Intro to College Math: Chapter 11.5
Multiply/ divide Radicals

1. Simplify. Assume all variables are positive. $(5\sqrt{2b^3})(3\sqrt{10b^3})$

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$5 \cdot 3 \cdot \sqrt{2b^3} \cdot \sqrt{10b^3}$

* Rearrange so that the #'s outside the √ are beside each other, and √ are beside each other.

$15 \cdot \sqrt{2} \cdot \sqrt{10} \cdot \sqrt{b^3} \cdot \sqrt{b^3}$

* multiply the #'s ; then seperate each term under the √ signs to their own √

$15 \cdot \sqrt{20} \cdot \sqrt{b^{3+3}}$

* multiply the numbers under the √ sign.
* since the variables are the same, we add the exponents

multiply

$15 \cdot 2\sqrt{5} \cdot \sqrt{b^6}$

* Now type the number √ into the Calculator.

$30\sqrt{5} \cdot b^{6/2}$

Divide

$30\sqrt{5} \cdot b^3$

$\boxed{30b^3\sqrt{5}}$

2. Simplify $\sqrt[5]{16x^2} \cdot \sqrt[5]{2x^3}$

$\sqrt[5]{16x^2} \cdot \sqrt[5]{2x^3}$

$\sqrt[5]{16} \cdot \sqrt[5]{x^2} \cdot \sqrt[5]{2} \cdot \sqrt[5]{x^3}$

* Seperate each term under the $\sqrt{\ }$ signs to their own $\sqrt{\ }$

$\sqrt[5]{16 \cdot 2} \cdot \sqrt[5]{x^2 \cdot x^3}$

* Combine the numbers multiplied together under one $\sqrt{\ }$ + the variable under another $\sqrt{\ }$.

$\sqrt[5]{32} \cdot \sqrt[5]{x^{2+3}}$

* multiply the numbers under the $\sqrt{\ }$ sign.
* since the variables are the same, we add the exponents

$2 \cdot \sqrt[5]{x^5}$

* Now type the number $\sqrt{\ }$ into the calculator.

$2 \cdot x^{5/5}$ ← Divide

$\boxed{2x}$

3. Multiply. Assume all expressions under square roots are positive. $(\sqrt{x} - 4)(\sqrt{x} + 6)$

$(\sqrt{x} - 4)(\sqrt{x} + 6)$

* Use the foil method to multiply each term in the 1st set of ( ) by each term in 2nd set of ( ).

$\sqrt[2]{x^2} + 6\sqrt{x} - 4\sqrt{x} - 24$

combine like terms

Divide →

$x^{2/2} + 2\sqrt{x} - 24$

$\boxed{x + 2\sqrt{x} - 24}$

4. Multiply. Assume all expressions under square roots are positive. $(\sqrt{y} - 1)^2$

$(\sqrt{y} - 1)^2$

$(\sqrt{y} - 1)(\sqrt{y} - 1)$

* Use the foil method to multiply each term in the 1st set of ( ) by each term in 2nd set of ( ).

$\sqrt{y^2} - 1\sqrt{y} - 1\sqrt{y} + 1$

combine like terms

Divide

$y^{2/2} - 2\sqrt{y} + 1$

$\boxed{y - 2\sqrt{y} + 1}$

5. Simplify. Write your answer as a reduced fraction or integer. $\dfrac{-35 - \sqrt{49}}{14}$

$\dfrac{-35 - \sqrt{49}}{14}$ ← Take $\sqrt{\ }$ of number

$\dfrac{-35 - 7}{14}$ ← Combine terms on top

$\dfrac{-42}{14}$ ← Divide

$\boxed{-3}$

6. Simplify the radical expression. Write in exact form without decimals. $\frac{-9-\sqrt{162}}{3}$

$\frac{-9-\sqrt{162}}{3}$ ← Take $\sqrt{\ }$ of number

$\frac{-9-9\sqrt{2}}{3}$ ← Can't combine top, because one has a $\sqrt{\ }$.

$\frac{-9}{3} - \frac{9\sqrt{2}}{3}$ ← Split the fraction apart so that there are 2 seperate fractions.

← Then simplify.

$\boxed{-3 - 3\sqrt{2}}$