Name: _____ Date: _____

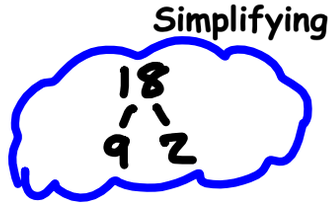
Notes: Simplifying Radicals

Vocab Breakdown

Radical or Root: $\sqrt{}$

Simplifying Radicals

$\sqrt{18}$



Step 1: Find the largest perfect square that divides the radicand.

$\sqrt{9}\sqrt{2}$

Step 2: Rewrite the square root as the product of the square root of the perfect square and the other factor.

$3\sqrt{2}$

Step 3: Find the square root of the perfect square.

$\sqrt{16}\sqrt{8}$ → $4\sqrt{8}$ → $4\sqrt{4}\sqrt{2}$ → $4(2)\sqrt{2}$ → $8\sqrt{2}$

$\sqrt{48}$

$\sqrt{16}\sqrt{3}$

$4\sqrt{3}$

$5\sqrt{63}$

$5\sqrt{9}\sqrt{7}$

$5(3)\sqrt{7}$

$15\sqrt{7}$

$\sqrt{128}$

$\sqrt{64}\sqrt{2}$

$8\sqrt{2}$

$\sqrt{289}$

$\sqrt{289}$

17

$\frac{4-\sqrt{320}}{4}$

$\frac{4-\sqrt{64}\sqrt{5}}{4}$

$\frac{4-8\sqrt{5}}{4}$

$\frac{4}{4} - \frac{8\sqrt{5}}{4} = 1-2\sqrt{5}$

$\frac{5+\sqrt{72}}{2}$

$\frac{5+\sqrt{36}\sqrt{2}}{2}$

$\frac{5+6\sqrt{2}}{2}$

or

$2.5+3\sqrt{2}$

$\frac{4+\sqrt{1352}}{2}$ → $\sqrt{169}\sqrt{8}$ → $13\sqrt{8}$ → $13\sqrt{4}\sqrt{2}$ → $13(2)\sqrt{2}$ → $26\sqrt{2}$

$\frac{4+26\sqrt{2}}{2}$

$\frac{4}{2} + \frac{26\sqrt{2}}{2} = 2+13\sqrt{2}$

What if we have variables?

$\sqrt{80m^{10}}$

1) Split up each term

$\sqrt{80}\ \sqrt{m^{10}}$

2) Completely simplify each radical.

$\sqrt{16}\sqrt{5}\ \sqrt{m^{10}}$

$4\sqrt{5}\ m^5$

$4m^5\sqrt{5}$

$\sqrt{54n^7}$

$\sqrt{54}\ \sqrt{n^7}$

$\sqrt{9}\sqrt{6}\ \sqrt{n^6}\sqrt{n}$

$3\sqrt{6}\ n^3\sqrt{n}$

$3n^3\sqrt{6n}$

$-x\sqrt{75x^3}$

$-x\sqrt{75}\ \sqrt{x^3}$

$-x\sqrt{25}\sqrt{3}\sqrt{x^2}\sqrt{x}$

$-x(5)\sqrt{3}(x)\sqrt{x}$

$-5x^2\sqrt{3x}$

$\sqrt{45x^7y^4}$

$\sqrt{45}\ \sqrt{x^7}\ \sqrt{y^4}$

$\sqrt{9}\sqrt{5}\ \sqrt{x^6}\sqrt{x}\ \sqrt{y^4}$

$3\sqrt{5}\ x^3\sqrt{x}\ y^2$

$3x^3y^2\sqrt{5x}$

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Classwork: Simplifying Radicals

1. $\sqrt{8}$ $\sqrt{4}\sqrt{2}$ $2\sqrt{2}$	2. $\sqrt{40}$ $\sqrt{4}\sqrt{10}$ $2\sqrt{10}$	3. $\sqrt{98}$ $\sqrt{49}\sqrt{2}$ $7\sqrt{2}$	4. $\frac{6-\sqrt{32}}{2}$ $\frac{6-\sqrt{16}\sqrt{2}}{2}$ $\frac{6-4\sqrt{2}}{2}$ $3-2\sqrt{2}$
5. $3\sqrt{48}$ $3\sqrt{16}\sqrt{3}$ $3(4)\sqrt{3}$ $12\sqrt{3}$	6. $\sqrt{180}$ $\sqrt{36}\sqrt{5}$ $6\sqrt{5}$	7. $\frac{4+\sqrt{432}}{4}$ $\frac{4+\sqrt{144}\sqrt{3}}{4}$ $\frac{4+12\sqrt{3}}{4}$ $1+3\sqrt{3}$	8. $\frac{1}{3}\sqrt{252}$ $\frac{1}{3}\sqrt{36}\sqrt{7}$ $\frac{1}{3}(6)\sqrt{7}$ $2\sqrt{7}$
9. $\sqrt{y^2}$ y	10. $\sqrt{16d^2}$ $\sqrt{16}\sqrt{d^2}$ $4d$	11. $\frac{14-\sqrt{150}}{7}$ $\frac{14-\sqrt{25}\sqrt{6}}{7}$ $\frac{14-5\sqrt{6}}{7}$	12. $\sqrt{81w^2}$ $\sqrt{81}\sqrt{w^2}$ $9w$
13. $\sqrt{r^8s^6}$ $\sqrt{r^8}\sqrt{s^6}$ r^4s^3	14. $\sqrt{x^4y^2}$ $\sqrt{x^4}\sqrt{y^2}$ x^2y	15. $\sqrt{4y^2}$ $\sqrt{4}\sqrt{y^2}$ $2y$	16. $\sqrt{36m^2}$ $\sqrt{36}\sqrt{m^2}$ $6m$

17)

When $5\sqrt{20}$ is written in simplest radical form, the result is $k\sqrt{5}$. What is the value of k?

1) 20
2) 10
3) 7
4) 4

$5\sqrt{4}\sqrt{5}$

$5(2)\sqrt{5}$

$10\sqrt{5}$

18)

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

1) $3\sqrt{5}$
2) $5\sqrt{5}$
3) $6\sqrt{5}$
4) $18\sqrt{5}$

$2\sqrt{9}\sqrt{5}$

$2(3)\sqrt{5}$

$6\sqrt{5}$

19)

What is $\frac{\sqrt{32}}{4}$ expressed in simplest radical form?

1) $\sqrt{2}$
2) $4\sqrt{2}$
3) $\sqrt{8}$
4) $\frac{\sqrt{8}}{2}$

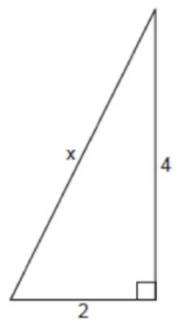
$\frac{\sqrt{16}\sqrt{2}}{4}$

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

$\sqrt{2}$

20)

Theo determined that the correct length of the hypotenuse of the right triangle in the accompanying diagram is $\sqrt{20}$. Fiona found the length of the hypotenuse to be $2\sqrt{5}$. Is Fiona's answer also correct? Justify your answer.



Yes

$2^2+4^2=x^2$

$4+16=x^2$

$20=x^2$

$\sqrt{20}=x$

$\sqrt{4}\sqrt{5}=x$

$2\sqrt{5}=x$