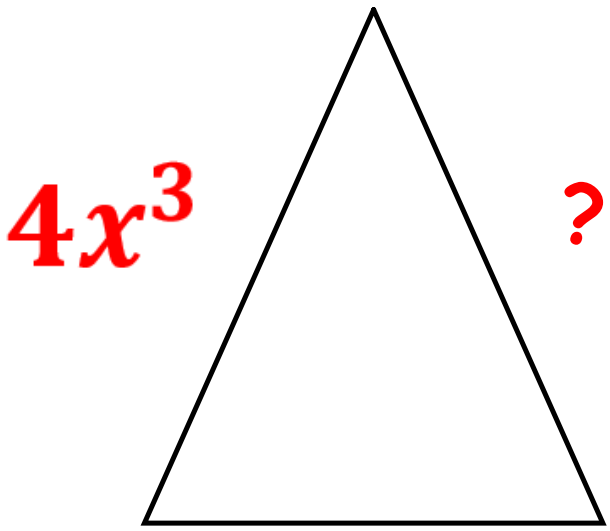
Warm-Up 1/15/2021

1. Given the perimeter is $6x^3 + 4x^2 + 3$

Find the missing side.



① $4x^3$

$-\ x^3+2x^2+3$

$3x^3+2x^2+3$

(Sum of the 2 sides)

$(6x^3+4x^2+3)-(3x^3+2x^2+3)$

$6x^3+4x^2+3$

$-3x^3-2x^2-3$

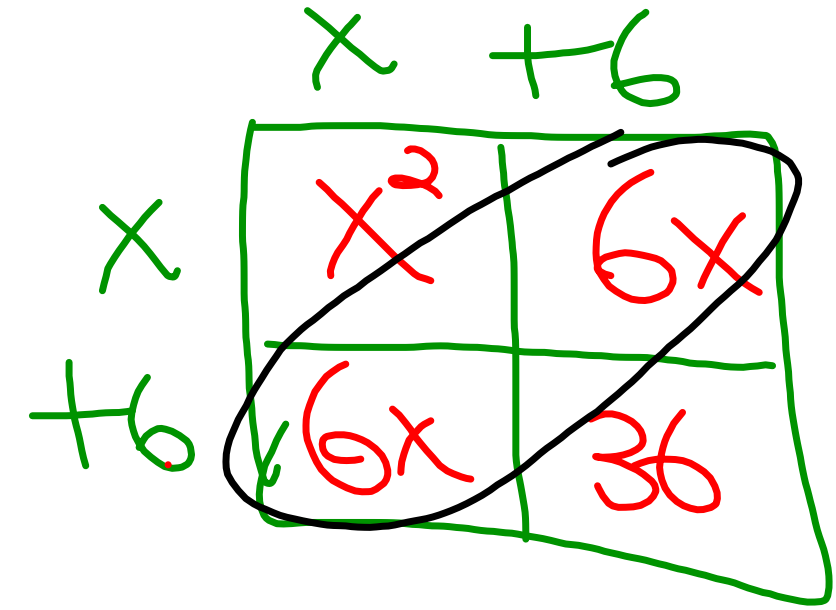
$\boxed{3x^3+2x^2}$

Missing side

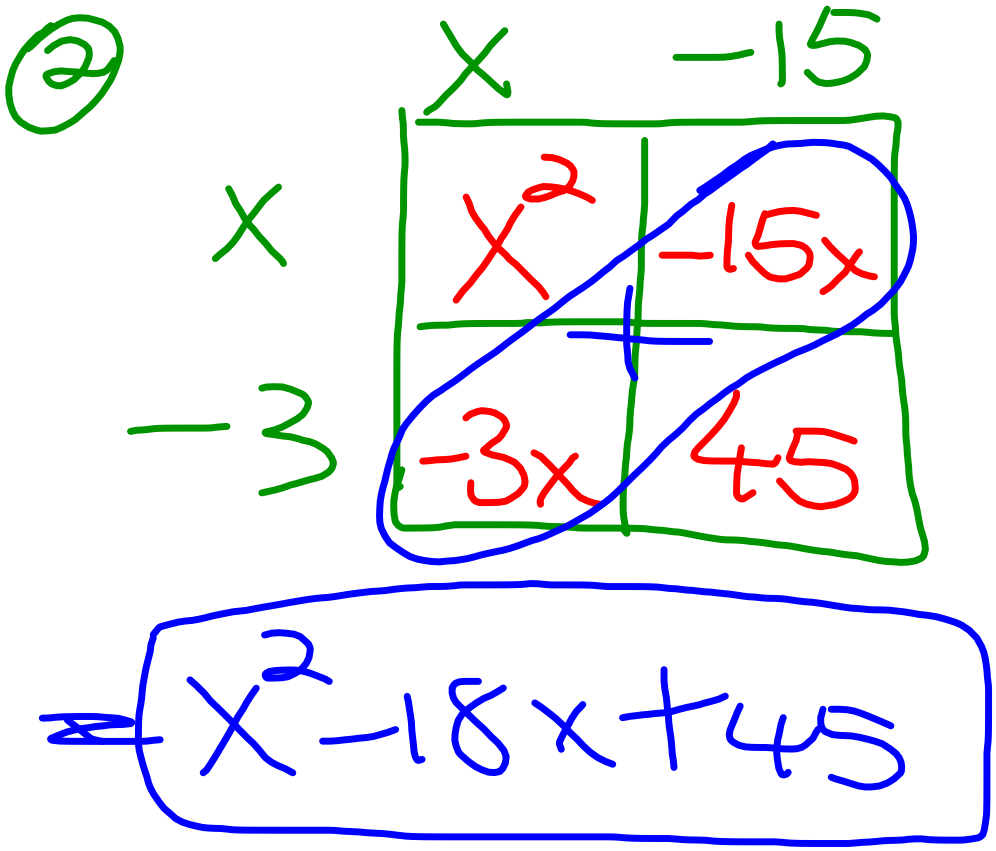
Find the product to the following expressions:

2. $(x - 15)(x - 3)$

3. $(x + 6)^2 = (x+6)(x+6)$



$= x^2 + 12x + 36$


②
x
−15
x
−3
x^2
−15x
−3x
45
$= x^2 - 18x + 45$

EOC Type Questions - Math Talks

1. Andrew purchased some drinks and some chips. Each bag of chips cost \$2.00 and each drink cost \$2.50. The expression $2x + 2.5y$ gives the total amount of money spent by Andrew on chips and drinks. What is the meaning of the term $2.5y$?

A. The number of chips purchased by Andrew

B. The cost of one drink

C. The total amount spent on drinks by Andrew

D. The number of drinks purchased by Andrew

x = # of bags of chips.
y = # of drinks.

2. The average amount of time it takes Greg to mow x lawns can be defined by the expression $28x + 5$. In this scenario, what does the number 28 represent?

A. The number of lawns Greg mows

B. The average time it takes to mow one lawn

C. The average price Greg charges per lawn

D. The average time it takes to mow multiple lawns

2x

5. The length of a rectangle is 6 inches. The width is 3*w* inches.

$A = L \cdot W$

$5w \cdot 6 = 30w\ in^2$

$+2$

$5w$

If the coefficient of the width increases by 2, what could be an expression for the area of the rectangle?

A. $18w\ in^2$

B. $30w\ in^2$

C. $6w + 12\ in^2$

D. $10w + 12\ in^2$

6. The expression s^2 is used to calculate the area of a square, where s is the side length of the square. What does the expression $(5x)^2$ represent?

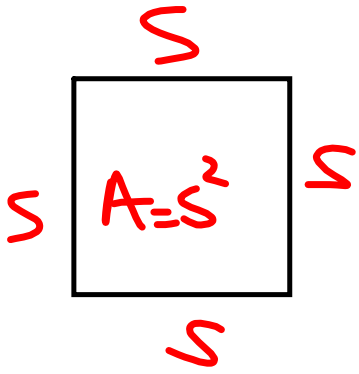
A. The area of a square with a side length of 5

B. The area of a square with a side length of 25

C. The area of a square with a side length of $5x$

D. The area of a square with a side length of $25x$

$(5x)^2$



Essential Question 1/15/21

- How can I simplify Radical Expressions?

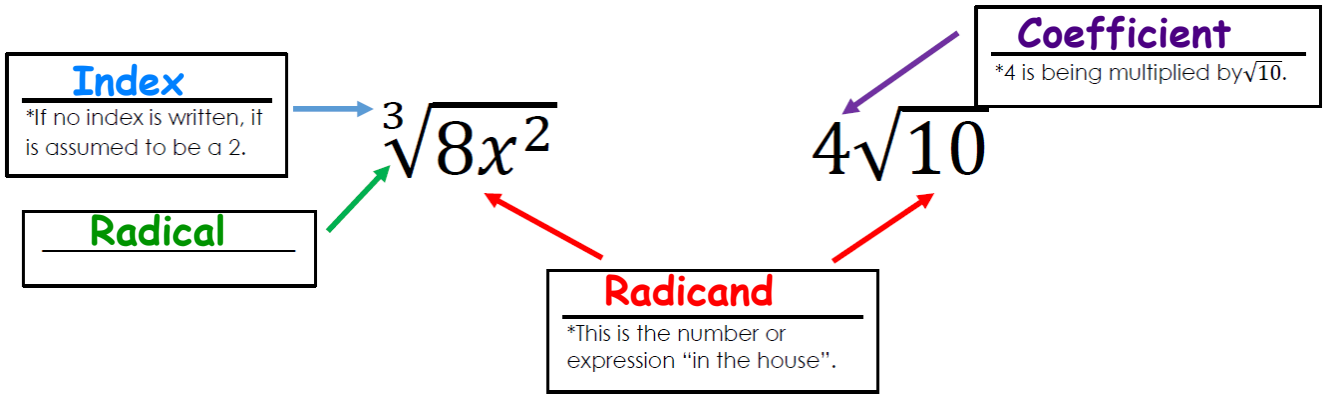
Unit 1

Day 5 - Simplifying Radical Expressions

What is a Radical?

Standard(s): MGSE9–12.N.RN.2

Rewrite expressions involving radicals and rational exponents using the properties of exponents.



Square Root Table

Complete the table below.

Square each of the following numbers.	1	2	3	4	5	6	7	8	9	10	x
Perfect Squares	1	4	9	16	25	36	49	64	81	100	x^2
Take the square root of each of your perfect squares.	$\sqrt{1}$	$\sqrt{4}$	$\sqrt{9}$	$\sqrt{16}$	$\sqrt{25}$	$\sqrt{36}$	$\sqrt{49}$	$\sqrt{64}$	$\sqrt{81}$	$\sqrt{100}$	$\sqrt{x^2}$
Square Roots	1	2	3	4	5	6	7	8	9	10	x

Taking square roots and squaring a number are inverse or they undo each other, just like adding and subtracting undo each other.

Review Factors

A factor is a number or mathematical expression that divides another number or expression **evenly**.

Example: What are the factors of the following?

a) 24

24

1	24
2	12
3	8
4	6

b) 45

45

1	45
3	15
5	9

c) 17

17

1	17

d) y^4

y^4

y^2	y^2

Chart of Perfect Squares 1 to 30

$1^2 = 1$	$11^2 = 121$	$21^2 = 441$
$2^2 = 4$	$12^2 = 144$	$22^2 = 484$
$3^2 = 9$	$13^2 = 169$	$23^2 = 529$
$4^2 = 16$	$14^2 = 196$	$24^2 = 576$
$5^2 = 25$	$15^2 = 225$	$25^2 = 625$
$6^2 = 36$	$16^2 = 256$	$26^2 = 676$
$7^2 = 49$	$17^2 = 289$	$27^2 = 729$
$8^2 = 64$	$18^2 = 324$	$28^2 = 784$
$9^2 = 81$	$19^2 = 361$	$29^2 = 841$
$10^2 = 100$	$20^2 = 400$	$30^2 = 900$

Perfect Square Roots Chart 1 – 50

$\sqrt{1} = 1$	$\sqrt{121} = 11$	$\sqrt{441} = 21$	$\sqrt{961} = 31$	$\sqrt{1681} = 41$
$\sqrt{4} = 2$	$\sqrt{144} = 12$	$\sqrt{484} = 22$	$\sqrt{1024} = 32$	$\sqrt{1764} = 42$
$\sqrt{9} = 3$	$\sqrt{169} = 13$	$\sqrt{529} = 23$	$\sqrt{1089} = 33$	$\sqrt{1849} = 43$
$\sqrt{16} = 4$	$\sqrt{196} = 14$	$\sqrt{576} = 24$	$\sqrt{1156} = 34$	$\sqrt{1936} = 44$
$\sqrt{25} = 5$	$\sqrt{225} = 15$	$\sqrt{625}=25$	$\sqrt{1225} = 35$	$\sqrt{2025} = 45$
$\sqrt{36} = 6$	$\sqrt{256} = 16$	$\sqrt{676} = 26$	$\sqrt{1296} = 36$	$\sqrt{2116} = 46$
$\sqrt{49} = 7$	$\sqrt{289}=17$	$\sqrt{729} = 27$	$\sqrt{1369} = 37$	$\sqrt{2209} = 47$
$\sqrt{64} = 8$	$\sqrt{324} = 18$	$\sqrt{784} = 28$	$\sqrt{1444} = 38$	$\sqrt{2304} = 48$
$\sqrt{81} = 9$	$\sqrt{361} = 19$	$\sqrt{841} = 29$	$\sqrt{1521} = 39$	$\sqrt{2401} = 49$
$\sqrt{100} = 10$	$\sqrt{400} = 20$	$\sqrt{900} = 30$	$\sqrt{1600} = 40$	$\sqrt{2500} = 50$

Simplifying Radicals

A radical expression is in **simplest form** if no perfect square factors other than 1 are in the radicand (ex. $\sqrt{20} = \sqrt{4 \cdot 5}$)

Guided Example: Simplify $\sqrt{80}$.

Step 1: Find the factors of the number inside the radical.	80 1 | 80 2 | 40 4 | 20 5 | 16 80 8 | 10
Step 2: Chose the pair of factors that contains the largest perfect square.	$\sqrt{80} = \sqrt{16} \cdot \sqrt{5}$
Step 3: Find the square root of the perfect square and leave the other root as is, since it cannot be simplified.	$= 4\sqrt{5}$
Step 4: Simplify the expressions both inside and outside the radical by multiplying.	$= 4\sqrt{5}$

Simplifying Radicals Graphic Organizer

Perfect Square

List of Perfect Squares:

If the problem contains a perfect square:
- Find the square root
- The square root would be an integer

Examples:

1) $\sqrt{25} = 5$

2) $-\sqrt{144} = -12$

Number is NOT a Perfect Square

If the problem contains a number that is not a perfect square:
- Use the product of two square roots
- One of these roots should be a perfect square
- Find the square root of the perfect square, leave the other root as is.

Examples:

1) $\sqrt{12} = \sqrt{4} \cdot \sqrt{3} = 2\sqrt{3}$

2) $\sqrt{32} = \sqrt{16} \cdot \sqrt{2} = 4\sqrt{2}$

Exponent is even

If the problem contains an even exponent:
- Divide the exponent by 2

Examples:

1) $\sqrt{x^4} \div 2 = x^2$

2) $\sqrt{x^4y^2z^6} = x^2y^1z^3 = x^2yz^3$

Exponent is odd

If the problem contains an odd exponent:
- Break the problem up into 2 powers
- One should have the highest even exponent
- The other exponent should be 1
- The sum of both exponents should be the original exponent

Examples:

1) $\sqrt{x^5} = \sqrt{x^4} \cdot \sqrt{x^1} = x^2\sqrt{x}$ ($\div 2$)

2) $\sqrt{y^{11}} = \sqrt{x^{10}} \cdot \sqrt{x^1} = x^5\sqrt{x}$ ($\div 2$)

Practice - I do

a. $\sqrt{25}$

$\sqrt{5 \cdot 5} = 5$

b. $\sqrt{24}$

$\sqrt{4} \cdot \sqrt{6}$

$2\sqrt{6}$

Radical form

Practice - We do

5x

c. $5\sqrt{32}$

$5\sqrt{16}\cdot\sqrt{2}$

x 4

$20\sqrt{2}$

d. $-2\sqrt{63}$

$-2\sqrt{9}\cdot\sqrt{7}$

x 3

$-6\sqrt{7}$

$5\sqrt{32}$

2 16

2 8

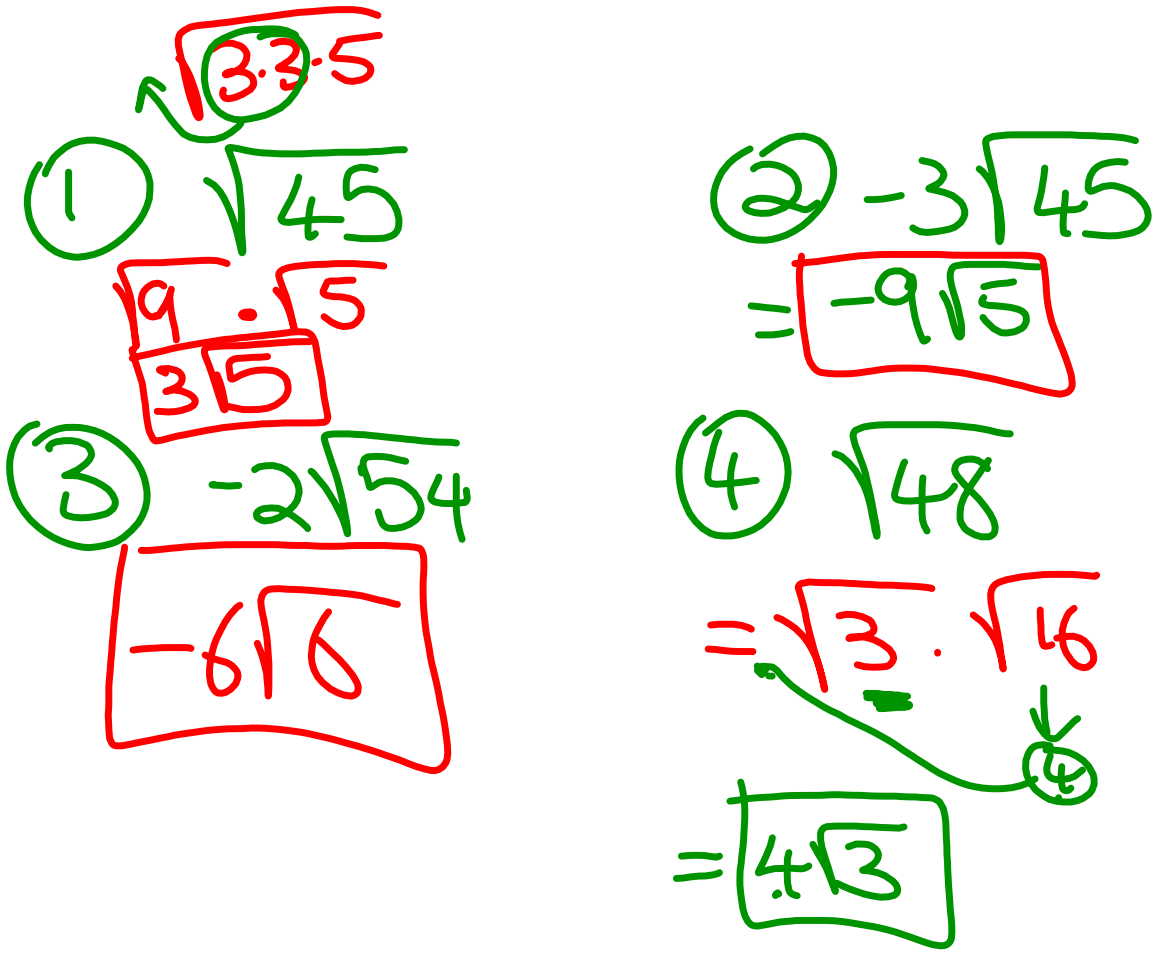
2 4

2 2

2·2 = 4

$20\sqrt{2}$

Class Work Practice



⑤ $-3\sqrt{54}$

$-3\sqrt{9}\cdot\sqrt{6}$

$=\boxed{-9\sqrt{6}}$

Radicals with Variables

Step 1: If the problem contains an even exponent: · Divide the exponent by 2 · The radical sign goes away!	a) $\sqrt{x^4}$ ÷2	b) $\sqrt{x^{50}}$ ÷2	c) $\sqrt{x^3}$
Step 2: If the problem contains an odd exponent: · Break the problem up into 2 powers · One should have the highest even exponent · The other exponent should be 1 · The sum of both exponents should be the original exponent	x^2	x^{25}	$x^{2+1}\cdot\sqrt{x^1}$
Step 3: Simplify the expressions both inside and outside the radical by multiplying.			$x\sqrt{x}$

a. $\sqrt{x^8}$ ÷2

x^4

b. $\sqrt{x^5}$

$x^{4+1}\cdot\sqrt{x}$

$x^2\sqrt{x}$

c. $\sqrt{y^4z^3}$

$y^{4+2}z^{2+1}$

$y^2z\sqrt{z}$

Simplifying Radical Expressions

When simplifying radical expressions, you simplify both the coefficients and variables using the same methods as you did previously (Remember $\sqrt{x^2} = x$; square and square roots undo each other).
Remember, anything that is left over stays under the radical!

Practice - I do

a. $\sqrt{9x^6}$ ÷2 → x^3 → $= 3x^3$

b. $\sqrt{4x^4}$ ÷2 → $= 2x^2$

$2\sqrt{16x^6}$ ÷2 → 4, x^3 → $= 8x^3$

Practice - We do

c. $\sqrt{32z^7}$

$\sqrt{16}\cdot\sqrt{2}\cdot\sqrt{z^6}\cdot\sqrt{z^1}$

$4 \quad z^3$

$4z^3\sqrt{2z}$

d. $\sqrt{45y^2}$

$\sqrt{5}\cdot\sqrt{9}\cdot\sqrt{y^2}$

$3 \quad y$

$3y\sqrt{5}$

Practice - You do

e) $2\sqrt{108x^5y^9}$

$2\sqrt{36 \cdot 3 \cdot x^4 \cdot x \cdot y^8 \cdot y}$

$6 \quad x^2 \quad y^4$

$= 12x^2y^4\sqrt{3xy}$

f) $-8\sqrt{48g^4h^7}$

$-8\sqrt{16 \cdot 3 g^4 h^6 h}$

$4 \quad g^2 \quad h^3$

$= -32g^2h^3\sqrt{3h}$

HW: #1

Simplify this radical expression $3\sqrt{18a^4}$

HW: #2

Simplify this radical expression $-2\sqrt{36f^3g^4}$

HW: #3

Simplify this radical expression $\sqrt[5]{20x^{16}y^{10}}$

HW: #4

Simplify this radical expression $2\sqrt{27a^4b}$

HW: #5

Simplify this radical expression $-\sqrt{54m^4n^2}$

HW: #6

Simplify this radical expression $-8\sqrt{48g^4h^7}$

Extra Practice

SIMPLIFYING RADICAL EXPRESSIONS

Perfect Squares: 1, 4, 9, 16, 25, ____, ____, ____, ____, ____, ____, 144…

x^2, x^4, x^6, ____, ____... Exponents must be _____.

$\sqrt{25}$ is read "the square root of 25".

$\sqrt{25} = 5$ because $5^2 = 25$ $\sqrt{36} =$ 6 because ____ = ____ $\sqrt{100} =$ _____ $\sqrt{49} =$ _____

$\sqrt{a^6} = a^3$ because $(a^3)^2 = a^6$ $\sqrt{m^{16}} = m^8$ because ____ = ____ $\sqrt{y^{10}} =$ _____ $\sqrt{a^2} =$ _____

Hint: Divide the exponent by _____.

In the expression $\sqrt{a}$, the $\sqrt{\ }$ is called the radical and *a* is called the radicand.

Simplify (Simplifying Perfect Squares):

1. $\sqrt{4}$
2. $\sqrt{16}$
3. $-\sqrt{100}$
4. $\sqrt{a^8}$
5. $\sqrt{w^{12}}$
6. $\sqrt{a^6b^{10}}$
7. $\sqrt{9a^2}$
8. $-\sqrt{81m^{64}}$
9. $\sqrt{49a^4b^{12}}$
10. $\sqrt{121x^{14}y^6}$

Extra Practice

Simplify (Simplifying Radicals that are not Perfect Squares):

1. $\sqrt{20} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}$
2. $\sqrt{27} = \sqrt{9}\sqrt{3} = 3\sqrt{3}$
3. $\sqrt{48} = \sqrt{16}\sqrt{3} = 4\sqrt{3}$
4. $\sqrt{45} = \sqrt{\ }\sqrt{\ } = \_\sqrt{\ }$
5. $\sqrt{12} = \sqrt{\ }\sqrt{\ } =$ _____
6. $\sqrt{50} =$
7. $\sqrt{a^5} = \sqrt{a^4}\sqrt{a} = a^2\sqrt{a}$
8. $\sqrt{x^9} = \sqrt{\ }\sqrt{\ } =$ _____
9. $\sqrt{x^3} =$

Simplify:

1. $\sqrt{18}$
2. $\sqrt{125}$
3. $\sqrt{72}$
4. $\sqrt{180}$
5. $\sqrt{a^3}$
6. $\sqrt{b^7}$
7. $\sqrt{m^{11}}$
8. $\sqrt{75x^7y^5}$
9. $\sqrt{27a^{11}b^7}$
10. $\sqrt{32a^7b^4}$
11. $\sqrt{9a^8}$
12. $\sqrt{45a^7}$
13. $\sqrt{36x^2y^6}$
14. $\sqrt{12x^{20}y^8}$
15. $-\sqrt{200}$
16. $\sqrt{196}$
17. $\sqrt{63x^4y}$
18. $\sqrt{6x^3}$
19. $\sqrt{100x^5y}$
20. $\sqrt{80x^{100}y^{49}}$

Extra Practice

Homework: Simplifying Radicals

Name _____
Class Time_____

Simplify each of the following expressions completely.

_____ 1. $\sqrt{64}$ _____ 2. $-\sqrt{18}$ _____ 3. $\sqrt{32}$

_____ 4. $\sqrt{50}$ _____ 5. $\sqrt{400}$ _____ 6. $\sqrt{x^6}$

_____ 7. $\sqrt{x^7}$ _____ 8. $\sqrt{16x^{16}}$ _____ 9. $\sqrt{9x^9}$

_____ 10. $\sqrt{40x^8}$ _____ 11. $\sqrt{25x^7}$ _____ 12. $\sqrt{12x^5}$

_____ 13. $\sqrt{a^2b^4}$ _____ 14. $\sqrt{49a^8x^{12}}$ _____ 15. $\sqrt{28x^9y^6}$

_____ 16. $\sqrt{32m^7n^{11}}$ _____ 17. $\sqrt{20x^{10}y^5}$ _____ 18. $\sqrt{100ab^4}$

_____ 19. $\sqrt{75x^8y^3}$ _____ 20. $\sqrt{98x^7y^5}$ _____ 21. $\frac{x^2+16x+63}{2x^2+19x+9}$


FINISH STRONG
You Got this!