Review

Solve: $3x+36=x^2-6x$

$0=x^2-6x-3x-36$

$0=x^2-9x-36$

$0=(x-12)(x+3)$

$x=12,-3$

6.6 Literal Equations

6. $A=\frac{1}{2}bh$; h

$\frac{A}{\frac{1}{2}b} = \frac{\frac{1}{2}bh}{\frac{1}{2}b}$

$\frac{A}{\frac{1}{2}b}=h$

$h=\frac{A}{b}\cdot\frac{2}{1}$

$h=\frac{2A}{b}$

10. $S = V_0 t - 16t^2$; V_0

$$\frac{S + 16t^2}{t} = \frac{V_0 t}{t}$$

$$\boxed{V_0 = \frac{S + 16t^2}{t}}$$

16. $P = \frac{R - C}{n}$; R

$$nP = R - C$$

$$\boxed{nP + C = R}$$

20. $x = ax + b \quad ; x$

$$x - ax = b$$

$$x(1-a) = b$$

$$\boxed{x = \frac{b}{1-a}}$$

22. $y - y_1 = m(x - x_1) \quad ; x$

$$\frac{y-y_1}{m} = x - x_1$$

$$\boxed{\frac{y-y_1}{m} + x_1 = x}$$

$$y - y_1 = mx - mx_1$$

$$y - y_1 + mx_1 = mx$$

$$\frac{y - y_1 + mx_1}{m} = x$$

24. $\frac{1}{x}+\frac{1}{a}=b$; x

LCD $= ax$

$$\frac{ax}{1}\left(\frac{1}{x}+\frac{1}{a}\right)=b\cdot\frac{ax}{1}$$

$$\frac{\cancel{a}\cancel{x}}{1}\cdot\frac{1}{\cancel{x}}+\frac{\cancel{a}x}{1}\cdot\frac{1}{\cancel{a}}=abx$$

$$a+x=abx$$

$$a=abx-x$$

$$a=x(ab-1)$$

$$\boxed{\frac{a}{ab-1}=x}$$

26. $a(a-x)=b(b-x)$; x

$$a^2-ax=b^2-bx$$

$$a^2-b^2=ax-bx$$

$$a^2-b^2=x(a-b)$$

$$\frac{a^2-b^2}{a-b}=x$$

$$\frac{\cancel{(a-b)}(a+b)}{\cancel{a-b}}=x$$

$$\boxed{x=a+b}$$

34. $V = \dfrac{V_1 + V_2}{\left(1 + \frac{V_1 V_2}{c^2}\right)}$; V_1

$V\left(1 + \frac{V_1 V_2}{c^2}\right) = V_1 + V_2$

$c^2 \cdot \left(V + \frac{V V_1 V_2}{c^2}\right) = (V_1 + V_2) \cdot c^2$

$Vc^2 + V V_1 V_2 = V_1 c^2 + V_2 c^2$

$V V_1 V_2 - V_1 c^2 = V_2 c^2 - V c^2$

$V_1 (V V_2 - c^2) = V_2 c^2 - V c^2$

$\boxed{V_1 = \dfrac{V_2 c^2 - V c^2}{V V_2 - c^2}}$

$\frac{V V_1 V_2}{c_2} - V_1 = V_2 - V$

$V_1\left(\frac{V V_2}{c^2} - 1\right) = V_2 - V$

$\boxed{V_1 = \dfrac{V_2 - V}{\frac{V V_2}{c^2} - 1}}$

7.1 Rational Exponents & Radical Expressions

$m, n \in \mathbb{Z}^+$; $a^{1/n} \in \mathbb{R}$

positive integers real

$\frac{m}{n} = \frac{m}{1} \cdot \frac{1}{n} = \frac{1}{n} \cdot \frac{m}{1}$

1. $a^{m/n} = \left(a^m\right)^{\frac{1}{n}} = \left(a^{\frac{1}{n}}\right)^m$

$a \in \mathbb{R}$; $n \in \mathbb{Z}^+$

$27^{1/3} = \sqrt[3]{27} = 3$ because $3^3 = 27$

2. $a^{\frac{1}{n}} = \sqrt[n]{a}$

"n^{th} root of a" is the number that when raised to the n^{th} power (multiplying it by itself n times) equals a.

$16^{1/2} = \sqrt{16} = \sqrt[2]{16} = 4$

$4^2 = 16$

$a^{1/n} \in \mathbb{R}$

$$a^{\frac{m}{n}} = \begin{cases} (a^m)^{\frac{1}{n}} = \sqrt[n]{a^m} \\ (a^{\frac{1}{n}})^m = (\sqrt[n]{a})^m \end{cases}$$

* numerator of exponent stays an exponent, denominator is a root

$$32^{3/5} = \sqrt[5]{32^3} = \boxed{(\sqrt[5]{32})^3}$$

$$32 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

special case:

$$\cancel{\sqrt[n]{a^n} = a^{\frac{n}{n}} = a^1 = a}$$

$$\sqrt[n]{a^n} = \begin{cases} a, & \text{if } n \text{ is odd} \\ |a|, & \text{if } n \text{ is even} \end{cases}$$

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

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

$$\left.\begin{array}{l} \sqrt[2]{2^2} = \sqrt[2]{4} = 2 = |2| \\ \sqrt[2]{(-2)^2} = \sqrt[2]{4} = 2 = |-2| \end{array}\right\} \sqrt[n]{x^n} = |x| \text{ for } n \text{ even}$$

$\sqrt{-2}$ is not a real #

(even roots of negative #'s are imaginary)

$\sqrt{x}$ domain is $[0, \infty)$

Rewrite as radical.

94. $(a^2b^4)^{3/5}$

$\boxed{\sqrt[5]{(a^2b^4)^3}}$ or $\left(\sqrt[5]{a^2b^4}\right)^3$

simplified . . .

$\sqrt[5]{a^6b^{12}} = \sqrt[5]{a^5ab^{10}b^2} = \sqrt[5]{a^5a(b^2)^5b^2}$

$= \sqrt[5]{a^5} \cdot \sqrt[5]{(b^2)^5} \cdot \sqrt[5]{ab^2}$

$= \boxed{ab^2\sqrt[5]{ab^2}}$

rewrite as exponent

104. $\sqrt[4]{a^3}$

$= a^{3/4}$

110. $-\sqrt[4]{4x^5} = (-1)\cdot\sqrt[4]{4x^5}$

$= (-1)4^{1/4}x^{5/4} = \boxed{-4^{1/4}x^{5/4}}$

Simplify.

$\sqrt[3]{81x^5y^6}$

$9\cdot 9$

$\underbrace{3\cdot3\cdot3}\cdot3$

$3^3\cdot3\cdot x^3\cdot x^2\cdot(y^2)^3$

$=\sqrt[3]{3^3\cdot3\cdot x^3\cdot x^2\cdot(y^2)^3}$

$= \boxed{3xy^2\sqrt[3]{3x^2}}$

$\sqrt[3]{\boxed{m}^3}$

$= \boxed{m}$

Simplify.

$$\sqrt[5]{96x^{12}y^{7}z^{15}}$$

$$= \sqrt[5]{3\cdot 2^5\cdot (x^2)^5\cdot x^2\cdot y^5 y^2\cdot (z^3)^5}$$

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

$3\cdot 32$
$3\cdot 2\cdot 16$
$3\cdot 2\cdot 2\cdot 8$
$3\cdot 2\cdot 2\cdot 2\cdot 4$
$3\cdot 2\cdot 2\cdot 2\cdot 2\cdot 2$
$3\cdot 2^5$

$x^{12} = x^{10}\cdot x^2$
$= (x^2)^5\cdot x^2$

6.6 HW: 5-25 odd

7.1 HW 85-113 odd