A+ Elementary Number Sense

Test Writer's Perspective

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Married 4 children 3 grandchildren Classroom Teacher 42 years Co-founder Texas Math and Science Coaches Association (TMSCA) Azle Junior High – (1974 – 1982) Azle High School – (1982 – 2016) Physics teacher (1982 - 2016)AP Physics reader – (2004 – 2016) AISD Grant Writer – (2017) High School Aerospace Scholar counselor – (2006 – 2010) Coached - JH slide rule (1974 - 1982) HS slide rule, number sense, calculator applications, mathematics, science (1982 – 2016) Coached numerous high school state champions and state championship teams. Azle HS UIL academic coordinator 2001 – 2002 UIL sponsor excellence award winner

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Elementary Problem Guidelines

<u>Problem 1 – 20</u>

- 1. Addition, subtraction, multiplication, & division of whole numbers
- 2. Recognizing place value
- 3. Rounding off whole numbers
- 4. Multiplication short-cuts
- 5. Remainder type problems
- 6. Even & odd number type problems
- 7. Expanded notation
- 8. Sums of whole numbers with regrouping
- 9. Differences of whole numbers with regrouping
- 10. Roman numerals/Arabic numbers conversion

<u>Problem 1 – 20</u>

(1) 22 – 19 =	(12) 22 × 18 =
(2) 7 × 12 =	(13) Which digit is in the hundred-thousandths place in
(3) 220 ÷ 4 =	21340.65789?
(4) 2021 + 2022 =	(14) 24 × 12 =
(5) $12 \times 5 \times 10 =$	(15) What is the remainder for 2918 ÷ 9?
(6) 132 × 5 =	(16) There are whole numbers between 6 and 26.
(7) 143 ÷ 11 =	(17) $2 \times 10^4 + 6 \times 10^1 + 8 \times 10^{-1} =$ (decimal)
(8) 73 - 28 - 25 =	(18) $8 \times 15 - 15 \times 2 =$
(9) 24 × 25 =	(19) MMXXI = (Arabic Numeral)
*(10) 201 × 2021 =	*(20) 2022 × 21 – 2022 =
(11) 414599.6206 rounded to the thousands	s place is

Elementary Problem Guidelines

<u>Problems 21 – 40</u>

- 1. Addition/subtraction of fractions with common denominators
- 2. Addition, subtraction, multiplication, & division of decimal fractions
- 3. Comparing decimal fractions
- 4. Conversion problems (either way): fraction/decimal, percent/fraction, percent/decimal
- 5. Order of operations
- 6. More multiplication short-cuts
- 7. Ratio/proportion
- 8. Consumer type problems

Elementary Problem Guidelines

Problems 21 – 40 (continued)

- 9. Problems about prime numbers
- 10. Greatest common divisor (GCD) & least common multiple (LCM)
- 11. Conversion problems (either way): length, measurements, time

Please note that problem types in one category should not be found in a previous category. However, problem types of one category can be found in subsequent categories. For example, one would not expect to see the problem $\frac{4}{9} + \frac{2}{9}$ in problems 1 – 20. However, one can see this problem $\left(\frac{4}{9} + \frac{2}{9}\right)^2$ in problems 61 – 80.

<u>Problem 21 – 40</u>

(21)	14 + 16 + 18 + 20 =
(22)	8 ÷ 2 × 3 =
(23)	$4\frac{1}{7}$ weeks = days
(24)	$5\frac{3}{4}\% = $ decimal
(25)	$\frac{13}{24} + \frac{5}{24} =$
(26)	92 × 93 =
(27)	0.96 =common fraction
(28)	If 48 * costs 64¢ then 36 * cost¢
(29)	79 × 11 =
*(30)	667 × 239 =

(31) 17 quarters =nickels	(31)
(32) The sum of the two largest primes less than 10	(32)
is	
(33) \$3.20 minus 3 quarters = \$	(33)
$(34) \frac{9}{100} \div \frac{27}{100} = \underline{\qquad}$	(34)
(35) 72 inches =feet	(35)
(36) The LCM of 12 and 9 is	(36)
(37) 48 × 101 =	(37)
(38) $87\frac{1}{2}\% = $ common fraction	(38)
(39) The ratio of ounces in 1 pint to 1 quart is	(39)
(40) $44\frac{4}{9}\% \times 6299 =$	*(40)

Elementary Problem Guidelines

<u>Problems 41 – 60</u>

- 1. Addition, subtraction, multiplication & division of fractions and mixed numbers
- 2. Substitution problems
- 3. Perimeter/area of: square, rectangle, triangle
- 4. Radius/diameter of a circle
- 5. Powers & roots of numbers
- 6. Solving simple equations
- 7. Sequences
- 8. Sets
- 9. Word problems

Elementary Problem Guidelines

Problems 41 – 60 (continued)

- 10. Volume of cube/rectangular box
- 11. Right triangle problems
- 12. More multiplication short-cuts
- 13. Base systems conversions

<u>Problem 41 – 60</u>

(41) $16^2 =$ _____

(42) 4³ = _____

- (43) The volume of a cube with side 4-cm is $_{cm}^{3}$ cm³
- (44) The perimeter of a rectangle with sides 11-m and 19-m is ______m
- (45) If 15 + x = 36, then x =_____
- $(46) \quad \frac{9}{10} \quad \div \quad \frac{3}{5} = _$
- (47) $6\frac{1}{3} \times 6\frac{2}{3} =$ ____(mixed number)

(48) 37 × 33 =_____

(49) If x = 15, then 3x - 20 =_____

*(50) 13 × 15 × 17 =_____

(51) What is the number, *k*, in the sequence:
1, 1, 2, 3, *k*, 8, 13, ...?

(52)	If the area of a circle is 144π , what is the diameter of the circle?	
(53)	What is the area of a right triangle with	
	hypotenuse 5 in. and leg 4 in.?	_ in ²
(54)	125 × 16 =	
(55)	What whole number squared minus eight	
	equals twenty-eight?	

- (56) A triangle has sides of 10-in, 12-in and 14-in. What is its semi-perimeter? ______ in
- (57) How many elements are in the intersection of the sets {1, 2, 3, ..., 10} and {2, 4, 6, ..., 20}?
- (58) How many elements are in the power set of {T, H, R, E, E}?_____
- (59) What is the perimeter of the rhombus with a side length of $16 \frac{1}{4}$?
- *(60) 2991 weeks =_____days

Elementary Problem Guidelines

<u>Problems 61 – 80</u>

- 1. Addition, subtraction, multiplication & division of integers
- 2. Inverses
- 3. Basic geometry facts
- 4. More area problems
- 5. Squaring two-digit numbers
- 6. More multiplication short-cuts
- 7. More powers and roots of numbers
- 8. More consumer type problems
- 9. Inequalities
- 10. Probability
- 11. More area problems: parallelogram, rhombus, trapezoid

<u> Problem 61 – 80</u>

(61) 27 (base 10) =_____(base 9)

(62) $-2^4 \div 4 =$ _____

- (64) $32^2 =$ _____
- (65) Two fair dice are thrown. What is the probability that the sum of the two sides showing is 5?
- (66) 15 quarters plus 18 nickels plus 9 dimes plus15 cents = \$_____
- (67) The volume of a rectangular box that measures 10-m by 8-m by 12-m is_____m³
- (68) If x + 12 < 8, then $x < _$
- (69) $\frac{7}{9} + \frac{9}{7} =$ ____(mixed number)

*(70) 1111 × 809 + 1 =____

(71)	390 seconds =minute	S
(72)	For a rectangle with sides 4-cm and 8-cm, what is the ratio of its perimeter to its area?	
(73)	If 9% of x is 4.5% of 6, then $x =$	_
(74)	(-18) + (-24) ÷ (-2) =	_
(75)	36 ² + 12 ² =	
(76)	$28^2 - 18^2 =$	
(77)	What is the distance between -12 and 12 on the number line?	
(78)	143 × 28 =	_
(79)	The area of a square with diagonal 8 is	_
*(80)	√ <u>81796</u> =	_

Certain Facts Elementary Students Should Know!

Squares up to 25.

Cubes up to 10.

Common English measurement conversions (length, weight, area, volume, time)

- American monetary conversions
- Basic metric measurement conversions

Fraction, decimal, percent - equivalencies (thirds, fourths, fifths, sixths, eighths, ninths, elevenths, twelfths, sixteenths)

A+ Junior High Number Sense

Test Writer's Perspective

Junior Problem Guidelines

<u>Problems 1 – 20</u>

1. Addition, subtraction, multiplication & division of whole numbers, fractions, and decimals

- 2. Order of operations
- 3. Use of the distributive property
- 4. Comparison of fractions & decimals
- 5. Multiplication short-cuts
- 6. Squaring numbers
- 7. Roman numerals/Arabic numbers
- 8. Mean, median, mode
- 9. Sums of whole numbers of multiple terms of a finite series

<u>Problem 1 – 20</u>

(1) 32 × 11 =	(12) What is the median of 2, 6, 9 and 8?
(2) 21 + 22 =	(13) Which is larger: $\frac{8}{15}$ or $\frac{13}{25}$?
(3) 205 ÷ 5 =	(14) 25 × 38 =
(4) 12 + 6 ÷ 3 =	(15) 105 – 17 – 33 =
(5) $\frac{7}{12} + \frac{1}{6} =$	(16) 28 × 88 =
(6) 234 × 0.5 =	(17) 176 ÷ 11 =
(7) 101 ÷ 0.25 =	(18) 13 + 18 + 23 + 28 =
(8) $23^2 =$	(19) MCMXXV = (Arabic Numeral)
(9) 12 × 6 × 5 =	*(20) 1818 × 88 + 16 =
*(10) 2021 ÷ 0.0125 =	
(11) 15.25 × 4 =	

Junior Problem Guidelines

Problems 21 – 40

- 1. Addition, subtraction, multiplication & division of mixed numbers and integers
- 2. More multiplication short-cuts
- 3. Percent problems
- 4. Conversion problems (either way):
 - English/metric, length, area, capacity, time
- 5. Consumer type problems
- 6. Substitution problems
- 7. Solving simple equations
- 8. Square roots/cube roots
- 9. Greatest common divisor (GCD) & least common multiple (LCM)

Junior Problem Guidelines

Problems 21 – 40 (continued

- 10. Number theory prime numbers and divisors
- 11. Perimeter/area of: square, rectangle, circle
- 12. Ratio/proportion
- 13. Inverses
- 14. Multiplication of 101, 111

Problem <u>21 – 40</u>

- (21) $0.25 \times 24 + 0.5 \times 24 =$ _____ (31) 84 × 75 =____ (32) The sum of the two largest prime numbers less (22) If $f(x) = 3x^2 + 5$, then f(-3) =_____ than 20 is_____ (23) The ratio of ounces in 3 cups to 1 quart is (33) If 0.75 - 0.25 = n, the $n^{-1} =$ _____ (24) $6\frac{1}{3} \times 12\frac{1}{3} =$ _____(mixed number) (34) The product of the lcm and gcd of 8 and 24 is_____ $(25) 5\frac{3}{4} + 4\frac{5}{6} =$ (35) 1 mile = _____ (26) 111 × 64 =____ (36) 8 percent = (common fraction) (27) The negative square root of 169 is_____ (37) The total cost of item that costs \$160 with a sales tax of $6\frac{1}{4}$ % is \$_____ (28) If \boldsymbol{n} is to 8 as 3 is to 4, then $\boldsymbol{n} =$ (38) 46 × 44 =_____ (29) If 12 - 4x is 16 then x =(39) The area of an equilateral triangle with side *(30) 18 × 20 × 22 =____ 4-cm is $a\sqrt{3}$ and a =_____
 - *(40) 19\sqrt{14400} =_____

feet

cm²

Junior Problem Guidelines

<u>Problems 41 – 60</u>

- 1. Sets
- 2. Word problems
- 3. Pythagorean theorem
- 4. Sequences
- 5. Volume/surface area of rectangular solid/cube
- 6. Base systems: conversions and basic operations
- 7. Area of: parallelogram, rhombus, trapezoid, circle
- 8. Solving inequalities
- 9. Basic geometry facts
- 10. Remainder problems

<u>Problem 41 – 60</u>

(41) 23 (base 4) = _____ (base 2)

(42) $9^3 =$ _____

- (43) \$5 minus 3 quarters minus 4 nickels = \$
- (44) What is the length of a diagonal of a rhombus with an area of 36 m² and other diagonal 4 m?
 - ____m
- (45) 23 (base 5) 14 (base 5) = _____ (base 5)

(46) 72 × 68 =_____

(47) What is the length of an edge of a cube with surface area 2400?

(48) 95 × 96 =____

(49) $10 \times (0.1 + 0.2 + 0.3 + \ldots + 1.0) =$ _____

*(50) $502\pi^2 =$ _____

(51) In the sequence: 1, 4, a, 16, 25, b, 49, ...

a - b =_____

- (52) If $\frac{1}{3}x 12 > 15$, then x >_____
- (53) What is the area of a right triangle with leg 5 cm and hypotenuse 13 cm? _____ cm²
- (54) $23(base 5) \times 4(base 5) =$ ____(base 5)
- (55) What number times eight and added to fifteen equals nineteen?
- (56) What is the area of a trapezoid with bases 26, 24 and altitude 25?
- (57) If set $\mathbf{A} = \{S, A, N, M, A, R, C, O, S\}$ and set $\mathbf{B} = \{S, A, N, A, N, T, O, N, I, O\}$, then the number of elements in $\mathbf{A} = \mathbf{B}$ is ______
- (58) $(14^2 8 \times 6) \div 5$ has a remainder of _____
- (59) 101 × 243 =_____
- *(60) 749 × 361 =____

Junior Problem Guidelines

<u>Problems 61 – 80</u>

- 1. Repeating decimals
- 2. More number theory
- 3. Powers of numbers
- 4. Volume of: circular cylinder, cone, sphere
- 5. Sequences & series
- 6. Factorial
- 7. Coordinate geometry
- 8. Probability/odds
- 9. More percent type problems : Advanced
- 10. More remainder type problems
- 11. More multiplication short-cuts

Please note that problem types in one category should not be found in a previous category. However, problem types of one category can be found in subsequent categories.

For example, one would not expect to see the problem $\frac{4}{9} + \frac{2}{9}$ in problems 1 - 20. However, one can see this problem $\left(\frac{4}{9} + \frac{2}{9}\right)^2$ in problems 61 – 80.

<u>Problem 61 – 80</u>

- (61) $2 \times (2^{-1} + 2^{-2}) =$ _____
- (62) 3 miles =_____ yards
- (63) 30 miles per hour = _____ft/sec
- (64) 20% of 55% of 100 =
- (65) What are the odds of picking a red queen from a standard deck of 52 cards?
- (66) The number of minutes between 10:12 AM and 3:30 PM of the same day is _____
- (67) How many whole numbers will evenly divide into 18?
- (68) 0! = _____
- (69) $4\frac{1}{4} \div \frac{1}{8} =$ _____

*(70) 249700 ÷ 126 =_____

(71) $25^2 + 75^2 =$ _____ (72) 0.777 . . . = _____ (common fraction) (73) 0.8333... = _____ (common fraction) (74) The volume of a right cylinder with length 12 and radius 4 is $k\pi$, and k =(75) The fourth triangular number is (76) 286 × 7 =____ (77) What is the distance between the points (0, 5)and (-12, 0)?_____ (78) $\frac{8!}{6!} + 25 =$ _____ (79) $37^2 - 26^2 =$ _____ *(80) 15 square miles =_____ acres

Certain Facts Junior High Students Should Know!

Squares up to 25. Cubes up to 10. Common English measurement conversions (length, weight, area, volume, time) American monetary conversions Factorials up to 8! Basic metric measurement conversions Fraction, decimal, percent - equivalencies (thirds, fourths, fifths, sixths, eighths, ninths, elevenths, twelfths, sixteenths)

Number Sense Resources

A+ Academics Resources

This is a list of independent companies who advertise preparatory materials for UIL elementary and junior high academic contests. The University Interscholastic League is not affiliated with any of the companies and cannot be responsible for any of their products or services.

AMT Test Writing Service

- 675 Miller Rd., Azle, TX 76020
- Phone: 817-444-3655
- Email: <u>entermeet@gmail.com</u>
- Offers Number Sense: Elements of Number Sense by Jim Cummings. Contains preparatory material for the Number Sense Contest. Accepts School PO's, checks, M/C, Visa, Amex, Disc.

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- 6318 Palmetto Way, San Antonio, TX 78253
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- Email: Peggy Markham peggy@bestoftexascontest.com
- Website: <u>www.bestoftexascontest.com</u>

Apps for smart phones and tablets -- both iOS and Android -- in Spelling, Social Studies, Art, and Music Memory.

Computer Software Number Sense Computerized – by Larry White Larry White Box 25 Millersview, Tx UIL State NS & Mathematics Contest Director Phone:(325) 483-5446

Email: texasmath@centex.net

I have put together a group of programs that can assist you in coaching and teaching number sense shortcuts. I have completed NSC-1 containing 23 programs and NSC-2 containing 20 more programs and have another 20 in the works. The programs are excellent for beginners as well as great review for the more advanced number sense. A High School version and a Middle School version of NSC-1 and NSC-2 are available. Also, a set of 25 specially built programs for Elementary School is available.

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booklet: *NO SENSE IN MATHEMATICS* Don Skow, 4716 W. Monte Cristo Rd, Edinburg, TX 78541 E-mail: <u>dps1221@hotmail.com</u>

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- Email: doug@academicmeet.com
- Website: <u>www.academicmeet.com</u>

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- 9801 W. Parmer Lane #2622, Austin, TX 78717
- Phone: 956-491-3155 (cell)
- Email: toywiz127@aol.com
- Website: <u>www.rammaterials.com/</u>

Number Sense, Calculator Applications, Mathematics and Science practice tests, DVDS, and workbooks (including UIL, PSIA, and TMSCA Number Sense and UIL, PSIA, and TMSCA Mathematics workbooks) are available. Mr. Ramirez is also available for writing invitational meet tests and conducting workshops.

MRC Jr.

- Jamie Pennington
- 412 Paradise Canyon Circle, Paradise, TX, 76073
- Phone: 817-403-0669
- Email: info@uiltests.com
- Website: <u>www.uiltests.com</u>

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myQBook Meets offers free monthly online meets in Number Sense and Mathematics from October to April. Monthly cash awards are given to Teachers of winning teams. Visit www.myQBookMeets.org to register your team and participate.

Number Dojo

- Website: <u>www.NumberDojo.com</u>
- Email: numdojo@gmail.com
- Facebook: <u>www.facebook.com/numberdojo</u>

Free resources include the Number Dojo iPhone app, Number Sensei blog with over 100 concepts and free worksheets, Mathing Bee contest info, and contest maps listing information for all published number sense meets. Also flash cards, worksheets, curriculum and concept reference indexes (solution manuals) for purchase.

Texas Math & Science Coaches Association (TMSCA)

- PO Box 206, Olney TX 76374
- Phone: 940-563-1005; Fax: 940-563-1006
- Email: <u>execsectmsca@gmail.com</u>
- Web: <u>www.tmsca.org</u>

Membership provides an information forum for coaches of math/science contests; access to purchase Practice Materials and Tournaments Tests for number sense, calculator, mathematics and science for high school, middle school and elementary levels; and access to enter on-line and state meets for all grade levels.

The Virtual Challenge High School & Middle School Meets

- Owner/Director: Chuck Thompson
- Email: cthompson1313@gmail.com
- Phone: 940-782-9898
- Website: <u>www.virtualchallengemeets.com</u>

Offers a statewide testing program for the following contests for grades 9 – 12: Number Sense, Calculator, Mathematics, Science, Current Events, Social Studies, Literary Criticism, Spelling, Computer Science, Accounting.

- For grades 5-8: Number Sense, Calculator, Listening, Mathematics, Science I and II, Dictionary Skills, Maps, Graphs & Charts, Social Studies, and Spelling.
- The High School & Middle School Virtual Challenge Meets allow your team to compete in a season of 3 meets to prepare students for their UIL District Meet.
- Your combined elementary/middle school teams will enjoy unlimited entries in 16 different events in all 3 meets with no travel costs and all testing done on a customized schedule, all for one inexpensive combined Entry Fee.

Last year at the HS level, over 350 schools participated posting over 21,000 scores.

University Interscholastic League

- Developing Middle School Number Sense Skills
- Don Skow
- A+ Academic Materials Grades 2 8.