Concept: Square Root

Name:

Warm Up

1. Multiply the following:

(a) 2^2 = ***4*** (b) 3^2 = ***9*** (c) 4^2 = ***16***

(d) 5^2 = ***25*** (e) 6^2 = ***36*** (f) 7^2 = ***49***

COMPUTER COMPONENT

Instructions: In UMATH X follow the **Content Menu** path:

Exponents > **Square Root**

- Work through all Sub Lessons of the following Lessons **in order**:
  - *Squaring Numbers*
  - *Square Roots*
  - *Radical Signs*
  - *Square Roots of Negative Numbers*
  - *Examples Questions*
  - *Estimating Square Roots*
  - *Estimating Square Roots on a Number Line*

Additional Required Materials: Scientific calculator

- As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

NOTES

Squaring Numbers

- A number is squared when it is ***multiplied*** by ***itself.***

Fill in the following examples of squares.

$1^2 = 1 \times 1 = 1$

$2^2 = 2 \times 2 = 4$

$(-2)^2$	=	-2×-2	=	***4***
7^2	=	7×7	=	***49***
$(-7)^2$	=	-7×-7	=	***49***
4.5^2	=	4.5×4.5	=	***20.25***
$(-4.5)^2$	=	-4.5×-4.5	=	***20.25***
a^2	=	$a \times a$	=	a^2
$(-a)^2$	=	$-a \times -a$	=	a^2

Fill in the blanks.

(a) Every positive number has **2** square roots; one ***positive*** and one ***negative.***

Example:

$2^2 = 2 \times \mathbf{2} = \mathbf{4}$

$(-2)^2 = (-2) \times \mathbf{(-2)} = \mathbf{4}$

The square roots of ***4*** are ***2*** and ***-2 .***

(b) The $\sqrt{}$ symbol is called a ***radical*** sign.

(c) The radical sign tells you to take the ***positive*** square root.

What number has been squared to get the number under the square root symbol?

(a) $\sqrt{64}$ **8**

(b) $\sqrt{25}$ **5**

A number cannot be ***multiplied*** by ***itself*** to give a ***negative*** product.

Example: $\sqrt{-4}$

$2 \times 2 = 4$

$-2 \times -2 = 4$

$\neq$

The product is always a ***positive*** number.

*We **cannot** take the square root of a **negative** number.*

Remember:

- Operations ***under*** the ***radical*** sign are done ***first***.

  Example:

  $\sqrt{4 + 10} = \sqrt{14}$

  $= 3.74$

- A square root can be written as a ***product*** of two radicals.

  Example:

  (a) $\sqrt{6} = \sqrt{2 \times 3}$

  $= \sqrt{2}\ \sqrt{3}$

  (b) $\sqrt{9} = \sqrt{3 \times 3}$

  $= 3$

When **estimating** square roots.

- First, find an easier square root that is close, but a little ***less*** than it.
- Then find an easier square root that is just a little ***greater*** than it.

Example:

(a) $\sqrt{28}$ **is *between*** $\sqrt{25}$ **and** $\sqrt{36}$

OFF COMPUTER EXERCISES

1. Find the square roots of each number.

(a) 81 = ***9 × 9 and -9 × -9***

(b) 64 = ***8 × 8 and -8 × -8***

(c) 1= ***1 × 1 and -1 × -1***

(d) 0 = ***0***

(e) 100 = ***10 × 10 and -10 × -10***

(f) 144= ***12 × 12 and -12 × -12***

(g) 9 = ***3 × 3 and -3 × -3***

(h) 225 = ***15 × 15 and -15 × -15***

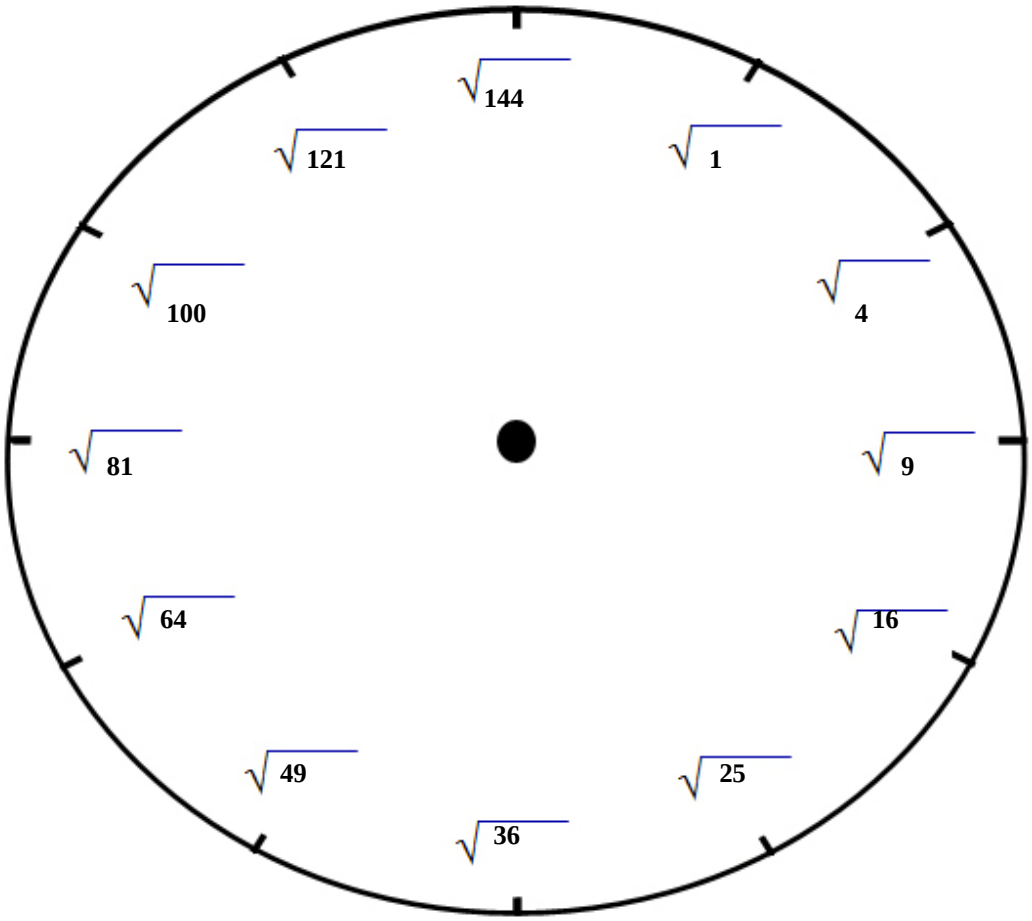
2. Which square roots are the following between?

(a) $\sqrt{72}$ **between** $\sqrt{64}$ **and** $\sqrt{81}$

(b) $\sqrt{38}$ **between** $\sqrt{36}$ **and** $\sqrt{49}$

(c) $\sqrt{109}$ **between** $\sqrt{100}$ **and** $\sqrt{121}$

3. Fill in the missing numbers on the radical clock face:



4. Evaluate.

(a) $\sqrt{36} = 6$

(b) $\sqrt{25} = 5$

(c) $\sqrt{225} = 15$

(d) $\sqrt{81} - \sqrt{144} = 9 - 12 = -3$

(e) $\sqrt{9} + \sqrt{16} = 3 + 4 = 7$

(f) $\sqrt{9+16} = 5$

(g) $\sqrt{9 \times 25} = 15$

(h) $\sqrt{9} \times \sqrt{25} = 15$

(i) $\sqrt{\frac{100}{16}} = \sqrt{\frac{10}{4}}$

(j) $\sqrt{\frac{4}{9}} = \sqrt{\frac{2}{3}}$

(k) $\sqrt{(\sqrt{81})} = 3$

(l) $4 + \sqrt{3^3 + 3^2} = 4 + 6 = 10$

5. Evaluate each expression if $x = 3$, $y = -4$ and $z = -7$.

(a) $-\sqrt{3x} = -3$

(b) $\sqrt{15x - y} = 7$

(c) $\sqrt{y^2 + 3x} = 5$

(d) $\sqrt{x^2 - z} = 4$

6. Answer the following and show all your steps.

(a) If the area of a square is 289 square mm, calculate the dimensions.

$\sqrt{289} = 17\ mm \times 17\ mm$

(b) If the area of a square is 0.0081 square cm, calculate the dimensions.

$\sqrt{0.0081}$ = ***0.09 × 0.09 cm***

(c) A rectangle has dimensions of 4 cm by 16 cm and is equal to a second figure which is a square. *Find the dimensions of the square.*

4 × 16 = 64 = $\sqrt{64}$ **= *8 × 8***

Challenge

7. Calculate the square root of $(4^3 + 4^3 + 4^3 + 4^3)$.

= $\sqrt{256}$ **= *16***

8. Find a number x to make this statement true:

$4 + (x \div 4^2) - 2 \times 3^2 = 18$

4 + (0 ÷ 16) – 2 × 9 = 18

4 + (0) -2 × 9 = 18

2 × 9 = 18 By 'guess and check', it is established that x = 0