

Answers Rationals Review #1

$$1) \frac{s^2 - t^2}{(s-t)^2} =$$

$$\frac{(s-t)(s+t)}{(s-t)^2} =$$

$$\frac{s+t}{s-t}$$

$$s \neq t$$

$$2) \frac{x^2 - 5x + 6}{x^2 - 7x + 12} =$$

$$\frac{(x-3)(x-2)}{(x-3)(x-4)} =$$

$$\frac{x-2}{x-4}$$

$$x \neq 4$$

$$3) \frac{9 - 4p^2}{6p^2 - 5p - 6} =$$

$$\frac{(3-2p)^2}{(3p+2)(2p-3)} =$$

$$\frac{(3-2p)^2}{-73p^2)(3-2p)} =$$

$$\frac{-(3-2p)}{3p+2} \cdot \frac{2p-3}{3p+2} =$$

$$p \neq -\frac{3}{2}$$

$$4) 2ab + \frac{2a^2}{b} + \frac{2b^2}{a}$$

$$\frac{2ab}{1} \cdot \frac{b}{2a^2} + \frac{a}{2b^2} = \frac{1}{2}$$

$$5) \frac{x^2}{4} \cdot \left(\frac{xy}{6}\right)^{-1} \cdot \frac{2y^2}{x} =$$

$$\frac{x^2}{4} \cdot \frac{6}{xy} \cdot \frac{2y^2}{x} = 3y$$

$$6) \frac{t-2}{t+3} \cdot \frac{t^2+2t-3}{t-t-2}$$

$$\frac{t-2}{t+3} \cdot \frac{(t+3)(t-1)}{(t-2)(t+1)} =$$

$$\frac{t-1}{t+1}$$

$$t \neq -1$$

$$7) \frac{3x^2 - 6x}{x^2 - 6x + 9} \div \frac{x^2 - 4}{x^2 - x - 6}$$

$$\frac{3x(x-2)}{(x-3)^2} \cdot \frac{(x^2 - x - 6)}{x^2 - 4} =$$

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

$$\frac{3x}{x-3}$$

$$x \neq 3$$

$$8) \frac{x^2 + 3x}{3-x} \cdot \frac{x^2 - 4x + 3}{1-x^2} =$$

$$\frac{x^2 + 3x}{3-x} \cdot \frac{x^2 - 4x + 3}{1-x^2} \cdot \frac{x+1}{x+3} =$$

$$\frac{x(x+3)}{(x-3)} \cdot \frac{(x-3)(x-1)}{(x-1)(x+1)} \cdot \frac{(x+1)}{(x+3)} =$$

$$x$$

$$9) \left(\frac{x+1}{1 + \frac{1}{x}}\right) \times \text{LCD} = x$$

$$\frac{x^2 + x}{x+1} = \frac{x(x+1)}{(x+1)} = x$$

$$10) \frac{a-b}{a^{-1} - b^{-1}} =$$

$$\left(\frac{a-b}{\frac{1}{a} - \frac{1}{b}}\right) \frac{ab}{ab} = \frac{a^2b - ab^3}{b-a} =$$

$$\frac{ab(a-b)}{b-a} = \frac{-ab(b-a)}{(b-a)} =$$

$$-ab$$

Answers - Radical Review #1

11) $\frac{3}{2x} - \frac{5}{x^2} + \frac{1}{6}$ LCD = $6x^2$

$$\frac{9x}{6x^2} - \frac{30}{6x^2} + \frac{x^2}{6x^2} =$$

$$\frac{x^2 + 9x - 30}{6x^2} \quad x \neq 0$$

12) $\frac{3}{x-2} + \frac{5}{2-x} =$

$$\frac{3}{x-2} + \frac{5}{-(x-2)} =$$

$$\frac{3}{x-2} - \frac{5}{x-2} = \frac{-2}{x-2}$$

$x \neq 2$

13) $\frac{3}{x^2-4} - \frac{1}{x^2-3x+2} =$

$\left(\frac{x-1}{x-1}\right) \left(\frac{3}{(x+2)(x-2)}\right) - \left(\frac{1}{(x-2)(x-1)}\right) \left(\frac{x+2}{x+2}\right)$ LCD = $(x+2)(x-2)(x-1)$

$$\frac{3x-3 - 1(x+2)}{(x-1)(x+2)(x-2)} =$$

$$\frac{3x-3-x-2}{(x-1)(x+2)(x-2)} =$$

14) $\frac{x}{x^2+x-2} - \frac{1}{x+2} =$

$\frac{1}{(x+2)(x-1)} - \frac{1}{x+2} \left(\frac{x-1}{x-1}\right)$ LCD = $(x+2)(x-1)$

$$\frac{1}{(x+2)(x-1)} - \frac{1(x-1)}{(x+2)(x-1)} =$$

$$\frac{1-x+1}{(x+2)(x-1)} = \frac{2-x}{(x+2)(x-1)}$$

$$\frac{2x-5}{(x-1)(x+2)(x-2)} \quad x \neq 1, 2, -2$$

15) $\frac{-1}{x} + \frac{2}{x^2+1} + \frac{1}{x^3+x}$

$\left(\frac{x^2+1}{x^2+1}\right) \frac{-1}{x} + \frac{2}{x^2+1} \left(\frac{x}{x}\right) + \frac{1}{x(x^2+1)}$ LCD = $x(x^2+1)$

$$\frac{-1(x^2+1) + 2x + 1}{x(x^2+1)} =$$

$$\frac{-x^2 - 1 + 2x + 1}{x(x^2+1)} = \frac{-x^2 + 2x}{x(x^2+1)}$$

$$\frac{x(-x+2)}{x(x^2+1)} = \frac{2-x}{x^2+1}$$

16) $\frac{2}{x+1} + \frac{2}{x-1} + \frac{1}{x^2-1} =$

$\left(\frac{x-1}{x-1}\right) \frac{2}{x+1} + \left(\frac{x+1}{x+1}\right) \frac{2}{x-1} + \frac{1}{(x+1)(x-1)}$ LCD = $(x+1)(x-1)$

$$\frac{2x-2 + 2x+2 + 1}{(x+1)(x-1)} =$$

$$\frac{4x+1}{(x+1)(x-1)}$$

$x \neq 1, -1$

17) $\left(\frac{1}{x} - \frac{1}{x+1}\right) \frac{x(x+1)}{x(x+1)}$ LCD = $x(x+1)$

$$\frac{x+1-x}{x} = \frac{1}{x} \quad x \neq 0$$

Answers - Radical Review #1

18) $\left(\frac{x+4}{x+5} - \frac{x}{x+1}\right) \cdot \frac{(x+5)(x+1)}{(x+5)(x+1)}$
 LCD = $(x+5)(x+1)$

$$\frac{(x+4)(x+1) - x(x+5)}{4(x+5)(x+1)} =$$

$$\frac{x^2 + 5x + 4 - x^2 - 5x}{4(x+5)(x+1)} =$$

$$\frac{-1}{4(x+5)(x+1)} = \frac{1}{(x+5)(x+1)}$$

$$x \neq -5, -1$$

21) $\left(\frac{1}{x} - \frac{1}{x+1} = 3\right) \cdot \frac{x(x+1)}{x(x+1)}$ LCD = $x(x+1)$

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

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

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

$$x = \frac{-3 \pm \sqrt{9 - 4(3)(-1)}}{2(3)}$$

$$x = \frac{-3 \pm \sqrt{21}}{6} \approx -1.26$$

$$x = \frac{-3 - \sqrt{21}}{6}$$

.

23) $\left(\frac{4n}{n-2} - \frac{1}{3} = \frac{13}{3(n-2)}\right) \cdot \frac{3(n-2)}{3(n-2)}$ LCD = $3(n-2)$

$$4n(3) - 1(n-2) = 13$$

$$12n - n + 2 = 13$$

$$11n = 11$$

$$n = 1$$

$$\frac{4(1)}{1-2} - \frac{1}{3} \stackrel{?}{=} \frac{13}{3(1-2)}$$

$$\frac{-4}{1-2} + \frac{1}{3} = \frac{4}{1-2}$$

$$\frac{4}{1-2} + \frac{1}{3} \neq \frac{4}{1-2}$$

19) $\frac{20-x}{x} = x$

$$20-x = x^2$$

$$x^2 + x - 20 = 0$$

$$(x+5)(x-4) = 0$$

$$x = -5, x = 4$$

$$\frac{20-5}{-5} \stackrel{?}{=} \frac{20-4}{4} \neq 4$$

20) $\left(\frac{4}{x} - \frac{5}{3} = \frac{x}{6}\right) \cdot \frac{6x}{6x}$ LCD = $6x$

$$24 - 10x = x^2$$

$$x^2 + 10x - 24 = 0$$

$$(x+12)(x-2) = 0$$

$$x = -12, x = 2$$

$$\frac{4}{-12} - \frac{5}{3} \stackrel{?}{=} \frac{-12}{6} \quad \frac{4}{2} - \frac{5}{3} \stackrel{?}{=} \frac{2}{3} \neq \frac{2}{3}$$

22) $\frac{x-4}{x+4} = \frac{x-4}{x}$

$$x(x-4) = (x+4)(x-4)$$

$$x^2 - 4x = x^2 - 16$$

$$-4x = -16$$

$$x = 4$$

$$\frac{4-4}{4+4} \stackrel{?}{=} \frac{4-4}{4}$$

24) $\frac{x}{x+3} + \frac{1}{x-1} = \frac{4}{x^2+2x-3}$

$$\left(\frac{x}{x+3} + \frac{1}{x-1} = \frac{4}{(x+3)(x-1)}\right) \cdot \frac{(x+3)(x-1)}{(x+3)(x-1)}$$

$$x(x-1) + 1(x+3) = 4$$

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

$$x^2 - 1 = 0$$

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

$$x = -1, x = 1$$

Answers Rational Review #1

$$LCD = (h-1)^2$$

$$25) \frac{y}{y-2} - \frac{2}{y+3} = \frac{10}{y^2+y-6}$$

$$26) \left(\frac{h+3}{h-1} \right)^2 = 2 + \frac{h+3}{h-1}$$

$$\frac{y}{y-2} - \frac{2}{y+3} = \frac{10}{(y+3)(y-2)}$$

$$(h+3)^2 = 2(h-1)^2 + (h+3)(h-1)$$

$$h^2 + 6h + 9 = 2(h^2 - 2h + 1) + h^2 + 2h - 3$$

$$h^2 + 6h + 9 = 2h^2 - 4h + 2 + h^2 + 2h - 3$$

$$h^2 + 6h + 9 = 3h^2 - 2h - 1$$

$$y(y+3) - 2(y-2) = 10$$

$$y^2 + 3y - 2y + 4 = 10$$

$$y^2 + y - 6 = 0$$

$$(y+3)(y-2) = 0$$

$$0 = 2h^2 - 8h - 10$$

$$0 = 2(h-5)(h+1)$$

$$\frac{-3}{-2-2} = \frac{-2}{-3+3} \times \frac{10}{3^2+3-3}$$

$$y = \text{No Solution}$$

$$\frac{(5+3)^2}{(5-1)^2} = 2 + \frac{3+3}{5-1}$$

$$\frac{(-1+3)^2}{(-1-1)^2} = 2 + \frac{1+3}{-1-1}$$

$$1 = 2 - 1$$

$$h = 5, -1$$

$$27) \left(\frac{x-3}{x+3} \right)^2 = \frac{2(x-3)}{x+3} + 3$$

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

$$x^2 - 6x + 9 = 2(x^2 - 9) + 3(x^2 + 6x + 9)$$

$$x^2 - 6x + 9 = 2x^2 - 18 + 3x^2 + 18x + 27$$

$$x^2 - 6x + 9 = 5x^2 + 18x + 9$$

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

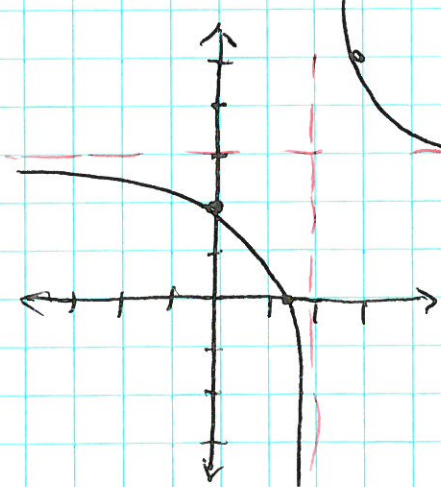
$$1 = 2 + 3$$

$$0 = 4x^2 + 24x$$

$$0 = 4x(x+6)$$

$$x = 0, -6$$

$$28) f(x) = \frac{3x-4}{x-2}$$



x	y
0	2
4/3	0
3	5

D: $(-\infty, 2) \cup (2, \infty)$
 HA: $y = 3$
 VA: $x = 2$
 No holes
 x-int: $(\frac{4}{3}, 0)$
 y-int: $(0, 2)$

29) $g(x) = \frac{x}{2x^2 - x} = \frac{x}{x(2x-1)}$

D: $(-\infty, 0) \cup (0, \frac{1}{2}) \cup (\frac{1}{2}, \infty)$

HA: $y = 0$

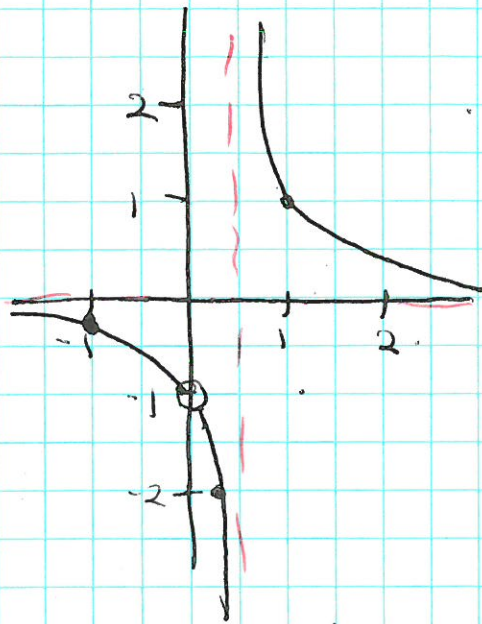
VA: $x = \frac{1}{2}$

Hole at $x = 0$

x-int: None

y-int: None

x	y
$\frac{1}{4}$	-2
1	1
$\frac{1}{2}$	$-\frac{1}{3}$
0	-1



30) $h(x) = \frac{x-3}{x^2-x-2} = \frac{x-3}{(x-2)(x+1)}$

D: $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$

HA: $y = 0$

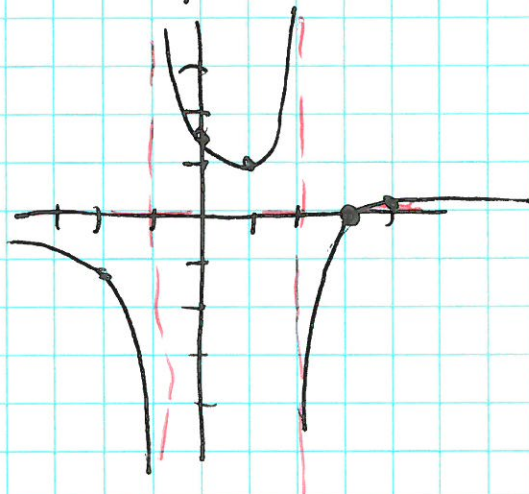
VA: $x = 2, x = -1$

No Holes

x-int: (3, 0)

y-int: $(0, \frac{3}{2})$

x	y
-2	-1.25
0	$\frac{3}{2}$
1	1
3	0
4	$\frac{1}{2}$



31) $p(x) = \frac{2(x^2-9)}{x^2-4}$

D: $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$

HA: $y = 2$

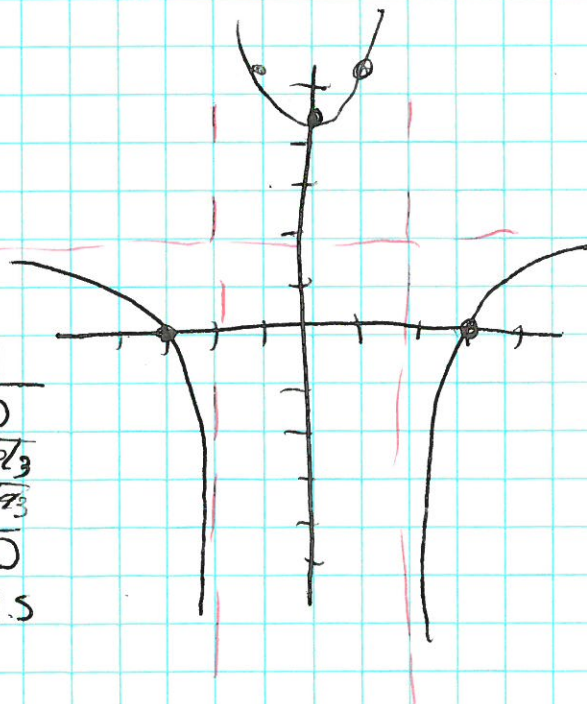
VA: $x = 2, -2$

No Holes

x-ints: (3, 0), (-3, 0)

y-int: (0, 4.5)

x	y
-3	0
-1	$\frac{16}{3}$
1	$\frac{14}{3}$
3	0
0	4.5



32) $f(x) = \frac{9x}{3x^3 - 6x} = \frac{9x}{3x(x^2 - 2)} = \frac{3}{(x^2 - 2)}$

D: $(-\infty, -\sqrt{2}) \cup (-\sqrt{2}, \sqrt{2}) \cup (\sqrt{2}, \infty)$

HA: $y = 0$

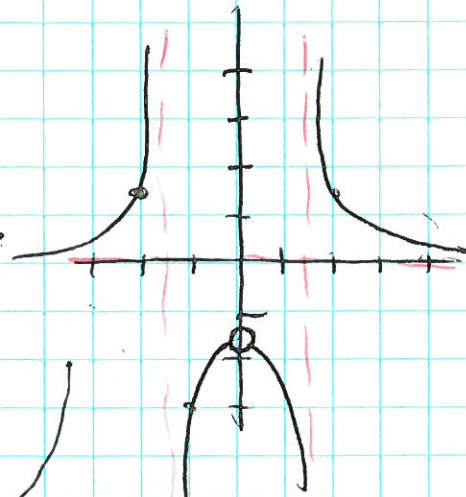
VA: $x = -\sqrt{2}, x = \sqrt{2}$

Hole at $x = 0$

x-int: None

y-int: $(0, -\frac{3}{2})$

x	y
$-\sqrt{2}$	$\frac{3}{2}$
$-\frac{1}{3}$	3
0	$-\frac{3}{2}$
$\frac{1}{3}$	3
$\sqrt{2}$	$\frac{3}{2}$



33) $f(x) = \frac{8x + 4}{2x + 1}$

D: $(-\infty, -\frac{1}{2}) \cup (-\frac{1}{2}, \infty)$

HA: $y = 4$

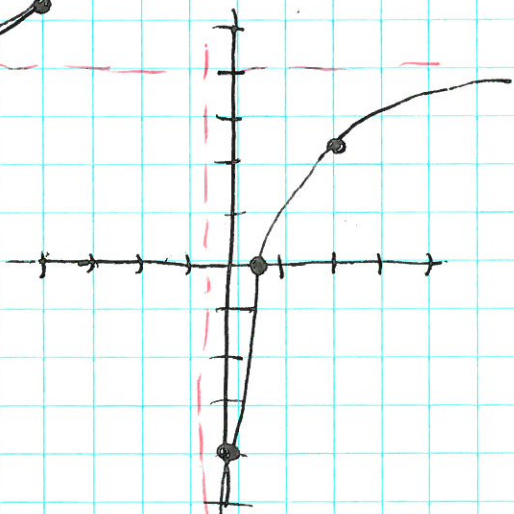
VA: $x = -\frac{1}{2}$

No Holes

y-int: $(0, 4)$

x-int: $(\frac{1}{2}, 0)$

x	y
$\frac{1}{2}$	5.1
0	4
$\frac{1}{2}$	0
2	$2\frac{2}{3}$



34) $r(x) = \frac{x^2 - 3x - 10}{x - 5} = \frac{(x - 5)(x + 2)}{(x - 5)}$

D: $(-\infty, 5) \cup (5, \infty)$

HA: none!

VA: none

Hole at $x = 5$

x	y
-1	1
0	2
5	7

