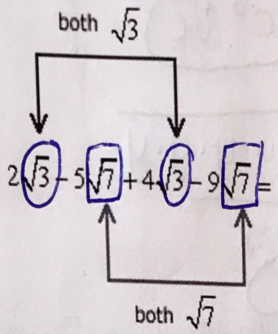
New Learning

Read pages 270 - 278 of your textbook to fill in the following notes, or use notes online at www.burnspvw.weebly.com

Radicals with the same radicand and index are called like radicals.

When adding and subtracting, only like radicals can be combined.
(Just like adding and subtracting polynomials and like terms!)



If a radical represents a **real number** (remember all numbers are real other than imaginary numbers – like infinity, and negative square roots) AND has an **even index**, the radicand must be non-negative.

Example:

$\sqrt{4-x} \geq 0$
$4 - x \geq 0$
$4 \geq x$ in order to be REAL #.

Convert the following mixed radicals to entire radicals:

a) $7\sqrt{2} = \sqrt{7^2 \cdot 2} = \sqrt{49 \cdot 2} = \sqrt{98}$

b) $a^4\sqrt{a} = \sqrt{(a^4)^2 a} = \sqrt{a^8 a} = \sqrt{a^9}$

c) $5b\sqrt[3]{3b^2} = \sqrt[3]{5^3 b^3 3b^2} = \sqrt[3]{125 \cdot 3 \cdot b^3 \cdot b^2}$
$= \sqrt[3]{375\,b^5}$

Convert the entire radicals to mixed radicals:

a) $\sqrt{200}$

$\sqrt{100 \times 2}$

$10\sqrt{2}$

b) $\sqrt[4]{c^9} = \sqrt[4]{c \cdot c \cdot c \cdot c \cdot c \cdot c \cdot c \cdot c \cdot c}$

$= c \cdot c \sqrt[4]{c}$

$= c^2 \sqrt[4]{c}$

c) $\sqrt{48y^5}$

$= \sqrt{16 \cdot 3 \cdot y \cdot y \cdot y \cdot y \cdot y}$

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

$= 4y^2 \sqrt{3y}$

Add and Subtract Radicals

Simplify and combine like terms...

a) $\sqrt{50} + 3\sqrt{2}$

$= \sqrt{25 \cdot 2} + 3\sqrt{2}$

$= 5\sqrt{2} + 3\sqrt{2}$

$= 8\sqrt{2}$

b) $-\sqrt{27} + 3\sqrt{5} - \sqrt{80} - 2\sqrt{12}$

$-\sqrt{9 \cdot 3} + 3\sqrt{5} - \sqrt{16 \cdot 5} - 2\sqrt{4 \cdot 3}$

$-3\sqrt{3} + 3\sqrt{5} - 4\sqrt{5} - 2 \cdot 2\sqrt{3}$

$-3\sqrt{3} + 3\sqrt{5} - 4\sqrt{5} - 4\sqrt{3}$

$-7\sqrt{3} - 1\sqrt{5}$

c) $\sqrt{4c} - 4\sqrt{9c}, c \geq 0$

$2\sqrt{c} - 4 \cdot 3\sqrt{c}$

$2\sqrt{c} - 12\sqrt{c}$

$-10\sqrt{c}$

$\sqrt{9}$ is $+3$ not -3 to be REAL #

Comparing and Ordering Radicals

Order the radicals from least to greatest without a calculator:

$4(13)^{\frac{1}{2}}$	$8\sqrt{3}$	14	$\sqrt{202}$	$10\sqrt{2}$
$4\sqrt{13}$	$\sqrt{64 \cdot 3}$	$\sqrt{14 \cdot 14}$	↓	$\sqrt{100 \cdot 2}$
$\sqrt{16 \cdot 13}$	$\sqrt{192}$	$\sqrt{196}$	$\sqrt{202}$	$\sqrt{200}$
$\sqrt{208}$				

Convert ALL to ENTIRE Radicals.

Least ⟹ Greatest ENTIRE RADICALS

$$\sqrt{192} < \sqrt{196} < \sqrt{200} < \sqrt{202} < \sqrt{208}$$

Convert back to ORIGINALS

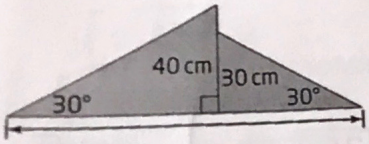
$$8\sqrt{3} < 14 < 10\sqrt{2} < \sqrt{202} < 4(13)^{1/2}$$

Reminder:

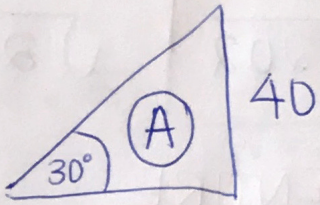
increasing
ascending
least to greatest

decreasing
descending
greatest to least

Applying Addition of Radicals

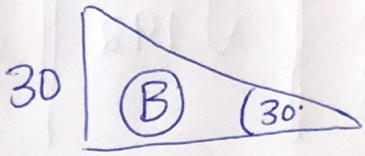


This is a diagram of a skateboard ramp. What is the exact distance across the base?



40

x

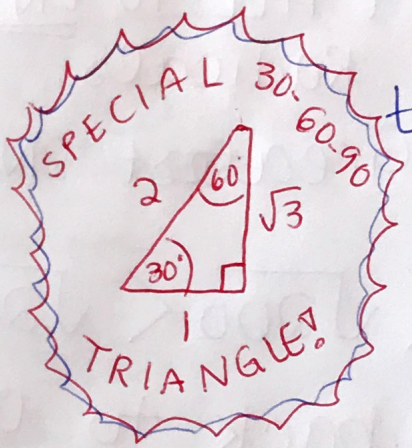


y

$$\tan 30° = \frac{40}{x}$$

$$\frac{1}{\sqrt{3}} = \frac{40}{x}$$

$$x = 40\sqrt{3}$$



$$\tan 30° = \frac{30}{y}$$

$$\frac{1}{\sqrt{3}} = \frac{30}{y}$$

$$y = 30\sqrt{3}$$

$$x + y = 40\sqrt{3} + 30\sqrt{3}$$

$$\boxed{x + y = 70\sqrt{3}\text{ cm}}$$

PRACTICE: Page 278 – Q 1, 3, 6, 8a, 9a, 10a, 19.