

Solving Rational Eq.

- ① factor denominators
- ② multiply through by LCD
to clear denominators
(be careful w/ minus signs)
- ③ There should not be any den.
- ④ Solve
- ⑤ Check solutions to see if
they are Vertical Asymptotes

$$\text{Ex1)} \quad \frac{2}{3} + \frac{5}{6} = \frac{1}{x}$$

$$\text{Ex2)} \quad \frac{x-4}{5} - \frac{x+7}{2} = 5$$

$$\text{Ex3)} \quad \frac{8}{x+10} = \frac{6}{x-4}$$

$$\text{Ex4)} \quad x + \frac{6}{x} = -5$$

$$\text{Ex 5} \quad \frac{9}{z} + \frac{6}{z} = 5$$

$$\text{Ex 6} \quad \frac{4x}{x+5} + \frac{20}{x} = \frac{100}{x^2+5x}$$

$$\text{Ex 7} \quad \frac{2}{x^2-9} + \frac{5}{x-3} = \frac{-3}{x+3}$$

$$\text{Ex 8} \quad \frac{90}{x^2-3x+9} - \frac{5x}{x+3} = \frac{405}{x^3+27}$$

Rational Functions

Factor 1st if possible

Domain: ① set den $\neq 0$
② solve
a) If i, domain is \mathbb{R}

Vertical Asym: ① set den = 0
② solve
a) If i, none

Hole: ① factor num + den
② If you can cancel, there's a hole.
③ If you can't factor, none

Horizontal: ① deg of num $>$ deg of den: none
② deg of num = deg of den
$$y = \frac{\text{coeff. num}}{\text{coeff. den}}$$

③ deg of num $<$ deg of den:
$$y = 0 \text{ (x-axis)}$$

Oblique (slanted) ① deg of num is exactly one more than den
② long division:
Remainder not part of line

Ex: $g(x) = \frac{x^2 - x - 12}{7x + 3}$

D:
VA:
HO:
HA:
O:

Ex: $h(x) = \frac{10x^2 - 37x - 78}{3x^2 - 11x - 4}$

D:
VA:
HO:
HA:
O:

Ex: $f(x) = \frac{x^2 + 8x - 9}{x^3 - 4x^2 + 3x}$

D:
VA:
HO:
HA:
O:

Ex: $g(x) = \frac{8x^3 + 125}{2x^2 - 5x - 42}$

D:
VA:
HO:
HA:
O:

10.2 Notes

Variation:

① set up

① varies (=)

② put k after =

③ type of variation

a) direct: multiply

b) inversely: divide

c) jointly: combination

mult / mult

mult / divide

④ solve for k

⑤ substitute again if there are still #'s in the problem.

Determine if x and y vary directly or inversely: Solve for x or y .

Ex | $\frac{x}{y} = 3$

Ex | $xy = 5$

Find the constant of variation, k , and write the equation. If more info continue solving.

Ex | y varies directly with x ;
if $y=4$ when $x=2/3$, find k

Ex | y varies directly with the sq. root of x ; if $y=3$ when $x=144$, find y when $x=225$.

Ex | y varies inversely with x ; if $y=12$ when $x=4$; find y when $x=2/5$.

Ex | z varies directly as x and
inversely as the sq. of y . If $z = \frac{7}{2}$
when $x = 14$ and $y = 6$, find z when
 $x = 10$ and $y = 15$.

Review on Asymptotes + Variation

Ex 1

$$\frac{x^3 + 64}{2x^2 + 7x - 4}$$

Ex 2

$$g(x) = \frac{x + 7}{9 - 4x}$$

Ex 3

$$\frac{x + 7}{(x + 8)(x - 3)}$$

$$\frac{\text{Ex 4} \mid x^2 + 8x - 9}{x}$$

Example 5:

The cost C of producing x items varies directly as x . If it costs \$282.20 to produce 340 items, what is C when $x=800$?

Example 6

Boyle's Law: The pressure P of a compressed gas is inversely proportional to the volume V . If there is a pressure of 25 lbs per square inch when the volume of gas is 400 cubic inches. Find the pressure when the gas is compressed to 200 cubic inches.

Example 7

The resistance R varies directly as the length L and inversely as the square of the diameter d . If a wire 80 feet long with a diameter 0.5 inches has a resistance of 120 ohms, how much resistance will there be if only 16 feet of wire is used?

21 Hooke's Law

$$P = KS \quad \text{direct}$$

23 Boyle's Law

$$P = \frac{k}{V} \quad \text{inverse}$$

Rational Inequalities

1. Put it in Standard form, $\leq \geq < \text{ or } >$, 0
2. Common denominator
3. If denominator $\neq 0$, always an open dot

Solutions from num. depend on problem's inequalities.

- a) $\leq \geq$: Closed Dot
- b) $< >$: Open Dot

4. Choose points (numbers) between dots:
-Substitute into original inequality

- a) True: Shade
- b) False: Don't Shade

5. Interval Notation: from graph

- a) $-\infty$ or ∞ : ()
- b) open dot : ()
- c) closed dot : []

Ex 1 | $\frac{8-3x}{2x+5} \geq 0$

Solve, graph, & write in interval notation

Ex 2 | $\frac{x+3}{2x-7} < 2$

Ex 3 | $\frac{x+8}{x} \leq 4$

$$\underline{\text{Ex 4}} \quad 5 \geq \frac{1}{x}$$

$$\underline{\text{Ex 5}} \quad \frac{x^2 + 4x - 5}{x^2 - x - 30} \geq 0$$

$$\underline{\text{Ex 6}} \quad \frac{(x+1)(x+2)}{(x-3)(x+3)} < 0$$