

## Working With Square Roots:

- A. The trick to working with square roots is to know what range the square root is in. Since squaring numbers ending in 0 and [squaring numbers ending in 5](#) are both easy, we can get the answer within a range of 5.
- B. If the number is a perfect square, then we can know what the ending digit will be of the answer by looking at the ending digit of the question.

If the number ends in a:

- 0 -> then the ending digit is a 0
- 1 -> then the ending digit is 1 or 9.
- 4 -> then the ending digit is 2 or 8.
- 5 -> then the ending digit is a 5.
- 6 -> then the ending digit is 4 or 6.
- 9 -> then the ending digit is 3 or 7.

- C. After finding the last digit (or possibility between two digits) mentally chop off the last two digits and focus on the remaining digits.
- D. Now, try to find a range of 5 that the number (in step c) is in. Once you do this you know the answer using step B. First, find a range of 10, then find out if the answer is in the upper-half of the range (i.e. ends in 5, 6, 7, 8, or 9) or if the answer is in the lower-half of the range (i.e. ends in 0, 1, 2, 3, or 4) by squaring the middle number (the number in the range that ends in 5).

Ex [1]  $\sqrt{5329} = \underline{\hspace{2cm}}$ .

- a. We know the last number must be a 3 or 7.
- b. Chopping off the last two numbers we need to focus on the remaining numbers or 53.
- c. We know that  $7^2 = 49$  and  $8^2 = 64$  so since 53 is between these two numbers, the answer is between 70 and 80.
- d. Squaring 75 we get 5625. Since the original number is lower than this, we know the answer is in the lower-half.
- e. The answer is 73.

Ex [2]  $\sqrt{15876} = \underline{\hspace{2cm}}$ .

- a. We know that the last number must be a 4 or 6.
- b. Chopping off the last two numbers we are left with 158.
- c. We know that  $12^2 = 144$  and  $13^2 = 169$  so the number is between 120 and 130 since  $144 < 158 < 169$ .
- d. Squaring 125, we get 15625. Since the original number is greater than this, we know the answer is in the upper-half.
- e. The answer is 126.