Geometry Monday 12-10-12 Class Notes

whole
NATURAL

$\{\ldots -2, -1, 0, 1, 2 \ldots\}$ "Ellipsis"

integers

ratio mean fractions

RATIONAL

$\left\{\frac{a}{b} \ldots\right\}$ a, b are any integers except $b \neq 0$

↑ cannot ÷ by zero

OR

{termination or repeating decimals}

(Ex) $\frac{1}{2} = .5$ (Ex) $\frac{1}{3} = .\overline{3}$

(Ex) $(2x-3)(x-5)=0$ $x = \left\{\frac{3}{2}, 5\right\}$

IRRATIONAL

{NON-repeating, non-term. dec}

IRRATIONAL

(Ex) $\sqrt{2}, \sqrt{3}, \sqrt{5}, \pi,$

d = perfect square

2 real, rational solutions ("factorable")

Reals = {rat + irr.}

Complex ⇒ $\sqrt{-1}$ = imaginary

{...-2, -1, 0, 1, 2, ...} integers

→ whole
→ NATURAL

"fraction is ratio"

$\left\{ \frac{a}{b} \ldots \right\}$ where a, b are integers, $b \neq 0$

RATIONAL

{terminating decimals, repeating decimals}

(ex) $\frac{1}{2} = .5$, (ex) $\frac{1}{3} = .\overline{3}$

(ex) $(3x-2)(x+5) = 0$

$x = \left\{ \frac{2}{3}, -5 \right\}$

$-\frac{5}{1}$

2 real, RATIONAL

d = perfect square

(ex) $(3x-2)(3x-2) = 0$

$x = \left\{ \frac{2}{3} \right\}$

d = zero

1 real RATIONAL solution

{ NON-Repeating and NON-terminating decimals }

Ex $\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6}, \pi$

$\sqrt{4} = 2 =$ RATIONAL

IRRATIONAL

$\{\ldots -2, -1, 0, 1, 2, 3 \ldots\}$ integers

A ratio is a fraction

$\left\{\frac{a}{b}\right\}$ where a, b are any integers, $b \neq 0$

* RATIONAL NUMBERS

OR {terminating, repeating decimals}

(ex) $\frac{1}{2} = .5$ (ex) $\frac{1}{3} = .\overline{3}$

---

* Not-fractions
Not-ratios
irrational $\Rightarrow$ {non-repeating, infinite decimals}
$\pi, \sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6},$

** Reals {rational, irrational}

(ex) $(3x-2)(x+8) = 0 \quad x = \left\{\frac{2}{3}, -8\right\}$

FACTORS $\Rightarrow$ 2 real rational solutions

d = perf. sq.

d	Meaning
+ perf. sq (ex) 49 (ex) 1	2 real, rational solutions
+ not a perf sq (ex) 7 (ex) 48	2 real, irrational solutions
0	1 real rational sol. "double root"
Neg	No real sol.

$$d = b^2 - 4ac$$

$$x = \frac{-b \pm \sqrt{d}}{2a}$$

(Ex) $x^2 = -4x - 3$ $\quad ax^2 + bx + c = 0$

$1x^2 + 4x + 3$

$1x^2 + 4x + 3 = 0$

Sum $= b = 4$

Prod $= ac = 3$

$+1x + 3$

$(x^2 + 1x) + (3x + 3) = 0$

$x(x+1) + 3(x+1) = 0$

$(x+1)(x+3) = 0$

$a \cdot b = 0$

Zpp $\quad x = \{-1, -3\}$

(Ex) $x^2 + 6x + 9 = 0$

$(x + 3)^2 = 0$

$(x+3)(x+3) = 0$ ✓

$x = \{-3\}$

(Ex) $x^2 - 6x + 9 = 0$

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

$x = \{3\}$

Perfect Square Quadratic Pattern

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

$= a^2 + 2ab + b^2$

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

$= a^2 - 2ab + b^2$

(Ex) $0 = 4N - N^2 - 4$

$N^2 - 4N + 4 = 0$

$(N-2)^2 \Rightarrow N = \{2\}$

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

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

(Ex) $-3N^2 - 3 = 6N$

$3N^2 + 6N + 3 = 0$

$3(N^2 + 2N + 1) = 0$

$3(N + 1)(N + 1) = 0$

$N = \{-1\}$

(Ex) $x^2 + 1 = -2x$ Find d, EXPLAIN

$+2x \quad +2x$

$x^2 + 2x + 1 = 0$

$a = 1$

$b = 2$

$c = 1$

$b^2 - 4ac$

$(2)^2 - 4(1)(1)$

$4 - 4 = 0 = d$

1 real rational sol.

$x^2 + 2x + 1 = 0$

$(x + 1)(x + 1) = 0$

$x = \{-1\}$

Double root

(7.) Find d, number & type of sol.

$5m^2 - 6m = -1$

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

$5m^2 - 6m + 1 = 0$

sum $= b = -6$

prod $= ac = 5$

$-1m \quad -5m$

$(5m^2 - 1m) + (-5m + 1) = 0$

$m(5m-1) + -1(5m-1) = 0$

$(5m-1)(m-1) = 0$

$m = \{\frac{1}{5}, 1\}$ ✓ ✓

CK $5(\frac{1}{5})^2 - 6(\frac{1}{5}) \stackrel{?}{=} -1$

$\frac{1}{5}(\frac{1}{5}) - \frac{6}{5} \stackrel{?}{=} -1$

$\frac{1}{5} - \frac{6}{5} \stackrel{?}{=} -1$

$\frac{-5}{5} \stackrel{?}{=} -1$ ✓

⑦ CONT. $5m^2 - 6m + 1 = 0$

$a = 5$ $\quad b^2 - 4ac$

$b = -6$ $\quad (-6)^2 - 4(5)(1)$

$c = 1$ $\quad 36 - 20 = \boxed{16 = d}$

perf. sq.

2, real, rational solutions

---

② $10 - 7a = -a^2$

ID

$1a^2 - 7a + 10 = 0$

sum $= -7$

prod $= 10$

$-2 \quad -5$

$(a-2)(a-5) = 0$

$\boxed{a = \{2, 5\}}$

ck

$10 - 7(2) \stackrel{?}{=} -(2)^2$

$10 - 14 \stackrel{?}{=} -4$ ✓

$10 - 7(5) \stackrel{?}{=} -(5)^2$

$10 - 35 \stackrel{?}{=} -25$ ✓

⑤ $0 = -15 - 28a - 5a^2$

$5a^2 + 28a + 15 = 0$

Sum = 28

prod = 75

$+3 \quad +25$

$(5a^2 + 3a) + (25a + 15) = 0$

$a(5a+3) + 5(5a+3) = 0$

$(5a+3)(a+5) = 0$

$a = \{-5, -\frac{3}{5}\}$

? ?