Number Sense Tips

&

Problem Solving

Andy Zapata

Azle ISD – 1974 to 2017

7^{th} grade math, high school math & Physics teacher

Married – 4 children & 3 grandchildren

ETS Physics reader 10 years

Attention All Attendees:

Thank you for registering your attendance for **EACH SESSION**:

UIL Elementary & Junior High Number Sense

Individuals are called upon every day to use their ability to make quick mental calculations to make decisions. The development of such abilities should be an integral part of the math curriculum. Concepts covered include, but are not limited to: addition, subtraction, multiplication, division, proportions, and use of mathematical notation.

Elementary Problem Guidelines

Problem 1 – 20

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

Elementary Problem Guidelines

Problems 21 – 40

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

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

Problems 41 – 60

Elementary Problem Guidelines

Problems 41 – 60 (continued)

6. Solving simple equations
7. Sequences
8. Sets
9. Word problems
10. Volume of cube/rectangular box

Elementary Problem Guidelines

Problems 61 – 80

1. Addition, subtraction, multiplication & division of integers
2. Inverses
3. Basic geometry facts
4. More area problems
5. Squaring two-digit numbers

Elementary Problem Guidelines

Problems 61 – 80 (continued)

12. Coordinate geometry - number line

13. More percent type problems

Junior Problem Guidelines

Problems 1 – 20

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

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):

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

Junior Problem Guidelines

Problems 41 – 60 (continued)

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

Junior Problem Guidelines

Problems 61 – 80 (continued)

4. Volume of: circular cylinder, cone, sphere
5. Sequences & series
6. Factorial
7. Coordinate geometry
8. Probability/odds

Sample Problems

(1) $25 \times 8 =$ _____

$8 \div 4 = 2$

Sample Problems

(2) $75 \times 23 =$ _____

$$75 = \frac{300}{4}$$

Sample Problems

(3) XXIX = _____Arabic Number

M = 1000; D = 500; C = 100; L = 50; X = 10; V = 5; I = 1

Sample Problems

(4) $\frac{11}{8} - \frac{5}{8} =$ _____(fraction)

$\frac{6}{8}$

$\frac{6}{8} = \frac{3}{4}$

Sample Problems

(5) $24 \times 26 =$ _____

Since $26 = 25 + 1$ and

$24 = 25 - 1$

Sample Problems

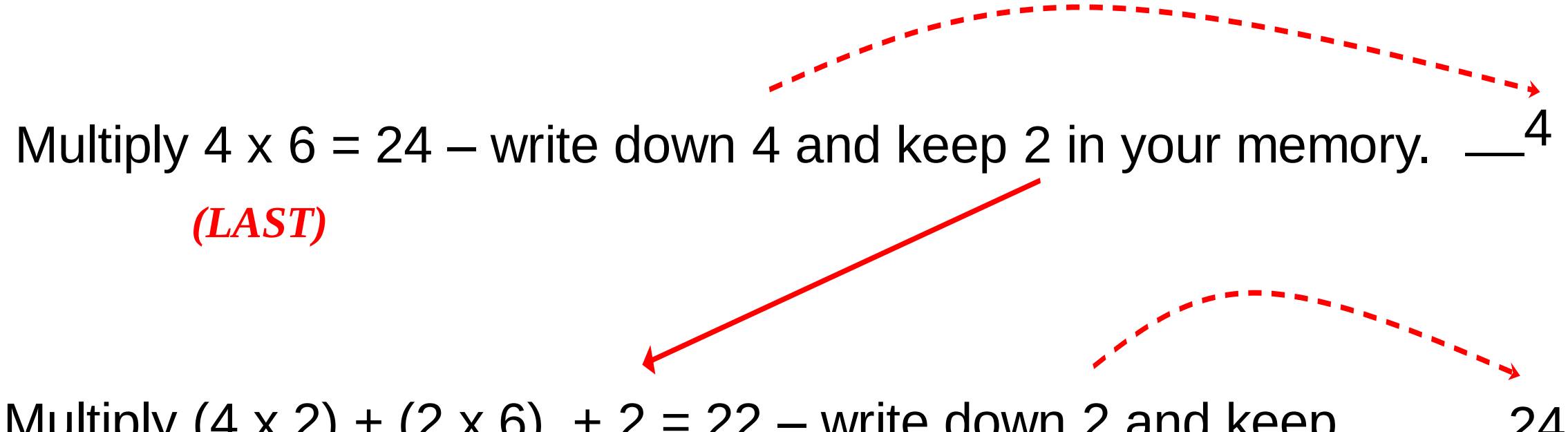
(6) $24 \times 26 =$___(Another Way)____

Since ten's digits are the same **And** one's digits add up to 10

Multiply units digits $\rightarrow$ 4 x 6 = 24 – write this down __24

Sample Problems

(7) $24 \times 26 =$ ___(Still Another Way)___



Sample Problems

(8) .121212… = _____(fraction)

$$.121212\ldots = \frac{12}{99}$$

$$\frac{12}{99} = \frac{2}{\quad}$$

Sample Problems

(9) $1 + 2 + 3 + \ldots + 9 =$ _____

$$1 + 2 + 3 + \ldots + n = \frac{n(n+1)}{2}$$

Sample Problems

(10) 14 + 17 + 20 + 23 + 26 = _____

For sums of equally spaced numbers, multiply the **median** of the numbers by the number of terms.

Sample Problems

(11) 21 + 24 + 27 + 30 = _____

For sums of equally spaced numbers, multiply the **median** of the numbers by the number of terms.

Sample Problems

(12) $4\frac{1}{3} \times 4\frac{2}{3} =$ _____(mixed number)

$\frac{1}{3} \times \frac{2}{3} = \frac{2}{9}$ Write this down

$20\frac{2}{6}$

Sample Problems

(13) $6\frac{1}{3} \times 3\frac{1}{3} =$ _____(mixed number)

$\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$ Write this down

$21\frac{1}{9}$

Sample Problems

(14) 16% of 36 is 8% of_____

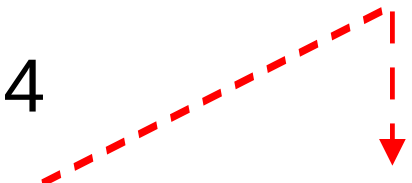
In equation form looks like this: 16% x 36 = 8% x ?

Sample Problems

(15) 5 base 8 + 7 base 8 = _____base 8

5 + 7 = 12

12 ÷ 8 = 1 remainder 4



Sample Problems

(16) The radius of a circle with an area of 16π is_____

$$A = \pi r^2$$

$$\sqrt{16\pi}$$

Sample Problems

(17) $12 \div 4 \times 3 =$ _____

$12 \div 4 = 3$ 3×3 **9**

(18) $12 + 4^2 \times 3 =$ _____

Sample Problems

(19) $26 \times 86 =$ _____

Since one's digits are the same

And ten's digits add up to 10

Sample Problems

(20) $113^2 \div 4$ has a remainder of _____

Just look at the last two digits of the number

$13 \div 4 \rightarrow$ remainder = 1

Sample Problems

(21) $(13^2 + 11 \times 15) \div 7$ has a remainder of _____

$13 \div 7 \rightarrow$ remainder = 6

$6^2 \div 7 \rightarrow$ remainder = 1

$(1 + 4 \times 1) \div 7$

Sample Problems

(22) How many total subsets can be made of the set {A, U, S, T, I, N}? _____

The set has 6 elements, so the number of subset is

2^6

Sample Problems

(23) The area of a rhombus with diagonals 17 and 20 is _____

$$\text{Area of a rhombus} = \frac{\left(diagonal_1\right) \times \left(diagonal_2\right)}{2}$$

Sample Problems

(24) What is the area of a square with diagonal 14? _____

$$\text{Area} = \frac{\left(diagonal\right)^2}{2}$$

Sample Problems

(25) What is the length of the side of an equilateral triangle with area $9\sqrt{3}$?_____

$$Area = \frac{(side)^2\sqrt{3}}{4} \rightarrow side = \sqrt{\frac{4(Area)}{\sqrt{3}}}$$

Sample Problems

(26) $91 \times 96 =$ _____

100 – 91 = 9 and 100 – 96 = 4.

Multiply 9 x 4 and write down.

Sample Problems

(27) $6\frac{3}{4} \div \frac{1}{4} = \_\_\_\_\_$

Recall $\div \frac{1}{4}$ is same as multiplying by 4

Sample Problems

(28) $\frac{5}{9} + \frac{9}{5} =$ _____ (mixed number)

Write down the number 2 for the whole number part of the answer

$2\frac{16}{\quad}$

16

Sample Problems

(29) 100101110 base 2 = _____base 8

Starting at the right end of the number group the digits into sets of 3 digits.

100 101 110

4 5 6

Sample Problems (Estimation)

***(30)** 69 + 79 + 199 = _____

70 + 80 + 200

350

Sample Problems (Estimation)

***(31)** 624 × 240 = _____

Recall $\frac{5}{8}$ = .625

$5000 \times 240 = 150{,}000$

Sample Problems (Estimation)

***(32)** $101^2 - 99^2 =$ _____

$(101 - 99) \times (101 + 99)$

$(2) \times (200)$

Sample Problems (Estimation)

***(33)** $167 \times 359 + 33 =$ _____

$$\frac{1}{6} \approx .167$$

Sample Problems (Estimation)

***(34)** $269 \times 3\frac{5}{9} =$ _____

$270 \times \frac{32}{9}$

$270 \div 9 = 30$

Sample Problems (Estimation)

***(35)** $\sqrt{224} \times \sqrt{325} =$ _____

Recall: $15^2 = 225$ and $18^2 = 324$

$15 \times 18 = 270$

Sample Problems (Estimation)

*(36) $83\frac{1}{3} \times 2390 =$ _____

Recall: $\frac{5}{6} = .83333\ldots$

Sample Problems (Practice)

(1) 25 x 32 = _____

(2) 1 + 2 + 3 + . . . + 19 = _____

(3) 97 x 93 = _____

(4) What is the area of a square with diagonal 8? _____

(5) DCLX = _____(Arabic Number)

(6) 17 x 97 = _____

Some Resources

AMT Test Writing Service

- 675 Miller Rd., Azle, TX 76020
- entermeet@gmail.com
- Phone: 817-444-3655

Offers Number Sense: ***Elements of Number Sense*** by Jim Cummings. Contains

Some Resources

D & R Enterprises

- 1101 W. Monte Cristo Rd. West, Edinburg, TX 78541
- Phone: 956-383-0372

No Sense in Mathematics (4th edition). By Don Skow

Some Resources

Hexco, Inc.

- PO Box 199, Hunt, TX 78024-0199
- 800/725-2627; Fax: 830-367-3824
- Email: hexco@hexco.com Web site: www.hexco.com

Supplies materials for Dictionary Skills, Number Sense, and Spelling

Some Resources

Mental Mathematics for Number Sense

- Frances Walzel
- 2023 CR 08, Cameron, TX 76520
- E-Mail: walzel@vvm.com

Offers 103-page booklet of problems, keys and coded pages for

Some Resources

MRC Jr.

- 1024 Scenic Drive, Justin, TX 76247
- Phone: 940-648-8587; Fax: 940-648-8580
- Email: tomcat2243@ev1.net

Offers study materials and tests for Maps, Graphs and Charts

Some Resources

Dr. Numsen/Doug Ray

- PO Box 312578, New Braunfels, TX 78131
- Phone: (512) 797-2158; Fax: (208) 575-9617
- Email: doug@academicmeet.com
- Web site: www.academicmeet.com

Some Resources

Leo Ramirez

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

Some Resources

TMSCA Test Pool

- Texas Math/Sciences Coaches Association
- PO Box 206, Olney Texas, 76374-0206
- (940) 563-1005
- TMSCA.org

Some Resources

The handbook, *Developing Middle School Number Sense Skills*, is available. It is the same edition first published in 1996. Stock #217. Cost: $6.00.

University Interscholastic League

PO Box 8028