Date: _____

Squares & Square Roots

A. SQUARING A NUMBER:

- to *square* a number means to multiply that number by itself;
- it is a very common *power* - the exponent is always '2'

- e.g. $3^2 = 3 \times 3 = 9$ $7^2 = 7 \times 7 = 49$ $15^2 = 15 \times 15 = 225$

- you should memorize these:

$1^2 = 1$ $2^2 = 4$ $3^2 = 9$ $4^2 = 16$

$5^2 = 25$ $6^2 = 36$ $7^2 = 49$ $8^2 = 64$

$9^2 = 81$ $10^2 = 100$ $11^2 = 121$ $12^2 = 144$

B. FINDING THE SQUARE ROOT OF A NUMBER:

1. square root - a number that, when multiplied by itself, equals the original number

eg. the square root of 64 is 8 since 8 x 8 = 64

the square root of 8.41 is 2.9 since 2.9 x 2.9 = 8.41
we use this symbol when we want to find the square root $\sqrt{}$

2. perfect square - a number that has a natural number as its square root

- natural numbers are the counting numbers (1, 2, 3, 4, 5, …)

eg. 64 is a perfect square because its square root is 8, a natural number

8.41 is not a perfect square because its square root is 2.9, and this is not a natural number

I. Find the following square roots. (You must memorize these perfect squares!)

a. $\sqrt{4}$ = ____ b. $\sqrt{9}$ = ____ c. $\sqrt{16}$ = ____ d. $\sqrt{25}$ = ____

e. $\sqrt{36}$ = ____ f. $\sqrt{49}$ = ____ g. $\sqrt{64}$ = ____ h. $\sqrt{81}$ = ____

i. $\sqrt{100}$ = ____ j. $\sqrt{121}$ = ____ k. $\sqrt{144}$ = ____

II. Find the following square roots.

a. $\sqrt{0.04}$ = ____ b. $\sqrt{0.16}$ = ____ c. $\sqrt{1.21}$ = ____

d. $\sqrt{1.44}$ = ____ e. $\sqrt{225}$ = ____ f. $\sqrt{196}$ = ____

C. ESTIMATING SQUARE ROOTS OF NUMBERS THAT ARE NOT PERFECT SQUARES:

√12 - this number is <u>not</u> a perfect square
- we can <u>estimate</u> the answer
- we look for the two <u>closest</u> perfect squares to 12 ----> 9 and 16

√16 = 4
√12
√9 = 3

} 12 is almost in the middle between 16 and 9

it is closer to 9, so √12 should be closer to 3 than 4

√12 ≐ <u>3.4</u>

this symbol means 'approximately equal'

I. Estimate the square roots of these numbers. Use your calculator to check afterwards.

a. √15 b. √37 c. √50 d. √93

II. Find a number that has a square root between each of the following numbers. The first one is done for you.

a. 6 and 7 b. 5 and 6 c. 10 and 11

6 is the square root of 36
7 is the square root of 49
So, a square root that is between 6 and 7 must be of numbers between 36 and 49.
I can choose any number between those two numbers - I choose 39.

Remember √39 will fall between 6 and 7.