Name _____ Class _____ Date _____

Reteaching Simplifying Radicals

You can remove perfect-square factors from a radicand.

Problem

What is the simplified form of $\sqrt{80n^5}$?

In the radicand, factor the coefficient and the variable separately into perfect square factors, and then simplify. Factor 80 and n^5 completely and then find paired factors.

Solve

$80 = 8 \cdot 10 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$ — Factor 80 completely.

$= (2 \cdot 2)(2 \cdot 2) \cdot 5 = (2 \cdot 2)^2 \cdot 5$ — Find pairs of factors.

$\sqrt{80} = \sqrt{4^2 \cdot 5} = \sqrt{4^2} \cdot \sqrt{5}$ — Use the rule $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$.

$= 4 \cdot \sqrt{5} = 4\sqrt{5}$ — The square root of a number squared is the number: $\sqrt{a^2} = a$.

$n^5 = n \cdot n \cdot n \cdot n \cdot n$ — Factor n^5 completely.

$= (n \cdot n) \cdot (n \cdot n) \cdot n = (n \cdot n)^2 \cdot n$ — Find pairs of factors.

$\sqrt{n^5} = \sqrt{(n \cdot n)^2} \cdot \sqrt{n}$ — Separate the factors.

$= n^2 \cdot \sqrt{n} = \cdot n^2\sqrt{n}$ — Remove the perfect square.

$\sqrt{80n^5} = 4 \cdot n^2\sqrt{(5 \cdot n)^2} = 4n^2\sqrt{5n}$ — Combine your answers.

Check

$\sqrt{80n^5} \stackrel{?}{=} 4n^2\sqrt{5n}$ — Check your solution.

$\frac{\sqrt{80n^5}}{\sqrt{5n}} \stackrel{?}{=} \frac{4n^2\sqrt{5n}}{\sqrt{5n}}$ — Divide both sides by $\sqrt{5n}$.

$\sqrt{16n^4} = 4n^2$ — Simplify.

$4n^2 = 4n^2$ ✓

Solution: The simplified form of $\sqrt{80n^5}$ is $4n^2\sqrt{5n}$.

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Simplifying Radicals Vocabulary Support

Complete the vocabulary chart by filling in the missing information.

Word or Word Phrase	Definition	Picture or Example
Division Property of Square Roots	*The Division Property of Square Roots* states for $a \geq 0$ and $b > 0$, $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$.	$\sqrt{\frac{25}{49}} = \frac{\sqrt{25}}{\sqrt{49}} = \frac{5}{7}$
Multiplication Property of Square Roots	**1.**	$\sqrt{63} = \sqrt{9} \cdot \sqrt{7} = 3\sqrt{7}$
radical	A *radical* is a quantity expressed as a root of another quantity.	**2.**
radical expression	**3.**	$3\sqrt{5}$
radicand	A *radicand* is the quantity under a radical sign.	**4.**
rationalize the denominator	**5.**	$\frac{3}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{5}}{5}$

Trigonometry CCP
Simplify Radicals

Name:
Date:

Simplify completely. Give answers in simplified radical form. Then, give the decimal approximation rounded to the nearest thousandth.

1. $\sqrt{32}$
2. $\sqrt{75}$
3. $\sqrt{48}$
4. $\sqrt{80}$
5. $\sqrt{98}$

6. $\sqrt{50}$
7. $\sqrt{162}$
8. $\sqrt{500}$
9. $\sqrt{180}$
10. $\sqrt{298}$

11. $3\sqrt{32}$
12. $8\sqrt{27}$
13. $-7\sqrt{48}$
14. $2\sqrt{75}$
15. $3\sqrt{108}$

16. $5\sqrt{3}\cdot 8\sqrt{6}$
17. $5\sqrt{30}\cdot 8\sqrt{60}$
18. $-7\sqrt{3}\cdot 2\sqrt{5}$
19. $\left(7\sqrt{3}\right)^2$
20. $\left(-4\sqrt{8}\right)^2$

21. $\left(-5\sqrt{6}\right)\left(4\sqrt{18}\right)$
22. $\left(2\sqrt{6}\right)\left(3\sqrt{40}+4\sqrt{7}\right)$
23. $\left(5+\sqrt{6}\right)\left(4-\sqrt{18}\right)$
24. $(-5)\left(\sqrt{14}\right)(2)\left(\sqrt{18}\right)$

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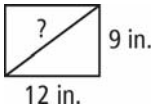
Reteaching

The Pythagorean Theorem

You can use the *Pythagorean Theorem* to find the length of the third side of a right triangle if you are given the lengths of any two of the sides.

Problem

What is the length of the diagonal in a 9 in.-by-12 in. rectangle?



The diagonal divides the rectangle into two right triangles of the same size and shape. Use the Pythagorean Theorem and substitute the lengths of the legs for the variables a and b. Then solve for c, the length of the hypotenuse.

Solve	$a^2 + b^2 = c^2$	Use the Pythagorean Theorem to find the length of the missing side.
	$9^2 + 12^2 = c^2$	Legs a and b are given as the length and width of the rectangle. Substitute 9 for a and 12 for b.
	$81 + 144 = c^2$	Follow the order of operations. Simplify the exponents first.
	$225 = c^2$	Then add to find the value of c^2.
	$15 = c$	Take the positive square root of each side.
Check	$9^2 + 12^2 = c^2$	Check your solution with the Pythagorean Theorem.
	$9^2 + 12^2 = 15^2$	Substitute 15 for c.
	$225 = 225$ ✓	Simplify.

Solution: The length of the diagonal is 15 in.

Note: The two legs always create the right angle. The hypotenuse is therefore always opposite the right angle.

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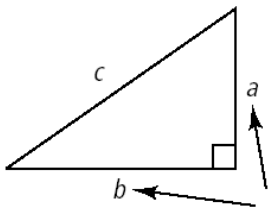
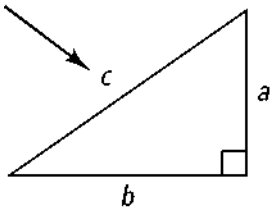
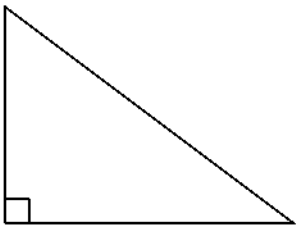
Pythagorean Theorem Vocabulary

Word Bank:

conclusion	**conditional statement**	**converse**
Converse of the Pythagorean Theorem	**hypotenuse**	**hypothesis**
legs	**Pythagorean Theorem**	**right triangle**

Choose the appropriate vocabulary word from the Word Bank above to describe the concept shown.

1. 	**2.** 	**3.** If an animal is a bird, then it has wings.
4. "it has wings" in the statement "If an animal is a bird, then it has wings."	**5.** 	**6.** "If an animal is a bird, then it has wings." compared to "If an animal has wings, then it is a bird."
7. $a^2 + b^2 = c^2$	**8.** If a triangle has side lengths of a, b, and c, and $a^2 + b^2 = c^2$, then the triangle is a right triangle with hypotenuse of length c.	**9.** "an animal is a bird" in the statement "If an animal is a bird, then it has wings."

TRIG CCP

Name:

Pythagorean Theorem

Review of Skills Day2 HW

Given the length of two legs of a right triangle…

a) Draw a right triangle and label with the given information
b) Find the exact length of the hypotenuse in simplified radical form
c) Then, give the decimal approximation of the hypotenuse to the thousandths place

1. 3, 4
2. 5, 12
3. 9,40
4. $12, 12\sqrt{3}$
5. $\sqrt{7}, \sqrt{11}$

Given the length of one leg and the hypotenuse of a right triangle…

a) Draw a right triangle and label with the given information
b) Find the exact length of the other leg in simplified radical form
c) Then, give the decimal approximation of the hypotenuse to the thousandths place

6. 7, 25
7. 5, 10
8. 6,10
9. $12, 12\sqrt{2}$
10. $\sqrt{7}, \sqrt{35}$

Given the coordinates of two points below…

a) Plot and label each point in the coordinate plane on graph paper
b) Create the segment between these two points
c) Create a right triangle with your new segment as the hypotenuse
d) Find the length of each leg (exact & decimal)
e) Find the length of the hypotenuse (exact & decimal)

11. $C(-3, 4)$ and $A(9, 9)$
12. $D(2, 1)$ and $O(5, -3)$
13. $M(11, 4)$ and $I(17, -4)$

Trig CCP

45-45-90 pattern

Name:

Date

For each problem below neatly,

(a) draw a square and label the sides with the given length,

(b) create one diagonal

(c) use the Pythagorean theorem to find the exact (and decimal) length of the diagonal

(d) can you determine a pattern between all three sides? Describe this pattern.

	Side length	SHOW Calculations work	Exact value Simplified Radical Form	Decimal value (3 places…thousandths place)
1	$s = 3$			
2	$s = 7$			
3	$s = 14$			
4	$s = 25$			
5	$s = \sqrt{3}$			
6	$s = 3\sqrt{5}$			
7	$s = \sqrt{8}$			
8	$s = 20\sqrt{2}$			
9	$s = x$			

Trig CCP

30-60-90 pattern

Name:

Date

For each problem below neatly,

(a) draw an equilateral triangle and label the sides with the given length,

(b) create **one** altitude to the base and relabel the length of the two segments on the base

(c) use the Pythagorean theorem to find the exact (and decimal) length of the height

(d) can you determine a pattern between all three sides? Describe this pattern.

	Side length	SHOW Calculations	Exact value Simplified Radical Form	Decimal value (3 places…thousandths place)
1	8			
2	6			
3	14			
4	50			
5	$2\sqrt{3}$			
6	$12\sqrt{3}$			
7	$10\sqrt{8}$			
8	$20\sqrt{3}$			
9	$2x$			