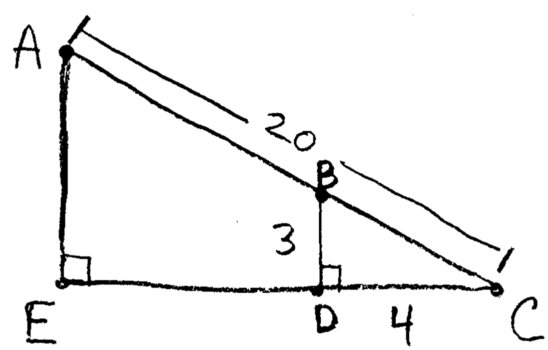
BE-Alg. 2 | TUESDAY 10-19-10

ACT 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)

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

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

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

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

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

as

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

$5\overline{AE} = 60$

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

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

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r = radix ⇒ Latin for root ⇒ $\sqrt{\ }$ radical

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

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

$\sqrt[4]{x} \Rightarrow a \cdot a \cdot a \cdot a = x$ 4th. root

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

$\sqrt{9} = 3$ $-\sqrt{9} = -3$ $\pm\sqrt{9} = \pm 3$

principal root

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

$\sqrt[3]{8} = 2$ $\sqrt[3]{-8} = -2$

only root   only root

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

(Ex) $\sqrt{x^2} = x = |x|$

EVEN EXPONENT, ALWAYS POSITIVE

MAY BE POSITIVE OR NEGATIVE ⇒ "changed" = broke

"fixed" ⇒ X is always positive again

(Ex) $\sqrt{x^8} = x^4$

even or odd

even or odd ⇒ OK

(Ex) $\sqrt{x^4} = x^2$

ALWAYS POSITIVE

ALWAY positive ⇒ OK

(Ex) $\sqrt{x^6} = x^3 \Rightarrow |x^3|$

ALWAYS Positive

POSITIVE or NEGATIVE

fix WITH absolute value ⇒ ALWAYS POSITIVE

(Ex)

EX 2 pg 247 Ch. 5-5

(A) $\sqrt[8]{x^8} = x^1 \Rightarrow$ EIOO $\Rightarrow \boxed{|x|}$

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

MULT. RULE for Exponents ⇒ ADD 4 times 3+3+3+3

Number OK, Always (+)

EIOO

Ex $\sqrt[3]{-x^6} \Rightarrow$ 3^{RD} root of − is − $\therefore$ $\boxed{-x^2}$

Ex $\sqrt{(5x)^4} = (5x)^2 = \boxed{25x^2}$

ALWAYS (+) ALWAYS (+) $\Rightarrow$ OK

Ex $\sqrt{49x^{20}y^{18}} = \boxed{7x^{10}|y^9|}$

EIOO

Ex $-\sqrt{x^2+4x+4}$

x ($2\cdot x\cdot 2$ ✓) 2

$-\sqrt{(x+2)^2} = \boxed{-|(x+2)|}$

A curve breaker ☺

THIS ONE IS EASY TO MISS!

Radical Expressions:

Ex $3\sqrt{2} - \sqrt{2} + 4\sqrt{3} + 8\sqrt{3}$

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

COEFFICIENT LIKE TERMS COEFFICIENT LIKE TERMS

How about multiplying and dividing radicals?

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

Ex $\sqrt{\frac{2}{3}} = \frac{\sqrt{2}}{\sqrt{3}}$ 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.

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

EIOO

Ex 1
pg 250
Ch 5-6

$\sqrt{16p^8q^7} \longrightarrow \sqrt{(+)(+)(\ )}$

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

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 $\frac{\sqrt{}}{\sqrt{}}$

Ex $\frac{1}{\sqrt{5}} \Rightarrow \frac{1}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{5}$

Ex $\frac{6\sqrt{2}}{\sqrt{10}} = \frac{6\sqrt{2}}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{6\sqrt{20}}{10}$

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

A more COMPLICATED + or − $\sqrt{}$ in bottom?
Multiply By its conjugate (top and bottom)

Ex $\frac{1}{3+\sqrt{5}} \cdot \frac{3-\sqrt{5}}{3-\sqrt{5}} = \frac{1(3-\sqrt{5})}{3^2-3\sqrt{5}+3\sqrt{5}-5}$ ⇐ DOS PATTERN $(a+b)(a-b)$ a^2-b^2

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

Ex 2
Pg 251

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

$$\sqrt{\frac{x^4}{y^5}} = \frac{\sqrt{x^4}}{\sqrt{y^4 \cdot y^1}} = \frac{x^2}{y^2\sqrt{y}} \cdot \frac{\sqrt{y}}{\sqrt{y}} = \boxed{\frac{x^2\sqrt{y}}{y^3}}$$

Ex 3
P252

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

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

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

$$= \boxed{108N}$$

216
2 108
9 12
3 3 3 4
2 2

$2^3 \cdot 3^3$

$\sqrt{2^3} \cdot \sqrt{3^3}$

$2 \cdot 3 = 6$

Ex6
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