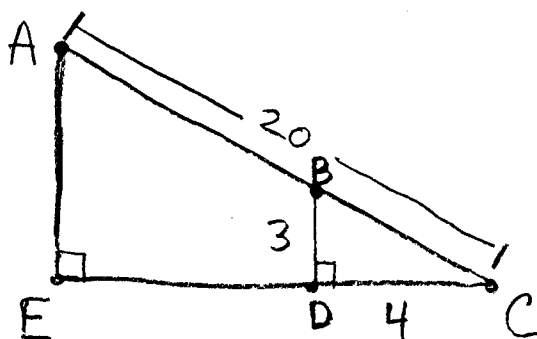


BE-Alg. 2 | MONDAY 10-24-11

QST ① In right triangle $\triangle ACE$ below, $\overline{BD}$ is parallel to $\overline{AE}$, and $\overline{BD}$ is perpendicular to $\overline{EC}$ at D . The length of $\overline{AC}$ is 20 feet, the length of $\overline{BD}$ is 3 feet, and the length of $\overline{CD}$ is 4 feet. What is the length, in feet, of $\overline{AE}$?



ANS

Since $\triangle AEC \sim \triangle BDC$ the sides ARE in proportion,
(corresponding)

$$\therefore \text{First Find } \overline{BC} \Rightarrow \overline{BC}^2 = 3^2 + 4^2$$

$$\overline{BC} = \sqrt{25} = 5$$

$$\therefore \frac{3}{5} = \frac{\overline{AE}}{20}$$

$$5\overline{AE} = 60$$

$$\boxed{\overline{AE} = 12 \text{ feet}}$$

3 is to 5 as $\overline{AE}$ is to 20

leg $\overline{BD}$ is to its hypotenuse (little $\triangle$)

leg $\overline{AE}$ is to its hypotenuse (big $\triangle$)

Review of Radicals

Ch. 5-5 Roots of Real Numbers

Ch. 5-6 Radical Expressions

Ch. 5-7 RATIONAL Exponents
(Fractional)

Ch. 5-8 Radical Equation and Inequalities

$r = \text{radix} \Rightarrow \text{LATIN for root} \Rightarrow \text{Radical}$

$\sqrt{x} = {}^2\sqrt{x} \Rightarrow a \cdot a = x$ Square root of x

${}^3\sqrt{x} \Rightarrow a \cdot a \cdot a = x$ Cube of 3rd root

${}^4\sqrt{x} \Rightarrow a \cdot a \cdot a \cdot a = x$ 4th root

${}^N\sqrt{x} \Rightarrow N^{\text{th}} \text{ root of } x$

$\sqrt{9} = 3$ $-\sqrt{9} = -3$ $\pm\sqrt{9} = \pm 3$
 $\uparrow$
 Principal root

$\sqrt{-9} = \text{No real root}$

${}^3\sqrt{8} = 2$ ${}^3\sqrt{-8} = -2$
 $\uparrow$ $\uparrow$
 ONLY ONLY
 root root

CAUTION: WATCH for "EVEN IN, ODD OUT" SITUATION WITH VARIABLES. (See pg 246-247)

$\sqrt{x^2}$
 ↑
 Even exponent,
 Always positive

$= x$
 ↑
 may be positive
 or negative $\Rightarrow$
 "changed" = broke

$= |x|$
 ↑
 "fixed" $\Rightarrow x$ is
 always positive
 Again

(EX)

$$\sqrt{\cancel{x}^8} = \cancel{x}^4$$

$\uparrow$ $\uparrow$

EVEN or EVEN or
ODD ODD $\Rightarrow OK$

$\textcircled{Ex} \quad \sqrt{x^4} = x^2$
 $\quad \quad \uparrow$
 $\quad \text{ALWAYS}$
 $\quad \text{POSITIVE} \Rightarrow \text{OK}$

EX $\sqrt{X^6} = X^3 \Rightarrow |X^3|$

↑ ↑ ↑

ALWAYS POSITIVE FIX WITH

POSITIVE OR NEGATIVE ABSOLUTE VALUE

⇒ ALWAYS POSITIVE

EX

EX2 pg247 Ch.5-5 (A) $\sqrt[8]{X^8} = X' \Rightarrow \varepsilon I_{00} \Rightarrow \boxed{1 \times 1}$

③ $\sqrt[4]{81(a+1)^{12}} = 3(a+1)^3 \Rightarrow \boxed{3|(a+1)|^3}$

MULT. RULE
FOR EXPONENTS
 $\Rightarrow$ ADD 4 times
 $3+3+3+3$

NUMBER
OK,
ALWAYS
(+)

$\in \mathbb{I}00$

Number
OK
Always
(+)

$$\textcircled{\text{EX}} \quad \sqrt[3]{-x^6} \Rightarrow \text{3rd root of - is -} \therefore \boxed{-x^2}$$

$$\textcircled{\text{EX}} \quad \sqrt{(5x)^4} = (5x)^2 = \boxed{25x^2}$$

$\uparrow$ ALWAYS $\oplus$
 $\uparrow$ ALWAYS $\oplus \Rightarrow \text{OK}$

$$\textcircled{\text{EX}} \quad \sqrt{49x^{20}y^{18}} = \boxed{7x^{10}|y^9|}$$

EIOO

$$\textcircled{\text{EX}} \quad -\sqrt{x^2 + 4x + 4}$$

$$-\sqrt{\overset{\downarrow}{x} \overset{\swarrow}{2} \cdot \overset{\nwarrow}{2} \cdot \overset{\downarrow}{x}} = \boxed{-|(x+2)|}$$

A curve breaker 😊
THIS ONE IS EASY TO MISS!

RADICAL EXPRESSIONS:

$$\textcircled{\text{EX}} \quad 3\sqrt{2} - \sqrt{2} + 4\sqrt{3} + 8\sqrt{3}$$

$$= \boxed{2\sqrt{2} + 12\sqrt{3}}$$

$\uparrow$ COEFFICIENT $\uparrow$ LIKE TERMS $\uparrow$ COEFFICIENT $\uparrow$ LIKE TERMS

How about multiplying and dividing radicals?

Ⓔ $\sqrt{3} \cdot \sqrt{5} = \sqrt{15}$ or $\sqrt{15} = \sqrt{3 \cdot 5} = \sqrt{3} \sqrt{5}$

Ⓔ $\sqrt{\frac{2}{3}} = \frac{\sqrt{2}}{\sqrt{3}}$ or $\frac{\sqrt{2}}{\sqrt{3}} = \sqrt{\frac{2}{3}}$

Can you simplify $\sqrt{40}$

Find a perfect square factor if it exists

$$\sqrt{40} = \sqrt{4} \sqrt{10} = \boxed{2\sqrt{10}}$$

Can you simplify $\sqrt{x^7}$?

There is always a perfect square factor, just subtract 1 to make an even power.

$$\sqrt{x^6} \sqrt{x^1} = \boxed{|x^3| \sqrt{x}}$$

ETIOO

EX1
Pg 250
Ch 5-6

$$\sqrt{16p^8q^7}$$

$$= \boxed{4p^4q^3\sqrt{q}}$$

$$\rightarrow \sqrt{(+)(+)(-)}$$

MUST BE $\oplus$
so technically
 q^7 CANNOT BE $-$
so $|q^3|$ NOT NEEDED.

RATIONALIZING THE DENOMINATOR

MAKING A "RATIO"
of "fraction" number

⇒ DO NOT LEAVE A RADICAL IN THE
BOTTOM OF A fraction.

How TO RTD?

Simple Radical in bottom ⇒ Multiply by $\frac{\sqrt{\quad}}{\sqrt{\quad}}$

$$\textcircled{\text{EX}} \quad \frac{1}{\sqrt{5}} \Rightarrow \frac{1}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{5}$$

$$\textcircled{\text{EX}} \quad \frac{6\sqrt{2}}{\sqrt{10}} = \frac{6\sqrt{2}}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{6\sqrt{20}}{10}$$

$$= \frac{3\sqrt{20}}{5} = \frac{3\sqrt{4}\sqrt{5}}{5} = \boxed{\frac{6\sqrt{5}}{5}}$$

A more complicated + or - $\sqrt{\quad}$ in bottom?

Multiply By its conjugate (top and bottom)

$$\textcircled{\text{EX}} \quad \frac{1}{3+\sqrt{5}} \cdot \frac{3-\sqrt{5}}{3-\sqrt{5}} = \frac{1(3-\sqrt{5})}{3^2-3\sqrt{5}+3\sqrt{5}-5} \leftarrow \begin{array}{l} \text{DOS} \\ \text{PATTERN} \\ (a+b)(a-b) \\ a^2-b^2 \end{array}$$

$$= \boxed{\frac{3-\sqrt{5}}{4}}$$

Ex 2
Pg 251

Simplify $\sqrt{\frac{x^4}{y^5}}$

$$\sqrt{\frac{x^4}{y^5}} = \frac{\sqrt{x^4}}{\sqrt{y^4 \cdot y}} = \frac{x^2}{y^2 \sqrt{y}} \cdot \frac{\sqrt{y}}{\sqrt{y}} = \boxed{\frac{x^2 \sqrt{y}}{y^3}}$$

Ex 3
Pg 252

$$6\sqrt[3]{9N^2} \cdot 3\sqrt[3]{24N}$$

$$= 18\sqrt[3]{216N^3} = 18N\sqrt[3]{216}$$

$$= (18N)(6)$$

$$= \boxed{108N}$$

$$\begin{array}{r} 216 \\ \wedge \\ \textcircled{2} 108 \\ \wedge \\ 912 \\ \wedge \quad \wedge \\ \textcircled{3} \textcircled{3} \textcircled{3} 4 \\ \wedge \\ \textcircled{2} \textcircled{2} \\ 2^3 \cdot 3^3 \\ \sqrt{2^3} \cdot \sqrt{3^3} \\ 2 \cdot 3 = 6 \end{array}$$

Ex 6
Pg 253

$$\frac{1-\sqrt{3}}{5+\sqrt{3}} \cdot \frac{5-\sqrt{3}}{5-\sqrt{3}} = \frac{5-\sqrt{3}-5\sqrt{3}+3}{25-3}$$

$$= \frac{8-6\sqrt{3}}{22} = \boxed{\frac{4-3\sqrt{3}}{11}}$$

Homework: Ch 5-5 ÷ 5-6

• Pg 248 # 29-45 odd

• Pg 254 # 15-25 odd, 35-45 odd