Section 10.4

TERMINOLOGY 10.4

For each of the following terms, provide 1) a definition in your own words, 2) the formal definition (as provided by your text or instructor), and 3) an example of the term using a drawing or problem. A sample filled-out form is available in the Introduction.

Perfect Square

Your definition	
Formal definition	
Example	

Square Root

Your definition	
Formal definition	
Example	

READING AND SELF-DISCOVERY QUESTIONS 10.4

1. If you multiply a whole number by itself, what is the resulting product called?

   A perfect square

2. How do you find the square root of a perfect square?

   I ask myself, "What positive number, multiplied by itself (squared), gives the number that is the perfect square?" If the perfect square is 100, for example, I ask, "What number, when multiplied by itself, gives 100?" The answer is 10 because 10 × 10 = 100.

CRITICAL THINKING QUESTIONS 10.4

1. If asked to explain the relationship between x and $\sqrt{x^2}$, how would you respond?

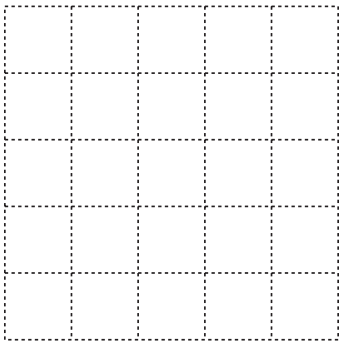
   Because the positive square root of x^2 is $|x|$, both expressions are equal to x. They are equivalent values, similar to 2/2 being equivalent to 1.

2. Draw a diagram of a square with a side length of 2 units. (Feel free to use the grid provided at right.)

   a) How many square units are in the square you drew? **4**

   b) Add an additional unit to the length and width of your square. How many square units are now in your square? **9**

   c) If you had a square of 16 inches per side, how many square inches would be contained in the figure? **256**



   d) What relationship can you ascertain between the measurement of each side of a square and the square units within the square?

   The number of units contained in a square is the measurement of one side, squared.

3. Do all integers have a positive square root? If not, give an example of an integer that does not have a positive square root.

   No. Students should be able to identify that negative numbers (which are integers) do not have a positive square root. I.e., there is no positive number, that when squared, yields a negative number.

DEMONSTRATE YOUR UNDERSTANDING 10.4

1. Is the square root of 39 closer to 6 or 7? How can you estimate the square root of a number?

   It is closer to 6. Compute the squares of 6 and 7: 36 versus 49. 36 is closer to 39 than 49 is.

2. Does $-\sqrt{5} = \sqrt{-5}$? Explain your answer.

   No. The number $-\sqrt{5}$ means the negative square root of 5 (a negative number, that when squared, yields 5). $\sqrt{-5}$ means the positive square root of a negative number (a positive number, that when squared, gives -5).

IDENTIFY AND CORRECT THE ERRORS 10.4

In the second column, identify the error(s) you find in each of the following worked solutions. Describe the error made in the second column. Solve the problem correctly in the third column.

Problem	Describe Error	Correct Process
1. Simplify: $\sqrt{49}+\sqrt{36}$ **Worked Solution** *(What is wrong here?)* $\sqrt{49}+\sqrt{36}$ $=\sqrt{85}$ $\approx$ **9.22**	**The student has incorrectly combined both terms under a single radical. This can be done with multiplication but *not* addition.**	$\sqrt{49}+\sqrt{36}$ $=7+6$ $=$ **13**

Problem	Describe Error	Correct Process
2. Simplify: $\frac{\sqrt{144}}{\sqrt{16}}$ **Worked Solution** *(What is wrong here?)* $\frac{\sqrt{144}}{\sqrt{16}}=\sqrt{144-16}$ $=\sqrt{128}$ $\approx$ **11.31**	**The student has incorrectly turned a division problem into a subtraction problem.**	$\frac{\sqrt{144}}{\sqrt{16}}$ $=\frac{12}{4}=$ **3**