

# Number Sense Tricks

The only thing  
I still use from High School

# Quick overview

State UIL competition just in Texas (as far as I know)

10 minutes, 80 questions, NO SCRATCH PAPER

Compete as individual or in teams of 4

# Dealing with decimals and 0s

$120 \times 7 \rightarrow$  Think  $7 \times 12$  first,  $7 \times 12 = 84$ . Then, add the 0s you missed  $84 \rightarrow 840$

**250 x 50**  $\rightarrow$

$$5 \times 25 = 125$$

add 2 zeroes, 12500

**200 x 130**  $\rightarrow$

$$2 \times 13 = 26$$

add 3 zeroes, 26000

# Trick 1 - Distributive Property

Best to use when you have an (easy number) x (hard number) or 2 somewhat easy numbers to multiply

$$12 \times 23$$

$$12 \times (\mathbf{20} + \mathbf{3})$$

$$12 \times \mathbf{20} + 12 \times \mathbf{3}$$

$$240 + 36 \quad \text{===} \quad 276$$

$$7 \times 127 \quad \text{===} \quad 7 \times (120 + 7) \quad \text{===} \quad 7 \times 120 + 7 \times 7 \quad \text{===} \quad 840 + 49 \quad \text{===} \quad 889$$

# Trick 2 - How to multiply by dividing

## Exact answers:

Particularly useful when multiplying by fractions with clean decimals

0.25, 0.2, 0.125

## Approximations:

Good for any fractions that you know the decimal for

0.33333, 0.1666666, 0.142857, 0.111111,

## Trick 2 - Multiply by Dividing - Examples

### 25 x 620

$$\begin{aligned} & 25 \quad * (620) \\ (100 \times 0.25) & * (620) \\ 100 \quad * & (0.25 \times 620) \\ 100 \quad * & \quad 155 \\ 15500 \end{aligned}$$

### 125 x 888:

$$125 \rightarrow (1000 \times 0.125) * (888) == 1000 * (0.125 \times 888) == 1000 * (111) = 111000$$

## Trick 2 - How to approximate

$$337 \times 18$$

- 1) Recognize that 337 is pretty much 333, which is pretty much  $0.333333333\dots$
- 2) Prepare mind to be blown, this may take up to 20 seconds
- 3)  $\frac{1}{3}$  of 18 is 6, move decimal place 3 places to the right
- 4) Our approximation is 6000 (real answer is 6066, that's within 1% error)
- 5) If you wanted a closer answer, can distribute,  $337 \times 6 = (333 + 4) \times 6 = 6000 + 24$ , 6024...but honestly who cares about getting closer

# Trick 3 - Multiplying 2 numbers close together

Time to bust out that perfect square knowledge!

Examples:

21 x 29, 35 x 45, 43 x 47, 101 x 99, 17 x 23

Steps:

- 1) Recognize that the 2 numbers are evenly spaced around a central number
- 2) Solve for perfect square in middle
- 3) Subtract the correct amount (square of the distance to middle number)
- 4) \$\$\$



# Trick 3 - Deeper dive

$$\underline{17 \times 23 = 400 - 9 = 391}$$

$$17 = 20 - 3$$

$$23 = 20 + 3$$

Take a deep breath, algebra incoming

$$17 \times 23 = (20 - 3) * (20 + 3) = 400 - (3 * 20) + (3 * 20) - 9 = 400 - 9 = 391$$

$$24 * 26 = 625 - 1$$

$$13 * 27 = 400 - 49$$

$$97 * 103 = 10000 - 9$$

# Practice Test

$$125 * 40$$

$$200 * 17$$

$$63 * 6$$

$$41 * 59$$

Approximate: 167 x 244