INSTRUCTIONS FOR THE CONTESTANT

• **ENTRIES.** As many as THREE students from each grade level (grades 4 and 5) and (grades 6, 7, and 8) OR ages 9,10, 11, 12 and 13 respectively by Sept. 1 of the current school year, if in an ungraded school, may be entered in the Number Sense District Contest from each school. The top **TWO** students from each grade level advance to State.

• **ADVANCING TO STATE.** A minimum of four students from at least two different schools must compete at the district meet in order for the TWO students from each grade level to advance to State. (See page 8 for complete rules for advancing to State.)

• **NATURE OF THE CONTEST.** The contest presents 80 problems. Elementary (Grades 4 and 5) problems requiring the applications of the four basic operations (+, -, x, ÷) for their solution constitute the core of what is commonly thought of as number sense. The middle school contest may range from whole number arithmetic to topics on the study of sequences in analysis, and topics relating to the efficient and/or high speed solution of mathematics problems, in addition to "special topics" distributed through workshop participation. 2018-2019 topics include: (1) Squaring numbers close to 1000, (2) Special Mixed Number Multiplication, (3) Finding the nth pentagonal number, and (4) Number of lines and triangles through n points.

• **WHAT HAPPENS IN THE CONTEST. 1)** The contest director will announce the time and place that contestants and one adult should report for verification of the scoring of tests. **2)** Contestant ID numbers will be provided to contestants at roll call and seating of substitutes or alternates. ests will be distributed to contestants face up, and contestants will be instructed to write their grade levels and their contestant ID numbers in the spaces provided on the front cover. Contestants must not open the test until the start signal is given. (Alternates taking the place of absent registered contestants should be sure to let the contest director know as they enter the room to save time in roll call.) No alarm watches or other devices that emit sound are allowed in the contest room, except the contest director's stopwatch to precisely time this contest.

TIME ALLOTTED. Contestants will have 10 minutes beginning at the start signal. No time warning will be given. Contestants shall remain quietly in their seats until the time has expired.

MARKING ANSWERS. Contestants MUST bring to contest and use their own standard **non-erasable BLUE** ball point or ink pen(s) to write answers in the blanks provided on the test. Test is disqualified if the required standard **blue** ink is not used. **Pens will NOT be provided by the contest director. Mark-outs and mark-overs on an answer blank constitute a 2-point deduction. Marks of any kind on any portion of the paper, OTHER THAN an answer blank, constitute a disqualification.** Any mark in an answer space will constitute an attempt. Problems are arranged in a sequential format (see p. 62).

(a) ***Fractions***. All fractions must be reduced to lowest terms. Improper fractions are acceptable answers. Decimal answers are permitted for the unstarred problems whose answers are exactly expressible as decimals. For example, 3/2, 11/2, and 1.5 are all acceptable.

(b) ***Symbols.*** Symbols such as $ and % are usually printed on the sheet. Therefore, answers require only the writing of numerals. If a symbol is omitted from the printed sheet, it is not the responsibility of the contestant to make sure the answer is complete. If not printed, the student need not include it in the answer. (This rule excludes dollars and cents markings.)

(c) ***Dollars and Cents.*** In agreement with the philosophy that answers should be complete, all dollars and cents problems must have complete answers. That is, twenty-three dollars must be written as $23.00 (with $ and .00). Sixteen cents must be written as $.16 or 16¢, depending on the answer blank format. The contestant's adding of a symbol, such as the $, to a line that already has the symbol posted does not constitute an error.

(d) ***Efficient Forms.*** Numerical answers should be written so that the answers are complete as in the two examples above. However, the answer should be written in the most efficient form possible. For example, if the answer is 16, the written answer 16.000 is not acceptable for the purposes of the number sense competition. Extraneous zeroes are not to be used. For example, if .16 is the answer, 0.16 is not an acceptable format.

(e) ***Exponentials.*** An answer such as 3 x 10^3 should be expressed as 3000 and not left in exponential form.

(f) ***Estimation Problems.*** Every 10th problem is an estimation problem, denoted by a star. These problems require approximate integral answers, i.e., they permit 5% error; all other problems require exact answers.

(g) ***Commas.*** Commas are allowed but not recommended. Misuse of the comma will constitute an incorrect answer (for example, if the answer is 16,780 and the contestant responds with 167,80 the answer will be counted wrong since the comma in incorrectly placed).

INSTRUCTIONS FOR THE CONTESTANT *CONTINUED*

• SAMPLE TEST PROBLEMS.

1. 34 x 11 = _____

2. The GCD of 24 and 30 is _____.

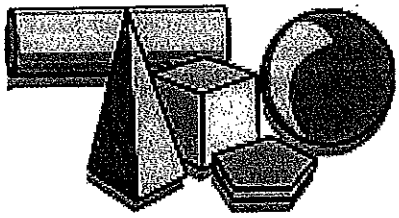
3. 79 ÷ 4 has a remainder of _____.

• SCORING. Add 5 points for each correct answer. Subtract 2 points for each incorrect answer, for each answer that was marked through, marked over, or erased, AND for skipped or unanswered test items down through the last item attempted.

• VERIFICATION PERIOD. No pens, pencils, papers, cell phones, or any other items should be in contestants' area while tests and answer sheets with keys are reviewed. Contestants and ONE coach OR parent OR adult have 15 minutes to check the computation of scores and ask questions about items counted incorrect. If the contest is held before Margh 30 at District or May 4 at State, tests must be turned back in to the contest director. Contestants will be disqualified from the contest should the paper be taken from the room prior to this date. After verification has been completed, awards will be issued in reverse order, beginning with 6th place. (At State, medals will be awarded through 6th place.)

• MATERIALS.

A variety of materials from a large number of sources is available for those who wish to get involved in PSIA number sense competition. Several are listed below: 1) Previous years' PSIA Number Sense tests are included in both the PSIA Elementary and Middle School Academic Study Materials booklets, which may be ordered from the PSIA office (Order forms is in the appendix of this handbook).

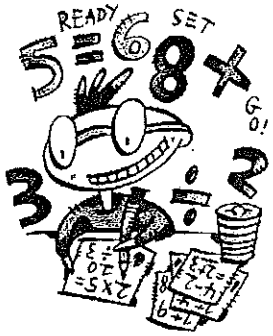


2) ***The Elements of Number Sense 2011 Edition***. by Doug Ray. A student-friendly resouce for learning the basics of Number Sense. Includes a few tricks and tests for honing skills. Available on PSIA Study Materials Order form. Other resources are available at the Dr Numsen website: **www.academicmeet.com. Additional resource providers are linked to the PSIA website: www.psiaacademics.org under 3rd Party Resources.**

ADDITIONAL INFORMATION FOR COACHES / CONTEST DIRECTOR7

• PREPARATION FOR CONTEST. Read and follow all instructions provided in the "Information Pertaining to All Contests" 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 Number Sense Contest should include multiple mind math practice sessions. Invitational meets with other schools are exciting for students and help them hone their skills in number crunching.

In addition to training students in the format of the tests, the resources named above provide practice that may best prepare students for competition.



• 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 directors also serve as graders. To expedite the grading process, provide at least two graders for every 8 papers.*

• SCORING REMINDERS. +5 for each correct answer, and -2 for each incorrect answer. REMEMBER, contestants are NOT allowed to skip items without each skip resulting in a 2-point deduction. The test will be scored through the last item attempted. Graders should each use a different color pen (excluding blue) or pencil to mark papers and place their initials in the spaces provided at the bottom of the test answer sheet to indicate that they have graded the paper.

Elementary Problem Sequence

Problems 1 - 20:

Addition, subtraction, multiplication, and division of (positive) whole numbers
Recognizing place value
Rounding numbers
Multiplication short-cuts
Remainder type problems
Even and odd number type problems
Expanded notation
Sums of whole numbers (series)
Roman numerals/Arabic numerals

Problems 21 - 40:

Addition/subtraction of fractions with common denominators
Addition, subtraction, multiplication, and division of decimal fractions
Comparing decimal fractions and common fractions
Conversion problems (fractions/percents/decimals)
Order of operations
Multiplication short-cuts
Ratio/Proportion
Consumer type problems
Prime number problems
Greatest common divisor (GCD)
Least common multiple (LCM)
Conversion problem (length/weight/volume)

Problems 41 - 60:

Addition, subtraction, multiplication, and division of fractions and mixed numbers
Substitution problems
Perimeter and area of squares, rectangles, triangle, circles
Powers and roots of numbers
Solving simple equations
Sequences and series
Sets
Word problems
Volume of cubes and rectangular boxes
Right triangle problems
Multiplication short-cuts
Base systems
Percent problems

Problems 61 - 80:

Addition, subtraction, multiplication, and division of integers
Inverses
Basic geometry facts
More area problems
Squaring two-digit numbers
Multiplication short-cuts
Powers of numbers
Consumer type problems
Inequalities
Probability
Area problems with parallelograms, rhombi, and trapezoids
Coordinate geometry on the number line
More percent problems

Junior High Problem Sequence

Problems 1 - 20:

Addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals
Order of operations
Distributive property
Comparison of fractions and decimals
Multiplication short-cuts
Squaring numbers
Roman numerals/Arabic numerals
Mean, median and mode
Sums of whole numbers

Problems 21 - 40:

Addition, subtraction, multiplication, and division of mixed numbers and integers
Multiplication short-cuts
Percent problems
Conversion problems (English/metric, length, area, volume, time)
Consumer type problems
Substitution problems
Solving simple equations
Square roots and cube roots
Greatest common divisor (GCD)
Least common multiple (LCM)
Number theory
Prime numbers
Divisors
Perimeter and area of squares, rectangles, and circles
Ratio and proportion
Inverses and reciprocals

Problems 41 - 60:

Sets
Word problems
Pythagorean theorem
Sequences
Volume and Surface area of rectangular solids and cubes
Base systems
Area of parallelograms, rhombi, and trapezoids
Solving inequalities
Basic geometry facts
Remainder problems
Multiplication short-cuts

Problems 61 - 80:

Repeating decimals
Number theory
Powers of numbers
Volume of circular cylinders, pyramids, cones, and spheres
Sequences and series
Multiplication short-cuts
Factorial
Coordinate geometry
Probability
More percent problems
More remainder problems