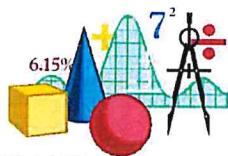


## INSTRUCTIONS FOR THE CONTESTANT

• **ENTRIES.** As many as THREE students in each grade level (2, 3, 4, 5, 6, 7 and 8) OR ages 7, 8, 9, 10, 11, 12, and 13 by Sept. 1 of the current school year, if in an ungraded school, may be entered in the MATHEMATICS District Contest from each school.



• **ADVANCING TO STATE.** In grades 2 and 3, only ONE (1) student advances to State from each grade level. For grade levels 4, 5, 6, 7 and 8, 2 advance from each grade to State if 4 compete. (See page 8 for complete rules. See page 107 for an abbreviated chart for contest administration.)

• **NATURE OF THE CONTEST.** The Mathematics contest tests the contestant's ability to solve a variety of mathematical problems studied at and above grade level. All contest materials, including 2 #2 pencils (mechanical acceptable) and eraser, other than the test itself, must be supplied by the contestant. No loose papers or other materials are allowed. Calculators are NOT permitted for use in the contest. The tests for grades 2 and 3 and grades 4 and 5 consist of 40 problems. The test for grades 6-8 consists of 50 problems. Test questions are similar to those found in state-adopted textbooks, but many items are usually tested at a higher grade level. For the grades 6-8 contest, approximately 25% of the problems will require knowledge of Algebra I computation skills. All tests will contain problems covering, but not limited to, numeration systems, arithmetic operations involving whole numbers, interers, fractions, decimals, exponents, order of operations, probability, statistics, number theory, simple interest, measurements (English and metric), and conversions normally covered (feet to inches, quarts to gallons, etc.). There will also be geometry problems normally covered in the middle school student's textbooks, including application of the Pythagorean theorem. Normal geometry problems will include finding area and volume of polygons/polyhedra and circles/spheres. Various types of problems are randomly distributed throughout the test. The special topic for grades 6-8 during the 2021 through 2023 school years is "Graph Theory."

• **WHAT HAPPENS IN THE CONTEST.** The contest director will announce the time and place that contestants and one adult should report for verification of the scoring of tests. (Substitutes taking the place of absent registered contestants should be sure to let the contest director know as they enter the room to save time at roll call.)

Answer sheets will be distributed to contestants first, followed by contestant ID-labeled tests distributed by student name. Contestants will be instructed to write their grade levels and their contestant ID numbers in the spaces provided on the answer sheet. Contestants must not open the test until the start signal is given. No alarm watches or other devices that emit sound are allowed in the contest room. Disqualification will result if such device makes a sound while placed in any portion of

the room. Contestants may use any white spaces on the test to assist in computing answers. No additional paper will be provided.

**TIME ALLOTTED.** When the start signal is given, contestants will have 30 minutes to answer test questions. Contestants will remain quietly in their seats until the time has expired.

**MARKING ANSWERS.** Contestants may write on the test paper, but only the PRINTED CAPITAL letter answer should be written in the answer space on the answer sheet. Any marking in the answer space will constitute an attempt.

• **SCORING.** Add 5 points for each correct answer. Subtract 2 points for each incorrect answer, or for each answer that was attempted, marked through or erased, and did not result in a correct answer. No points are added or deducted for skipped or unanswered test items.

• Mark-outs are acceptable, as long as a correct answer is written beside the mark-out. If an answer is marked out and no correct answer is written in the answer space, 2 points deducted. Erasures are permitted. Any erased correct answer that can still be seen is counted correct. An erased answer that is not correct and does not have a correct answer written over or beside it constitutes an incorrect answer, whereby 2 points are deducted.

• **VERIFICATION PERIOD.** (See page 14 for complete rules for Verification Period.)

• **MATERIALS.** Last year's PSIA Mathematics tests and answer keys, plus tests from previous PSIA contests, are included in the PSIA Academic Study Materials Booklets, which may be ordered from the PSIA office. A PSIA Study Materials Order Forms for these booklets are included in the appendix of this handbook.

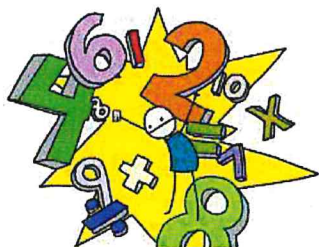
## Sample Level 2 &amp; 3 Mathematics Problems

- $33 + 48 =$   
A. 81      B. 71      C. 82      D. 72
- Find the next number in the pattern: 31, 34, 37, 40, 43, 46, ...  
A. 49      B. 50      C. 51      D. 52
- Round 394 to the nearest ten's place.  
A. 340      B. 300      C. 400      D. 390
- About how long is a new pencil?  
A. 7 inches      B. 40 centimeters  
C. 20 millimeters      D. 4 feet
- $7 \times 2 =$   
A. 14      B. 16      C. 18      D. 21
- Megan has 12 candies: 9 of them are red and the rest are blue. What fraction of the candies are blue?  
A.  $\frac{1}{3}$       B.  $\frac{1}{4}$       C.  $\frac{1}{6}$       D.  $\frac{1}{2}$
- Maria baked 83 cookies. She placed the cookies in bags. Each bag held either 5 or 6 cookies. If she used the fewest number of bags possible, how many bags had exactly 5 cookies? ?  
A. 1      B. 2      C. 3      D. 4      E. NOT



## Sample Level 4 & 5 Mathematics Problems

- $600 - 354 =$   
A. 256 B. 356 C. 246 D. 346 E. NOT
- The smallest prime number larger than 21 is  
A. 22 B. 23 C. 27 D. 29 E. NOT
- Dirk has 84 marbles and Elyse has 36 marbles. How many marbles should Dirk give to Elyse so that she has 4 more marbles than he does?  
A. 22 B. 24 C. 26 D. 28 E. NOT
- The LCM of 64 and 56 is  
A. 424 B. 448 C. 464 D. 488 E. NOT
- What perfect square number lies between 150 and 170?  
A. 169 B. 164 C. 166 D. 160 E. NOT
- The letter P represents a single digit in the equation  $27 \times 16935301 = 457P53127$ . Find the value of P.  
A. 1 B. 2 C. 3 D. 4 E. NOT
- There are 12 red tiles, 18 yellow tiles, and 6 green tiles in a box. A single tile is drawn out. What is the probability of not getting a red tile?  
A.  $1/4$  B.  $3/4$  C.  $1/3$  D.  $2/3$  E. NOT



## Sample Level 6, 7 & 8 Mathematics

- $LXXXIV =$  \_\_\_\_\_ (Arabic numerals)  
A. 136 B. 134 C. 84 D. 86 E. NOT
- How many centimeters are there in a dekameter?  
A. 1000 B. 10 C. 100 D. 10000 E. NOT
- $600 \times 500 \div 40 =$   
A. 750 B. 7500 C. 1750 D. 17500 E. NOT
- Which of the following is not a prime factor of 182?  
A. 2 B. 3 C. 7 D. 13 E. NOT
- If  $q = 4$ , what is the value of  $(q - 1)(q^3 + q^2 + q + 1)$ ?  
A. 256 B. 243 C. 242 D. 255 E. NOT
- A car drove 36 miles in 45 minutes. What was its average speed?  
A. 27 mph B. 48 mph  
C. 54 mph D. 80 mph E. NOT
- One factor of  $x^2 - 3x - 28$  is  
A.  $x + 14$  B.  $x - 14$   
C.  $x - 7$  D.  $x + 7$  E. NOT

### ANSWERS

2-3

1. A 2. A 3. D 4. A 5. A 6. B 7. A

4-5

1. C 2. B 3. C 4. B 5. A 6. B 7. D

6-8

1. C 2. A 3. B 4. B 5. D 6. B 7. C

2022

MATHEMATICS

2023

### ADDITIONAL INFORMATION FOR COACHES / CONTEST DIRECTORS

• **PREPARATION FOR CONTEST.** Read and follow all instructions provided in the "Rules for All Participants" section of the *PSIA Academic Handbook*. Observe and practice with students all rules and procedures delineated in the "Instructions to the Contestant" and in the "Checklist for Contest Directors" and the "Checklist for Graders." Preparation for the MATHEMATICS Contest should include student practice in regular and advanced mathematics textbook studies, as indicated in the student information.

• **PERSONNEL NEEDED FOR CONTEST.**

1. *Contest Director.* May be a knowledgeable coach of contestants in the contest.

2. *Assistant Directors.* Two knowledgeable coaches from different schools other than director's.

3. *Graders.* Director and assistant director may also serve as graders. To expedite the grading process, provide at least two graders for every 15 papers.

• **SCORING (ADDITIONAL INFORMATION).**

Tests ranking in the top 10 should be scored by a third individual. Post all scores on the Contest Roster before ranking to the top 10.

