UNIT 3 LESSON 2

RADICALS & PROPERTIES OF REAL NUMBERS

- **RATIONAL NUMBER** is a real number that can be written as a fraction or integer.
- **IRRATIONAL NUMBER** is a real number that can be written as a square root.

Properties of Radicals

Property	Formula	Example
Addition property To add two like radical terms, add the coefficients.	$a\sqrt{m}+b\sqrt{m}=(a+b)\sqrt{m}$	$2\sqrt{2}+3\sqrt{2}=5\sqrt{2}$
Product property The square root of a product is equal to the product of the square roots of the factors.	$\sqrt{m \bullet n}=\sqrt{m}\bullet\sqrt{n}$	$\sqrt{6}=\sqrt{2\bullet 3}=\sqrt{2}\bullet\sqrt{3}$
Quotient property The square root of a quotient is equal to the quotient of the square roots of the dividend and the divisor.	$\sqrt{\frac{m}{n}}=\frac{\sqrt{m}}{\sqrt{n}}, n \neq 0$	$\sqrt{\frac{2}{3}}=\frac{\sqrt{2}}{\sqrt{3}}=\frac{\sqrt{2}\bullet\sqrt{3}}{3}=\frac{\sqrt{6}}{3}$

[illegible]	Formula	Example
Power reduction property The square root of a number raised to an even power is equal to the number raised to half the original power.	$\sqrt{n^{2a}}=n^a$	$\sqrt{16}=\sqrt{2^4}=2^2=4$
Rational denominator property To rationalize the denominator, multiply the numerator and denominator by the radical in the denominator.	$\frac{m}{\sqrt{n}}=\frac{m}{\sqrt{n}}\bullet\frac{\sqrt{n}}{\sqrt{n}}=\frac{m\sqrt{n}}{n}$	$\frac{2}{\sqrt{2}}=\frac{2}{\sqrt{2}}\bullet\frac{\sqrt{2}}{\sqrt{2}}=\frac{2\sqrt{2}}{2}$

Ex 1) Reduce the radical expression $\sqrt{a^9b^2}$ Then determine whether the result is rational or irrational.

Ex 2) Evaluate the radical expression. $5\sqrt[3]{27}+2\sqrt[3]{8}$ Then determine whether the result is rational or irrational.

Ex 3) Evaluate the radical expression. $\sqrt{32}+4\sqrt{2}$ Then determine whether the result is rational or irrational.

Unit 3 Lesson 2

ex 1) $\sqrt{a^9b^2}$ = Separate exponent into even numbers

$\sqrt{a^8 \cdot a^1 \cdot b^2}$

= index for square root is 2; divide exponents by index

$a^{\frac{8}{2}} = a^4$

$b^{\frac{2}{2}} = b$

= multiply remaining values; bring any remainders

$\boxed{a^4 b\sqrt{a}}$

Ex 2) $5\sqrt[3]{27} + 2\sqrt[3]{8}$

= find perfect cube of number under radical; index of radical is 3 (cube)

$\sqrt[3]{27} = 3$; $\sqrt[3]{8} = 2$

= multiply perfect cube by coefficients

$(5 \cdot 3) + (2 \cdot 2)$

= Simplify

$15 + 4 = \boxed{19}$ RATIONAL

Ex3) $\sqrt{32} + 4\sqrt{2}$

= find perfect square in number under radical

$\sqrt{16 \cdot 2} + 4\sqrt{2}$

= simplify perfect square radical

$4\sqrt{2} + 4\sqrt{2}$

= Radicals are the same → we can combine coefficients

$\boxed{8\sqrt{2}}$ IRRATIONAL