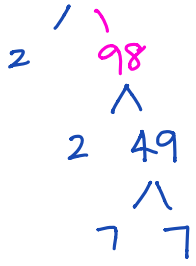
Name: _____ Date: _____

Learning Goal 7.1	I can identify perfect squares and cubes and evaluate square and cube roots.

Warm Up Determine which of the following numbers are perfect squares by using their prime factorization. Explain.

a. $196 = 2^2 \times 7^2$



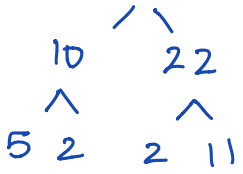
2 into 19? 9 R1

2 into 16? 8

$$2\overline{)196}\quad 98,\ 18,\ 16$$

Perfect square (all exponents are even)

b. $220 = 2^2 \times 5 \times 11$



Not a perfect square.

Estimating a Square Root

$\sqrt{196} < \sqrt{200} < \sqrt{225}$

Find perfect squares around the number $14 < \sqrt{200} < 15$
- one bigger and - one smaller
Decide which you are closer to;

$225 - 196 = 29$ $\quad 200 - 196 = 4$

estimate the decimal point.

$\sqrt{200} \doteq 14.1$

Example Estimate the following to **one decimal place.**

a. $\sqrt{10}$

perfect squares

$\sqrt{9} < \sqrt{10} < \sqrt{16}$

$3 < \sqrt{10} < 4$

$\sqrt{10} = 3\frac{1}{7} \doteq 3.2$

$16 - 9 = 7$ (denominator) $\quad 10 - 9 = 1$ (numerator)

b. $\sqrt{62}$

perfect squares

$\sqrt{49} < \sqrt{62} < \sqrt{64}$

$7 < \sqrt{62} < 8$

$\sqrt{62} = 7\frac{13}{15} \doteq 7.8$

$64 - 49 = 15$ (denominator) $\quad 62 - 49 = 13$ (num.)

c. $\sqrt{39}$

$\doteq 6.2$

$\doteq 6.3$

d. $\sqrt{110}$

$\doteq 10.4$

$\doteq 10.3$

Example Felicity wants to know if a wading pool will fit in a small space in her yard. She must estimate the side length of the square wading pool, which has an area of 7 m^2.

a. What is a reasonable estimate for the side length of the pool? Use perfect squares to estimate. Give you answer to one decimal place.

$\sqrt{4} < \sqrt{7\,m^2} < \sqrt{9}$

$2 < \sqrt{7} < 3$

$\sqrt{7} \doteq 2.6$

$9 - 4 = 5$ $\quad 7 - 4 = 3$

$\frac{3}{5} = 0.6$

A reasonable estimate is 2.6 m.

b. Use a calculator to approximate the side length of the pool, to the nearest tenth of a metre. Compare your estimate in part a. with the calculator's approximate answer.

$\sqrt{7} \doteq 2.6$ by calculator ☺

Example How many whole numbers are there who have a square root between 2 and 3. List them.

$\sqrt{4}$ (2) $\qquad$ $\sqrt{9}$ (3)

how far apart are these 2 numbers?

4, 5, 6, 7, 8, 9

There are 6 whole numbers that have a square root between 2 and 3

Example How many whole numbers are there who have a square root between 6 and 7. List them.

$= \sqrt{36}$ (6) $\qquad = \sqrt{49}$ (7)

① 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49

② 36 – 49 ☺