3/6 WED

Ch P.3 | Radicals & Rational Exponents

ex 1) $\sqrt{245} = \sqrt{5 \cdot 7 \cdot 7} = 7\sqrt{5}$

ex 2) $\sqrt{28} = 2\sqrt{7}$

ex 3) $\sqrt{98x^2} = 7x\sqrt{2}$

ex 4) $\sqrt[3]{27x^4} = 3x\sqrt[3]{x}$ (triples; index)

ex 5) $\sqrt{10x} \cdot \sqrt{70x} = \sqrt{10x \cdot 70x} = 10x\sqrt{7}$

ex 6) $\sqrt{64} + \sqrt{36} = 8 + 6 = 14$

ex 7) $\sqrt{-36} = 6i$

ex 8) $\sqrt{\frac{81}{25}} = \frac{\sqrt{81}}{\sqrt{25}} = \frac{9}{5}$

ex 9) $\sqrt{\frac{32x}{2x}} = \sqrt{16} = 4$ (reduce if possible)

ex 10) $\frac{\sqrt{168x^4}}{\sqrt{6x}} = \sqrt{\frac{168x^3}{6x}} = \sqrt{28x^3} = 2x\sqrt{7x}$

ex 11) $9\sqrt{3} + 3\sqrt{3} = 12\sqrt{3}$ ("9x + 3x"; treat $\sqrt{\ }$ like variable)

ex 12) $\sqrt{5x} - 6\sqrt{20x} + 3\sqrt{180x}$

$\rightarrow \sqrt{5x} - 6\,2\sqrt{5x} + 3 \cdot 2 \cdot 3\sqrt{5x}$

$\rightarrow \sqrt{5x} - 12\sqrt{5x} + 18\sqrt{5x} = 7\sqrt{5x}$

ex 13) $\sqrt[3]{x^7} = x^2\sqrt[3]{x^1}$ (index)

ex 14) $\sqrt[3]{x^{10}y^7z^6} = x^3y^2z^2\sqrt[3]{xy}$

ex 15) $\frac{\sqrt{5}}{\sqrt{11}} \cdot \frac{\sqrt{11}}{\sqrt{11}} = \frac{\sqrt{55}}{11}$ Rationalize the denom.

ex 16) $\frac{5}{(8-\sqrt{2})} \cdot \frac{(8+\sqrt{2})}{(8+\sqrt{2})} = \frac{40+5\sqrt{2}}{64-\sqrt{4}}$ FOIL

Rationalize → conjugate: $a \pm \sqrt{b}$

$\frac{64-2}{40+5\sqrt{2}}$

$\frac{40+5\sqrt{2}}{62}$

ex 17) a) $(x^2)^{\frac{1}{2}} = x^{2 \cdot \frac{1}{2}} = x^1$ (mult.)

b) $x^{\frac{3}{4}} = \sqrt[4]{(x)^3}$ (power; root)

ex 18) $625^{\frac{1}{4}} = \sqrt[4]{625^1} = 5$

Rational Exponents

$a^{\frac{m}{n}} = \sqrt[n]{a^m}$

radicals

reciprocate

ex 19) $16^{-\frac{3}{2}} = \frac{1}{16^{\frac{3}{2}}} = \frac{1}{\sqrt[2]{16^3}} = \frac{1}{16 \cdot 4} = \frac{1}{64}$

$\sqrt[2]{16^3} = \sqrt[2]{16 \cdot 16 \cdot 16}$, $4 \cdot 4$

ex 20) $(8x^{\frac{3}{4}}) \cdot (7x^{\frac{1}{2}}) = 8 \cdot 7 \cdot x^{\frac{3}{4}} \cdot x^{\frac{1}{2}} = 56 \cdot x^{\frac{3}{4}+\frac{1}{2}} = 56x^{\frac{5}{4}}$

ex 21) $(81x^6y^4)^{\frac{1}{2}} = 81^{\frac{1}{2}}(x^6)^{\frac{1}{2}}(y^4)^{\frac{1}{2}} = 9x^3y^2$

ex 22) $(125x^8y^9)^{\frac{1}{3}} = 125^{\frac{1}{3}}(x^8)^{\frac{1}{3}}(y^9)^{\frac{1}{3}} = 5x^{\frac{8}{3}}y^3$

→ radical form

$125 = 5 \cdot 25 = 5 \cdot 5 \cdot 5$

$\rightarrow 5y^3\sqrt[3]{x^8}$

$\rightarrow 5y^3x^2\sqrt[3]{x^2}$

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

ex 23) Simplify by reducing the index.

$\sqrt[6]{8x^3} = 8^{\frac{1}{6}}x^{\frac{3}{6}} = (2^3)^{\frac{1}{6}}x^{\frac{3}{6}} = 2^{\frac{3}{6}}x^{\frac{3}{6}} = 2^{\frac{1}{2}}x^{\frac{1}{2}} = (2x)^{\frac{1}{2}}$

$= \sqrt{2x}$

→ rat'l exp...

$2 \cdot 2 \cdot 2$

HW: p43, # 2-106 EOE