

Geometry

MONDAY 12-10-12 (CLASS NOTES)

$\{ \dots -2, -1, 0, 1, 2, \dots \}$
whole NATURAL
"ellipsis"

integers

ratio mean fractions

$\left\{ \frac{a}{b} \dots \right\}$

a, b are ANY integers
EXCEPT $b \neq 0$

RATIONAL

OR

CANNOT \div by zero

{ termination or repeating decimals }

EX $\frac{1}{2} = 0.5$ EX $\frac{1}{3} = 0.\bar{3}$

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

{ non-repeating, non-term. dec }

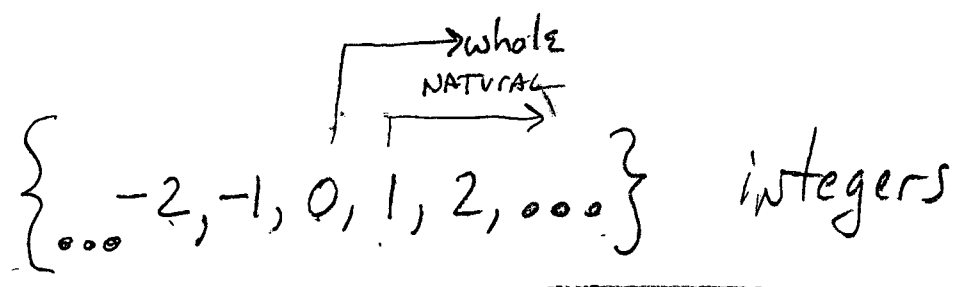
(IRRATIONAL)

EX $\sqrt{2}, \sqrt{3}, \sqrt{5}, \pi,$

↑ RATIONAL
d = perfect square
2 real, rational
solutions
("factorable")

Reals = { rat + irr. }

Complex $\Rightarrow \sqrt{-1} = \text{imaginary}$



"fraction is ratio"

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

RATIONAL

$\left\{ \text{terminating decimals, repeating decimals} \right\}$

(EX) $\frac{1}{2} = .5$, (EX) $\frac{1}{3} = .\bar{3}$

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

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

↓

$-\frac{5}{1}$

2 real, RATIONAL

$d = \text{perfect square}$

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

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

$d = \text{zero}$

1 real RATIONAL solution

{ non-repeating and non-terminating
decimals }

(Ex)

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

$\sqrt{4} = 2 = \text{rational}$

irrational

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

A ratio is a fraction

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

~~*~~

RATIONAL NUMBERS

OR $\left\{ \text{terminating, repeating decimals} \right\}$
 (EX) $\frac{1}{2} = 0.5$ (EX) $\frac{1}{3} = 0.\bar{3}$

~~*~~

NOT fractions

NOT RATIOS

IRRATIONAL $\Rightarrow \left\{ \text{non-repeating, infinite decimals} \right\}$
 $\pi, \sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6}, \dots$

~~*~~ ~~*~~ **Reals** $\{ \text{RATIONAL, irrational} \}$

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

FACTORS \Rightarrow 2 real rational solutions
 $d = \text{perf. sq.}$

d

Meaning

⊕ perf. sq
ⓧ 49

ⓧ 1

2 real, rational solutions

⊕ NOT a perf sq.
ⓧ 7
ⓧ 48

2 real, irrational solutions

○

1 real rational sol.
"double root"

Neg

NO real sol.

$d = b^2 - 4ac$ ✓

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

$$\textcircled{\text{Ex}} \quad x^2 = -4x - 3 \quad ax^2 + bx + c = 0$$

$$x^2 + 4x + 3$$

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

$$\text{Sum} = b = 4$$

$$\text{prod} = ac = 3$$

$$+1 \quad +3 \checkmark$$

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

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

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

$$a \cdot b = 0$$

ZPP

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

$$\textcircled{\text{Ex}} \quad x^2 + 6x + 9 = 0$$

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

$$(x + 3)(x + 3) = 0 \quad \checkmark$$

$$x = \{-3\}$$

$$\textcircled{\text{Ex}} \quad x^2 - 6x + 9 = 0$$

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

$$x = \{3\}$$

Perfect Square

Quadratic Pattern

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

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

$$\textcircled{\text{Ex}} \quad 0 = 4N - N^2 - 4$$

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

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

PST

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

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

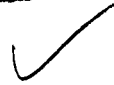
$$\textcircled{24} \quad -3N^2 - 3 = 6N$$

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

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

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

$$N = \{-1\}$$



$$\begin{matrix} \checkmark \\ \textcircled{EX} \end{matrix} \quad \begin{matrix} X^2 + 1 = -2X \\ +2X \quad +2X \end{matrix} \quad \begin{matrix} \text{Find } d, \\ \text{EXPLAIN} \end{matrix}$$

$$X^2 + 2X + 1 = 0$$

$a = 1$ $b^2 - 4ac$
 $b = 2$ $(2)^2 - 4(1)(1)$
 $c = 1$ $4 - 4 = \textcircled{0 = d}$

$X^2 + 2X + 1 = 0$ 1 real rational sol.

$(X + 1)(X + 1) = 0$

$X = \{-1\}$

Double root

⑦ Find d, r - Number & type of sol.

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

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

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

$$\text{sum} = b = -6$$

$$\text{prod} = ac = 5$$

$-1m, 5m$

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

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

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

$m = \left\{ \frac{1}{5}, 1 \right\}$

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

$$\frac{1}{5}\left(\frac{1}{25}\right) - \frac{6}{5} \stackrel{?}{=} -1$$

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

$$\frac{-5}{5} \stackrel{?}{=} -1 \quad \checkmark$$

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

⑧ $10 - 7a = -a^2$

to

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

$$\text{sum} = -7$$

$$\text{prod} = 10$$

$$\begin{matrix} \wedge \\ -2 \quad -5 \end{matrix}$$

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

OK

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

$$10 - 14 \stackrel{?}{=} -4 \checkmark$$

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

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

$$10 - 35 \stackrel{?}{=} -25 \checkmark$$

$$\textcircled{5} \quad 0 = -15 - 28a - 5a^2 \quad \downarrow$$

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

$$\text{sum} = 28$$

$$\text{prod} = 75$$

$$+3 + 25$$

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

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

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

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

? ?