaspoons. A dipper holds 10 teaspoons. The chef needs 77 teaspoons of flour and can only use the spoon, scoop, and dipper. She needs to use the least total number of all of these as possible. What is the least number of times she needs to use the spoon?

A. 0 B. 1 C. 2 D. 3 E. NOT

28. Find the area of this polygon.



A. 56
B. 52
C. 48
D. 46
E. NOT

29. What is the y-intercept of $6x - 3y = 24$?

A. $(0, -8)$ B. $(-8, 0)$ C. $(0, 4)$ D. $(4, 0)$ E. NOT

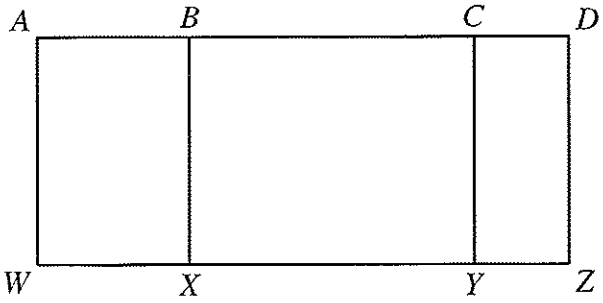
30. Solve for u: $6[3(2u - 7) - 4(5 + u)] + 2u = 5(3u + 8)$

A. -326 B. -314 C. -292 D. -286 E. NOT

31. If 44% of 86 is the same as P% of 43, what is P?

A. 88% B. 22% C. 11% D. 66% E. NOT

32. The area of $ACYW$ is 23. The area of $BDZX$ is 20. The area of $ADZW$ is 28. Find the area of $BCYX$.



A. 16
B. 15
C. 14
D. 13
E. NOT

33. Sarah earns \$350 per week. She spends 2% on bird feed and 9% on gasoline. How much does she spend on bird feed and gasoline in total per week?

A. \$36.50 B. \$37.50 C. \$38.50 D. \$39.50 E. NOT

34. Let $f(x) = \frac{3x+1}{2}$. Find the value of x where $f(x) = 17$.

A. 7 B. 11 C. 17 D. 26 E. NOT

35. The function shown below follows a quadratic model. What is the missing value?

x	3	4	5	6	7	8
y	9	13	19	27	37	?

A. 51 B. 47 C. 53 D. 49 E. NOT

36. If $3^{4x-1} = 5$, then what is the value of 3^{4x+1}?

A. 15 B. 35 C. 45 D. 55 E. NOT

37. A class has 11 students. How many ways can 3 students be chosen to represent the class in the county fair parade?

A. 990 B. 495 C. 330 D. 165 E. NOT

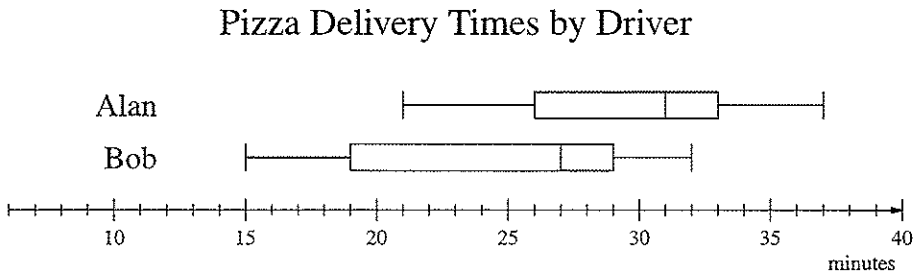
38. Hayleigh left camp, hiking north at 3 feet per second. Kylie left camp at the same time, hiking west at 4 feet per second. How far apart are they after 5 minutes?

A. 1500 ft B. 1750 ft C. 1800 ft D. 2100 ft E. NOT

39. How many integer solutions does the compound inequality $6x - 7 \leq 30$ and $3x + 1 > -15$ have?

A. 13 B. 11 C. 10 D. 12 E. NOT

40. Which of the following statements is true?



I. Alan's median delivery time is longer than Bob's.

II. Alan's delivery times are more consistent than Bob's.

III. Bob always delivers his pizzas faster than Alan.

A. **I** only B. **II** only C. **I** and **II** D. **I**, **II**, and **III** E. NOT

41. The number of students in a school doubles every 12 years. How long will it take the school population to quadruple?

A. 18 years B. 24 years C. 36 years D. 48 years E. NOT

42. A line passes through the points $(-2,5)$, $(2,7)$, and $(8,k)$. Find k.

A. 8 B. 9 C. 10 D. 11 E. NOT

43. A cylinder has a radius of 6 cm and height 5 cm. What is the volume of the cylinder?

A. 60π cm^3 B. 150π cm^3 C. 180π cm^3 D. 250π cm^3 E. NOT

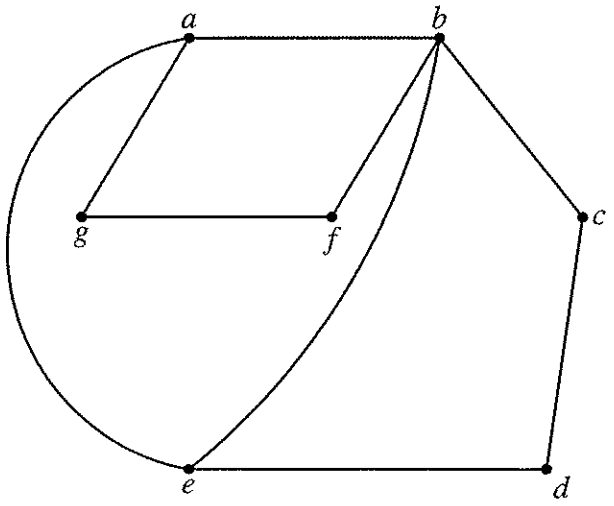
44. A museum charges \$8 per adult and \$3 per child. One day, 174 people visited and the museum earned \$1137 in admissions revenue. How many children visited the museum?

A. 47 B. 51 C. 55 D. 59 E. NOT

45. Five bronze coins weigh the same as four gold coins. Three gold coins weigh the same as ten silver coins. How many bronze coins weigh the same as eight silver coins?

A. 2 B. 4 C. 3 D. 1 E. NOT

46. Given the graph below, which vertices are adjacent to vertex g?



A. a, b B. c, d C. a, e D. a, f E. NOT

47. Using the same graph in question 46, what is the degree of vertex b?

A. 1 B. 2 C. 3 D. 4 E. NOT

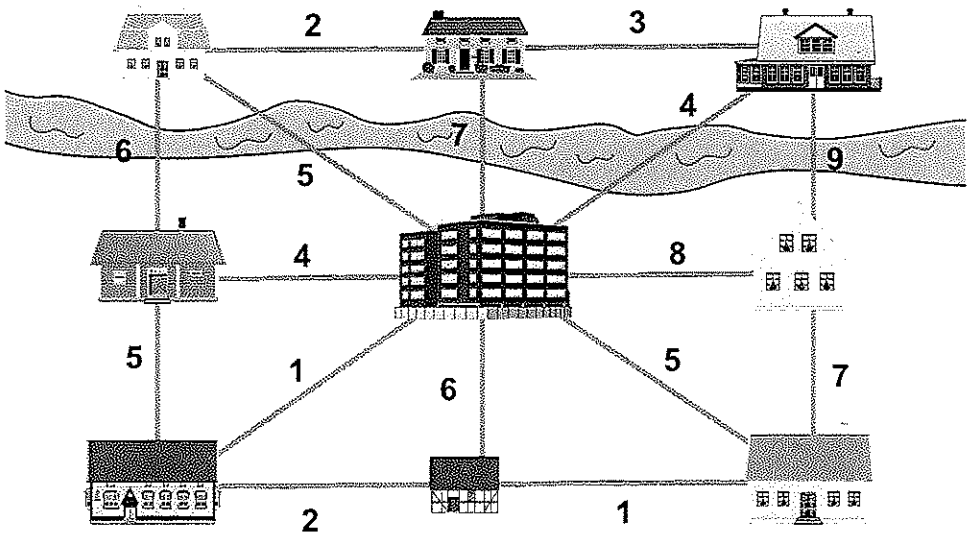
48. What is the size of P_{12}?

A. 11 B. 12 C. 66 D. 132 E. NOT

49. What is the order of $K_{3,5}$?

A. 15 B. 8 C. 2 D. 10 E. NOT

50. In the graph below, each building must be connected to the electric grid using the possible connections shown. The cost for each connection is given (in hundreds of dollars). Find the minimum cost to connect all 9 buildings.



A. \$2200 B. \$2300 C. \$2400 D. \$2500 E. NOT

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Mathematics Grades 6-8

District Contest

Contestant Answer Sheet

GRADERS: *Write scores and initial.*

Score 1: _____ Score 3: _____

Score 2: _____ FINAL: _____

Contestant ID: _____ Grade Level: _____

INSTRUCTIONS: Place the PRINTED CAPITAL letter of each answer choice (A, B, C, D, or E) in the blank corresponding to the test item number. SCORING: +5 for each correct answer; –2 for each incorrect answer; no deduction 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. _____	

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District 2022

ANSWER KEY

REMINDERS: PRINTED CAPITAL letters only. SCORING: +5 for each correct answer; –2 for each incorrect answer; no deduction 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. **D**
2. **C**
3. **B**
4. **A**
5. **D**
6. **B**
7. **C**
8. **B**
9. **D**
10. **D**
11. **A**
12. **B**
13. **E** (0)
14. **A**
15. **A**
16. **A**
17. **B**
18. **C**
19. **A**
20. **D**
21. **D**
22. **D**
23. **C**
24. **C**
25. **D**
26. **A**
27. **B**
28. **C**
29. **A**
30. **D**
31. **A**
32. **B**
33. **C**
34. **B**
35. **D**
36. **C**
37. **D**
38. **A**
39. **D**
40. **C**
41. **B**
42. **C**
43. **C**
44. **B**
45. **C**
46. **D**
47. **D**
48. **A**
49. **B**
50. **C**