



# ASE 2020-21 Notes

Lecture Notes by Dylan Yu

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August 7, 2020

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## §1 Sunday, 08/09/20

### §1.1 Number Sense: Squares From 41-59

There is a quick trick for easy computation for squares from 41 – 59. Let  $k$  be a 1-digit integer, then any of those squares can be expressed as  $(50 \pm k)$ :

$$\begin{aligned}(50 \pm k)^2 &= 2500 \pm 100 \cdot k + k^2 \\ &= 100(25 \pm k) + k^2\end{aligned}$$

What this means is that:

1. The tens/ones digits is just the difference the number is from 50, squared ( $k^2$ ).
2. The remainder of the answer is taken by *adding* (if the number is greater than 50) or *subtracting* (if the number is less than 50) that difference from 25.
3. Note: You could extend this concept to squares outside the range of 41 – 59 as long as you keep up with the carry appropriately.

Let's illustrate with a couple of examples:

	Tens/Ones:	$(50 - 46)^2 = 4^2$	<b>16</b>
$46^2 =$	Rest of Answer:	$25 - 4$	<b>21</b>
	Answer:		<b>2116</b>
	Tens/Ones:	$(57 - 50)^2 = 7^2$	<b>49</b>
$57^2 =$	Rest of Answer:	$25 + 7$	<b>32</b>
	Answer:		<b>3249</b>
	Tens/Ones:	$(61 - 50)^2 = 11^2$	<b>121</b>
$61^2 =$	Rest of Answer:	$25 + 11 + 1$	<b>37</b>
	Answer:		<b>3721</b>

### §1.1.1 Squares From 41-51 Problems

- |                           |   |
|---------------------------|---|
| 1. $58^2 =$ _____         | 5. (*) $48 \times 49 \times 50 =$ _____ |
| 2. $(510)^2 =$ _____      | 6. $56^2 =$ _____                       |
| 3. $47 \times 47 =$ _____ | 7. $59 \times 59 =$ _____               |
| 4. $53^2 =$ _____         | 8. $41^2 =$ _____                       |

## §1.2 Calculator: More Stated Problems

Today we will work more towards problems.

These problems are taken from 2019-20 Elementary Number Sense #5.

**Problem 1.** During the 2019 football season, Deshaun Watson gained 3852 yards passing. He gained 413 yards rushing. What was his combined yardage for both passing and rushing during the 2019 football season?

**Problem 2.** During the 2020 Spring break, Wyatt's family planned a skiing vacation with their cousins. They bought four round-trip tickets for a total cost of \$712. What was the cost of each individual ticket?

**Problem 3.** Using current values, an ounce of gold is worth \$1475.46. An ounce of silver is worth \$16.96. A pound of copper is worth \$3.68. What would be the difference in value of a pound of silver and a pound of gold?

**Problem 4.** On his calculator test, Wesley worked the first 59 problems. He missed two problems and skipped two. What was his score on the test?

**Problem 5.** Wyatt calculated the area of a regular hexagon. The shortest diagonal in the hexagon was 65.08. What was the measure of the longest diagonal of the hexagon?

**Problem 6.** Lindsey calculated the sum of twelve consecutive even integers. The sum of the twelve integers was 5868. What was the sum of the smallest and largest of these twelve integers?

**Problem 7.** Daryl calculated the area of an equilateral triangle with a height of 89.05 inches. Bryan calculated the area of a regular hexagon with a long diagonal of 34.92 inches. What was the absolute value of the difference between the two areas?

**Problem 8.** Lara can walk a mile in 13 minutes and 20 seconds. Hailey can walk a mile in 12 minutes and 30 seconds. If they start exactly one mile apart and walk toward each other, how many minutes will it take for them to meet?

**Problem 9.** Ayden calculated the area of a rhombus with a side length of 36 inches and a long diagonal of 60 inches. Rylie added the area of an equilateral triangle to Ayden's total. Her final answer was 1323.9 square inches. What was the height of Rylie's equilateral triangle?

**Problem 10.** Point  $J$  has coordinates  $(78, 12)$  and point  $S$  is located at  $(41, 37)$ . What is the distance from point  $S$  to point  $J$ ?

## §1.3 General Math: Practice MathLeague

Today we will be practicing doing questions from a real MathLeague test. I don't think I'm allowed to post actual questions anywhere, so I will instead just display it in the OneNote.