# REVIEW

- **Linear Equations**

line up equal signs

**Ex** $6 - 4(x+1) + 3x = 4 - 10x - 7$ ) dist.

$6 - 4x - 4 + 3x = 4 - 10x - 7$ ) simplify

$2 - x = -10x - 3$ ) gather like-terms

$-x + 10x = -3 - 2$ ) simplify

$9x = -5$ ) isolate $x$

$$x = \frac{-5}{9}$$

- **Quadratic eqn**

$$ax^2 + bx + c = 0$$

**Ex** $3x^2 + 2x + 1 = 0$

quadratic term — linear term — constant term

Solve for $x$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- Apply quadratic formula:

$$x = \frac{-(2) \pm \sqrt{2^2 - 4(3)(1)}}{2(3)}$$

$$x = \frac{-2 \pm \sqrt{4-12}}{6}$$

$$x = -\frac{1}{3} \pm \frac{1}{6}\sqrt{-8}$$

$$x = -\frac{1}{3} \pm \frac{2\sqrt{2}}{6} \cdot i$$

$$x = -\frac{1}{3} \pm \frac{\sqrt{2}}{3} i$$

$x = -\frac{1}{3} + \frac{\sqrt{3}}{3} i$ , $-\frac{1}{3} - \frac{\sqrt{3}}{3} i$

# 1.0b Review Notes

## Radicals, Inequalities & absolute values

### Radicals

Ex $\sqrt{32}\sqrt{2}$

Line up on Left

$= \sqrt{32 \cdot 2}$

$= \sqrt{64}$

$= 8$

↙ expression

No No

$\sqrt{32}\sqrt{2} = \sqrt{32 \cdot 2} = \sqrt{64} = 8$

$\frac{a^n}{a^m} = a^{n-m}$

$a^n a^m = a^{n+m}$

$a^{-n} = \frac{1}{a^n}$

$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

Ex $\frac{\sqrt{3x}}{\sqrt{4x^3}}$

$= \sqrt{\frac{3x}{4x^3}}$

$= \frac{\sqrt{3}}{\sqrt{4}} \cdot \sqrt{\frac{x}{x^3}}$

$= \frac{\sqrt{3}}{2}\sqrt{x^{1-3}}$

$= \frac{\sqrt{3}}{2}\sqrt{x^{-2}}$

$= \frac{\sqrt{3}}{2}\sqrt{\frac{1}{x^2}}$

$= \frac{\sqrt{3}}{2}\frac{1}{\sqrt{x^2}}$

$= \boxed{\frac{\sqrt{3}}{2x}}$

- Radical Work

$$\sqrt{a} = a^{1/2}$$

$$\sqrt[n]{a} \equiv a^{1/n}$$

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \Leftrightarrow \left(\frac{a}{b}\right)^{1/n} = \frac{a^{1/n}}{b^{1/n}}$$

**ex**

Reduction

$$\sqrt{a^2}$$

$$= (a^2)^{1/2}$$

$$= a^{2 \cdot \frac{1}{2}}$$

$$= a$$

$$\Rightarrow \boxed{\sqrt{a^2} = a}$$

**ex:**

$$\sqrt{a^{10}}$$

$$= (a^{10})^{1/2}$$

$$= \boxed{a^5}$$

# 1.0b Notes

## exponents

$$a^n a^m = a^{n+m} \qquad \frac{a^n}{a^m} = a^{n-m}$$

$$a^{-n} = \frac{1}{a^n}, \quad a^n = \frac{1}{a^{-n}}, \quad (a^n)^m = a^{n \cdot m}$$

$$(ab)^n = a^n b^n, \quad \left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

**Ex**

$$3^{10} \times 9^8$$
$$= 3^{10} \times (3^2)^8$$
$$= 3^{10} \times 3^{16}$$
$$= 3^{10} 3^{16}$$
$$= 3^{10+16}$$
$$= \boxed{3^{26}}$$

**Symbols**

$x$ (ex), $X$, $\cdot$ (multiply)

$t$ (tee), $+$ (plus), $x$ ($x$ w/o crossing), $)($, $\chi$

$Z$ (zee), $2$ (two), $z$, $\underbrace{2z}_{\text{2 or zee ?}}$, $zz$

$b, 6, 6, 6, b$

**Ex**

$$\sqrt[3]{a^7}$$

$$= a^{7 \cdot \frac{1}{3}}$$

$$= a^{7/3}$$

$$= a^{2+\frac{1}{3}}$$

$$= a^2 a^{1/3}$$

$$= \boxed{a^2 \sqrt[3]{a^1}}$$

Notes ...

$$3\overline{)7} \quad 2 \text{ r } 1$$

$$-6$$

$$1$$

$$\frac{7}{3} = 2 + \frac{1}{3}$$

**Ex**

$$\sqrt[4]{a^{11}}$$

$$= a^2 \sqrt[4]{a^3}$$

$$4\overline{)11} \quad 2 \text{ r } 3 \qquad = 2 + \frac{3}{4}$$

$$-8$$

$$3$$

**Ex** $\left(x^{-5} y^{3} z^{10}\right)^{-3/5}$

$= \left(x^{-5}\right)^{-3/5} \left(y^{3}\right)^{-3/5} \left(z^{10}\right)^{-3/5}$

$= x^{(-5)(-\frac{3}{5})} \quad y^{3\cdot(-\frac{3}{5})} \quad z^{10\cdot(-\frac{3}{5})}$

$= x^{\frac{5\cdot 3}{5}} \quad y^{-\frac{3\cdot 3}{5}} \quad z^{-\frac{10\cdot 3}{5}}$ (2)

$= x^{3} \quad y^{-9/5} \quad z^{-6}$

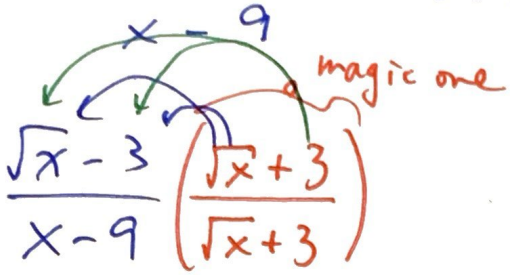
$= \dfrac{x^{3}}{y^{9/5} z^{6}}$ ← $y^{9/5} = y^{1+4/5} = y\, y^{4/5}$

$= \dfrac{x^{3}}{y \sqrt[5]{y^{4}}\, z^{6}}$

$= \boxed{\dfrac{x^{3}}{y z^{6} \sqrt[5]{y^{4}}}}$

## Rationalizing Expression

**EX** $\dfrac{\sqrt{x}-3}{x-9}$ rationalize the Numerator




$$= \frac{\sqrt{x}-3}{x-9}\left(\frac{\sqrt{x}+3}{\sqrt{x}+3}\right)$$

$$= \frac{(\sqrt{x})^2 - 3\sqrt{x} + 3\sqrt{x} - 3\cdot 3}{}$$

$$= \frac{x-9}{x-9}\left(\frac{1}{\sqrt{x}+3}\right)$$

$$= \boxed{\frac{1}{\sqrt{x}+3}}$$

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

**EX** $\dfrac{1}{\sqrt{x}-\sqrt{y}} \cdot \left(\dfrac{\sqrt{x}+\sqrt{y}}{\sqrt{x}+\sqrt{y}}\right)$ Rationalizing the Denominator

$$= \frac{\sqrt{x}+\sqrt{y}}{\sqrt{x}^2 - \sqrt{y}\sqrt{x} + \sqrt{y}\sqrt{x} - \sqrt{y}^2}$$

$$= \boxed{\frac{\sqrt{x}+\sqrt{y}}{x-y}}$$