

Name: _____ Algebra 10 Unit 9 Lesson 1 & 2

Square Roots & Irrational Numbers

DO NOW ~ Tuesday 2/4

What was the most difficult part of the Unit 8 Test? _____



Classwork

Find the value of each of the following square roots.

(a) $\sqrt{25} = \pm 5$

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

(c) $\sqrt{100} = \pm 10$

(d) $\sqrt{0} = 0$

(e) $\sqrt{\frac{1}{4}} = \frac{\sqrt{1}}{\sqrt{4}} = \pm \frac{1}{2}$

(f) $\sqrt{\frac{64}{9}} = \frac{\sqrt{64}}{\sqrt{9}} = \pm \frac{8}{3}$

Give all (positive and negative) square roots of each of the following numbers.

(a) 4 $\sqrt{4} = \pm 2$

(b) 36 $\sqrt{36} = \pm 6$

(c) $\frac{1}{16}$ $\frac{\sqrt{1}}{\sqrt{16}} = \pm \frac{1}{4}$

Exercise #3: Given the function $f(x) = \sqrt{x+3}$, which of the following is the value of $f(46)$?

(1) 22

(3) 16

(2) 5

(4) 7

$\sqrt{46+3}$

$\sqrt{49}$

Exercise #4: Find the value of each of the following products.

(a) $\sqrt{4} \cdot \sqrt{9} = 2 \cdot 3 = 6$

(b) $\sqrt{4 \cdot 9} =$

$\sqrt{36} = 6$

(c) $\sqrt{4} \cdot \sqrt{25} = 2 \cdot 5 = 10$

(d) $\sqrt{4 \cdot 25} =$

$\sqrt{100} = 10$

Continue onto the next page.

Exercise #5: Find the result of each of the following products.

(a) $\sqrt{2} \cdot \sqrt{8} =$

$$\sqrt{16} = \textcircled{4}$$

$$y = 45/x$$

(b) $\sqrt{12} \cdot \sqrt{3} =$

$$\sqrt{12 \cdot 3} = \sqrt{36} = \textcircled{6}$$

(c) $\sqrt{20} \cdot \sqrt{5} =$

$$\sqrt{100} = \textcircled{10}$$

Exercise #6: To introduce **simplifying square roots**, let's do the following first.

(a) List out the first 10 perfect squares (starting with 1).

1, 4, $\textcircled{9}$, 16, 25, 36, 49, 64, 81, 100

(b) Now consider $\sqrt{18}$. Which of these perfect squares is a factor (divides) of 18?

$$\sqrt{9} \cdot \sqrt{2} = \boxed{3\sqrt{2}}$$

(c) Simplify the $\sqrt{18}$. This is known as writing it in **simplest radical form**.

Exercise #7: Write each of the following square roots in simplest radical form.

(a) $\sqrt{8}$

$$\sqrt{4} \cdot \sqrt{2} = \textcircled{2\sqrt{2}}$$

(b) $\sqrt{45}$

$$\sqrt{9} \cdot \sqrt{5} = \textcircled{3\sqrt{5}}$$

(c) $\sqrt{48}$

$$\sqrt{16} \cdot \sqrt{3} = \textcircled{4\sqrt{3}}$$

(d) $-\sqrt{75}$

(e) $\sqrt{72}$

(f) $-\sqrt{500}$

$$\sqrt{100} \cdot \sqrt{5} = -10\sqrt{5}$$

DO NOW ~ Wednesday 2/5

Give all answers to the following:

$$\begin{array}{r} \sqrt{36} \\ + \\ - \end{array} \quad \textcircled{6}$$

$$\begin{array}{r} \sqrt{144} \\ + \\ - \end{array} \quad \textcircled{12}$$



Classwork

Fractions *Integers*
Rational Numbers
 Decimals that stop
 1.2 6.5

 Decimals that Repeat
 2. $\overline{3}$ 4. $\overline{67}$

Irrational Numbers
 Decimals that never end, but don't repeat.
 2.346... π

Exercise #1: Let's consider a number that is rational and one that is irrational (**not rational**). Consider the rational number $\frac{2}{3}$ and the irrational number $\sqrt{\frac{1}{2}}$. Both of these numbers are less than 1.

- (a) Draw a pictorial representation of $\frac{2}{3}$ of the rectangle shown below.



- (b) Using your calculator, give the decimal representation of the number $\frac{2}{3}$. Notice that it has a repeating decimal pattern.

0. $\overline{6}$

- (c) Write out all of the decimal places that your calculator gives you for $\sqrt{\frac{1}{2}}$. Notice that it does not have a repeating decimal pattern.

0.7071067812...

- (d) Why could you not draw a pictorial representation of $\sqrt{\frac{1}{2}}$ that way you do for $\frac{2}{3}$?

Continue onto the next page.

Exercise #2: Write out every decimal your calculator gives you for these **irrational numbers** and notice that they never repeat.

(a) $\sqrt{2} =$

1.414213562...

Irrational

(b) $\sqrt{10} =$

3.16227766...

Irrational

(c) $\sqrt{23} =$

4.795831523...

Irrational

Exercise #3: Consider the **irrational number** $\sqrt{28}$.

$\sqrt{1}, \sqrt{4}, \sqrt{9}, \sqrt{16}, \sqrt{25}, \sqrt{36}$

(a) Without using your calculator, between what two consecutive integers will this number lie? Why?

$\sqrt{25}$
5

$\sqrt{36}$
6

(c) Write $\sqrt{28}$ in simplest radical form.

$\sqrt{4} \cdot \sqrt{7}$

$2\sqrt{7}$

(b) Using your calculator, write out all decimals for $\sqrt{28}$.

5.291502622...

(d) Write out the decimal representation for your answer from (c). Notice it is the same as (b).

↓

1, 4, 9, 16, 25, 36

DO NOW ~ Thursday 2/6

Are the following real numbers rational or irrational?

$\frac{-1}{2}$

rational

$\sqrt{5}$

Irrational

1.55

Rational



Classwork

Exercise #4: For each of the following addition or subtraction problems, a rational number has been added to an irrational number. Write out the decimal representation that your calculator gives you and classify the result as rational (if it has a repeating decimal) or irrational (if it doesn't).

(a) $\frac{1}{2} + \sqrt{2}$

Irrational

Rat. + Irr. =

(b) $\frac{4}{3} + \sqrt{10}$

Rat. + Irr. =

Irrational

(c) $7 - \sqrt{8}$

Rat. - Irr. =

Irrational

Exercise #5: Fill in the following statement about the sum of rational and irrational numbers.

When a **rational number** is added to an **irrational number** the result is always Irrational.

Exercise #6: Which of the following is an irrational number? If necessary, play around with your calculator to see if the decimal representation does not repeat. **Don't be fooled by the square roots.**

(1) $\sqrt{25}$

(3) $\frac{7}{2}$

(2) $4 - \sqrt{9}$

(4) $3 + \sqrt{6}$

$4 - 3$

$3 + \sqrt{6} = \text{Irrational}$

①

To earn your full participation point for the Do Now be sure to have completed all of the following by the time is up:

- 1) Be in your seat
- 2) Take out your calculator
- 3) Have last night's homework out
- 4) Complete the do now



DO NOW ~ Friday 2/7

Simplify the following radical expression.

$$\sqrt{28} = \sqrt{4 \cdot 7} = 2\sqrt{7}$$



1, 4, 9, 16, 25, 36

$$y = 28/x$$

Table

Classwork

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

What is $\sqrt{32}$ expressed in simplest radical form?

$$\sqrt{16} \cdot \sqrt{2} = 4\sqrt{2}$$

What is $\sqrt{108}$ expressed in simplest radical form?

$$\sqrt{36} \cdot \sqrt{3} = 6\sqrt{3}$$

$$\sqrt{9} \cdot \sqrt{12}$$

What is $2\sqrt{27}$ expressed in simplest radical form?

$$2 \cdot \sqrt{9} \cdot \sqrt{3} = 2 \cdot 3 \cdot \sqrt{3} = 6\sqrt{3}$$

What is $3\sqrt{147}$ expressed in simplest radical form?

$$3 \cdot \sqrt{49} \cdot \sqrt{3} = 3 \cdot 7 \cdot \sqrt{3} = 21\sqrt{3}$$

Continue onto the next page.

Write each of the following products in simplest radical form.

$$3\sqrt{12} =$$

$$3 \cdot \sqrt{4} \cdot \sqrt{3}$$

$$3 \cdot 2 \cdot \sqrt{3}$$

$$(6\sqrt{3})$$

$$4\sqrt{45} =$$

$$4 \cdot \sqrt{9} \cdot \sqrt{5}$$

$$4 \cdot 3 \cdot \sqrt{5}$$

$$(12\sqrt{5})$$

$$\frac{1}{2}\sqrt{32} =$$

$$\frac{1}{2} \cdot \sqrt{16} \cdot \sqrt{2}$$

$$\frac{1}{2} \cdot 4 \cdot \sqrt{2}$$

$$\cancel{4} \cdot \cancel{2}$$

$$(2\sqrt{2})$$

Mrs. Ferreri's Station ~ Simplifying Radicals**Simplify.**

1) $\sqrt{18}$

2) $\sqrt{96}$

3) $\sqrt{20}$

4) $\sqrt{36}$

5) $\sqrt{150}$

6) $\sqrt{144}$

7) $-5\sqrt{18}$

8) $-2\sqrt{27}$

9) $-\sqrt{50}$

10) $6\sqrt{80}$

11) $3\sqrt{54}$

12) $3\sqrt{96}$

Continue onto next page.

1) $3\sqrt{32}$

2) $4\sqrt{72}$

3) $7\sqrt{144}$

4) $6\sqrt{75}$

5) $-6\sqrt{8}$

6) $-6\sqrt{150}$

Simplify the following radicals.

HINT: Write out the first 12 perfect squares at the top of your paper.

1) $3\sqrt{32}$

2) $4\sqrt{72}$

11) $3\sqrt{54}$

12) $3\sqrt{96}$

Continue onto next page.

3) $7\sqrt{144}$

4) $6\sqrt{75}$

5) $-6\sqrt{8}$

6) $-6\sqrt{150}$

What is $2\sqrt{45}$ expressed in simplest radical form?

- A) $3\sqrt{5}$ B) $5\sqrt{5}$ C) $6\sqrt{5}$ D) $18\sqrt{5}$

What is $3\sqrt{250}$ expressed in simplest radical form?

- A) $5\sqrt{10}$ B) $8\sqrt{10}$ C) $15\sqrt{10}$ D) $75\sqrt{10}$

Computer Station ~ Rational vs. Irrational Numbers Video

1) Go to the Google classroom and watch both **Rational vs. Irrational Numbers** videos.

2) Give two examples of **rational** numbers: _____

3) Give two examples of **irrational** numbers: _____

4) How can you tell if a number is rational or irrational? _____

Continue onto the next page.

1) Go to the Google classroom and watch the **Simplifying Radical** video.

2) Use the space below to work along with the teacher:

Mrs. Kennedy's Station ~ Simplifying Radical Expressions Coloring Sheet

 $\sqrt{20}$

 $\sqrt{27}$

 $\sqrt{150}$

 $\sqrt{8}$

 $\sqrt{45}$

 $\sqrt{28}$

 $\sqrt{500}$

 $\sqrt{72}$

 $\sqrt{12}$

 $\sqrt{54}$

 $\sqrt{24}$

 $\sqrt{40}$

 $\sqrt{32}$

$9\sqrt{3}$	$2\sqrt{5}$	$8\sqrt{2}$	$2\sqrt{6}$	$4\sqrt{7}$
$3\sqrt{2}$	$6\sqrt{3}$	$10\sqrt{5}$	$7\sqrt{3}$	$2\sqrt{2}$
$3\sqrt{6}$	$2\sqrt{7}$	$5\sqrt{5}$	$3\sqrt{3}$	$2\sqrt{10}$
$5\sqrt{6}$	$9\sqrt{10}$	$4\sqrt{2}$	$6\sqrt{5}$	$2\sqrt{3}$
$7\sqrt{2}$	$6\sqrt{2}$	$5\sqrt{3}$	$3\sqrt{5}$	$8\sqrt{5}$

 $\sqrt{18}$

 $\sqrt{128}$

 $\sqrt{125}$

 $\sqrt{98}$

 $\sqrt{180}$

 $\sqrt{147}$

 $\sqrt{243}$

 $\sqrt{75}$

 $\sqrt{320}$

 $\sqrt{108}$

 $\sqrt{112}$

 $\sqrt{810}$

Independent Station ~ Perfect Square Root Memory Game**Directions:**

- 1) Spread out all of the cards face down on two desks.
- 2) Choose which player will go first and select two cards to turn over. If you have a match, collect the cards and go again.

A MATCH MEANS One card is a square root and the other is the "answer." For example: $\sqrt{25}$ and 5.
- 3) The player with the most matches at the end of the station WINS. ***See Mrs. Ferreri for your prize.***

When you are finished, continue onto the next page.

Independent Station ~ Tic Tac Toe

Directions: 6 in a row is a winner! Player 1 goes first and uses the "sentence stem" on the bottom. Rational or Irrational?

Rational or Irrational Number? Tic Tac Toe 1

$\sqrt{25}$	5	$\sqrt{16}$	$\sqrt{81}$	π	4
$\sqrt{99}$	$2\frac{1}{4}$	π	100.1	$3\frac{1}{2}$	$\sqrt{1}$
$\frac{1}{3}$	234	1.23	26	5.5	$\frac{2}{5}$
π	$\sqrt{27}$	$\sqrt{4}$	5	$\sqrt{45}$	.1212
500	22.5	.3333	$\frac{1}{2}$	$\sqrt{3}$	$\sqrt{144}$
$\sqrt{64}$	$\frac{3}{4}$	10	234	$\sqrt{25}$	π

Sentence Stem: This number is _____ because _____.



Homework ~ Tuesday 2/4	
<i>Give all square roots of the following numbers:</i>	
49	100
121	16

Homework ~ Wednesday 2/5	
<i>Simplify the following radical expressions.</i>	
$\sqrt{18}$	$\sqrt{96}$
$\sqrt{20}$	$\sqrt{150}$

Homework ~ Thursday 2/6	
<i>Simplify.</i> $\sqrt{125}$	$\sqrt{100}$
$3\sqrt{128}$	$-8\sqrt{72}$
$\sqrt{80}$	$\sqrt{18}$

Homework ~ Thursday 2/7

Which represents an irrational number?

- A) $-\frac{4}{5}$ B) π C) $\sqrt{9}$ D) 0

Which is an irrational number?

- A) $\sqrt{9}$ B) $\sqrt{2}$ C) $\frac{2}{3}$ D) 0

Which represents an irrational number?

- A) 0 B) $\frac{3}{4}$ C) $\sqrt{3}$ D) $\sqrt{4}$

An example of an irrational number is

- A) $5.\overline{3}$ B) $\sqrt{5}$ C) 0 D) $-\frac{11}{6}$