

HM3 Rationals Review

① $\frac{6n^4}{48n^3} \cdot \frac{5\sqrt{am^5z}}{9n^4}$ $\frac{m^2}{n^4}$

② $\frac{3x+b}{2x-4} \div \frac{bx+12}{2x^2-8}$ * keep, change, flip

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

③ $\frac{x^2-6x+5}{x^2-2x-8} \cdot \frac{x^2+3x-4}{x^2-x-20}$

④ $\frac{x^2-x-6}{x^2-7x+12} \cdot \frac{x^2-2x-8}{x^2-3x-10}$

$\frac{(x-3)(x+1)}{(x-3)(x+1)} \cdot \frac{(x+4)(x-1)}{(x-5)(x+4)}$ $\frac{x+2}{x-5}$

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

⑤ $\frac{3x-12}{2x^2-8x} \div \frac{x^2+x-6}{x^3-4x}$

⑥ $\frac{4x-16}{4x} \div \frac{x^2-2x-8}{3x+6}$

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

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

$\frac{3(x+2)}{2(x+3)}$

⑧ $\frac{m+4}{2n} + \frac{3m+5}{2n}$ $\text{CD} = 2n$

⑦ $\frac{2x-1}{x-3} + \frac{3x}{x^2-9}$ $\text{CD} = (x-3)(x+3)$

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

$\frac{m+4+3m+5}{2n}$

$\frac{4m+9}{2n}$

$\frac{2x^2+6x-x-3+3x}{(x-3)(x+3)}$

⑨ $\frac{2}{27x^2y^4} - \frac{4}{9xy^2}$ $\text{CD} = 27x^2y^4$

$\frac{2}{27x^2y^4} - \frac{4 \cdot 3xy^2}{27x^2y^4}$

$\frac{2x^2+8x-3}{(x-3)(x+3)}$

$\frac{2-12xy^2}{27x^2y^4}$

$$\textcircled{10} \frac{2x - \frac{7}{2} \cdot \frac{2}{1}}{\frac{2}{1} \cdot \frac{3x}{2} + \frac{2}{1} \cdot \frac{2}{1}} \quad \text{CD: } 2$$

$$\textcircled{11} \frac{x(x+1) \cdot 2 + \frac{2}{x+1} \cdot \frac{x(x+1)}{1}}{\frac{x(x+1)}{1} \cdot \frac{x-2}{x} + x \cdot \frac{x(x+1)}{1}} \quad \text{CD: } x(x+1)$$

$$\frac{4x-7}{3x+4}$$

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

distribute & combine like terms

$$\frac{2x^2 + 2x + 2x}{x^2 - 2x + x - 2 + x^3 + x^2} \rightarrow \frac{2x^2 + 4x}{(x^3 + 2x^2)(x-2)}$$

$$\textcircled{12} \frac{\frac{1}{x} + \frac{2}{y} \cdot \frac{xy}{1}}{\frac{xy}{1} \cdot \frac{1}{x} - \frac{2}{y} \cdot \frac{xy}{1}} \quad \text{CD: } xy$$

look @ back page for another way to do this problem

$$\frac{2x}{x^2-1}$$

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

$$\frac{y+2x}{y-2x}$$

$$\textcircled{13} \frac{7y}{y^2-4} + \frac{5}{y-2} = \frac{2y}{y^2-4} \quad \text{CD: } (y-2)(y+2)$$

$$\frac{7y}{(y-2)(y+2)} + \frac{5(y+2)}{(y-2)(y+2)} = \frac{2y}{(y-2)(y+2)}$$

$$7y + 5y + 10 = 2y$$

$$10 = -10y$$

$$y = -1$$

$$\textcircled{14} \frac{x+4}{x^2+4x} - \frac{x}{x^2+6x} = 0$$

$$\frac{x+4}{x(x+4)} - \frac{x}{x(x+6)} = 0$$

can reduce here to save you time later 😊!

$$\frac{1}{x} - \frac{1}{x+6} = 0 \quad \text{CD: } x(x+6)$$

$$\frac{x+6}{x(x+6)} - \frac{x}{x(x+6)} = \frac{0}{x(x+6)}$$

$$x+6-x=0$$

$$6=0 \text{ untrue!}$$

∅

$$\textcircled{15} \frac{x+4}{3x-3} \leq 0$$

$$\frac{x+4}{3(x-1)} \leq 0$$

Critical Values: -4, 1



$$[-4, 1)$$

★... if you didn't reduce originally you would get the answer $x = -4$ but it makes a denominator = 0 so its still ∅

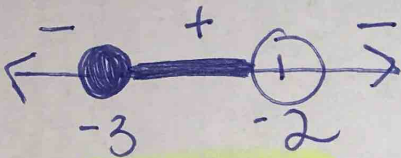
$$\textcircled{16} \frac{x}{x+2} \geq 3$$

$$\frac{x}{x+2} - 3 \geq 0$$

$$\frac{x}{x+2} - \frac{3x+6}{x+2} \geq 0$$

$$\frac{-2x-6}{x+2} \geq 0$$

$$\frac{-2(x+3)}{x+2} \geq 0 \quad \text{critical values: } -3, -2$$



$$[-3, -2)$$

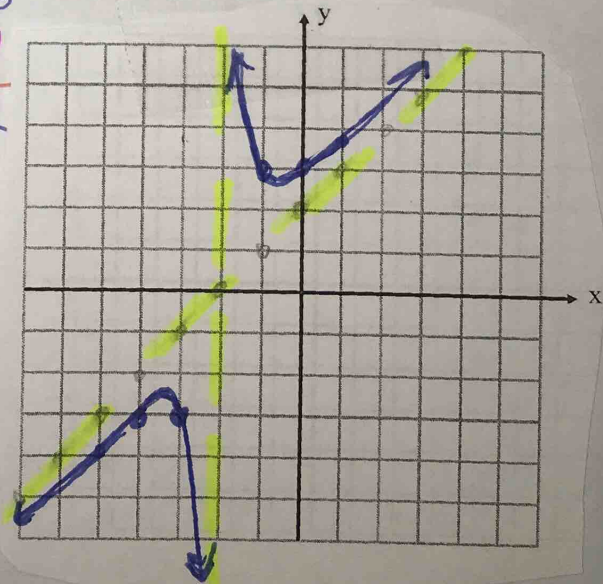
$$\textcircled{18} f(x) = \frac{x^2+4x+6}{x+2}$$

$$\text{VA: } x = -2$$

$$\text{HA: } y = x+2 \quad (\text{slant asymptote})$$

$$\text{hole: none}$$

$$\begin{array}{r} x+2 \sqrt{x^2+4x+6} \\ \underline{-x^2+2x} \\ 2x+6 \\ \underline{-2x+4} \\ 2 \end{array}$$



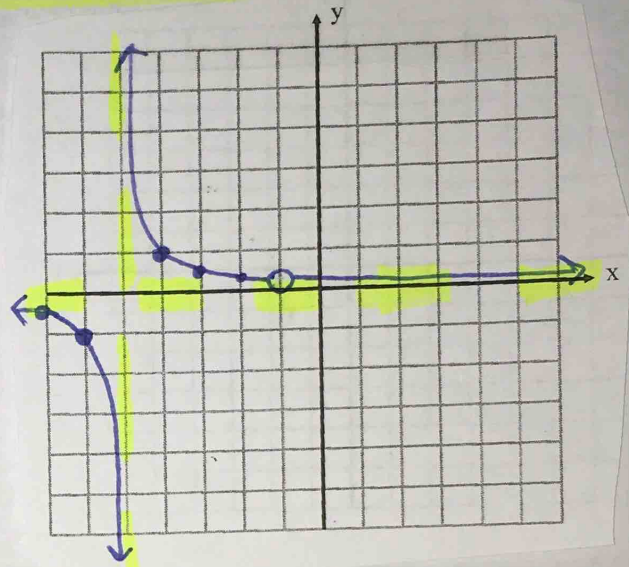
$$\textcircled{17} f(x) = \frac{x+1}{x^2+6x+5}$$

$$\frac{x+1}{(x+5)(x+1)}$$

$$\text{VA: } x = -5$$

$$\text{HA: } y = 0$$

$$\text{hole: } x = -1$$



19) *be careful! it gives you different units... you can change them both to hours or both to minutes

MINUTES:

$$\frac{40}{60} + \frac{40}{x} = 1 \quad \text{CD} = 60x$$

$$\frac{40x}{60x} + \frac{2400}{60x} = \frac{60x}{60x}$$

$$2400 = 20x$$

$$120 = x$$

120 minutes

HOURS:

$$\frac{2/3}{1} + \frac{2/3}{x} = 1 \quad \text{CD} = x$$

$$\frac{2/3x}{x} + \frac{2/3}{x} = \frac{x}{x}$$

$$2/3 = 1/3x$$

$$2 = x$$

2 hours

20) *same time $\rightarrow \frac{d}{r} = \frac{d}{r}$

Rudolph

$$\frac{130}{x+10}$$

Donner

$$\frac{110}{x}$$

$$130x = 110x + 1100$$

$$20x = 1100$$

$$\text{Donner: } x = 55 \text{ mph}$$

$$\text{Rudolph: } 65 \text{ mph}$$

#11 another way:

$$2 + \frac{2}{x+1}$$

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

$$\frac{2x+2+2}{x+1}$$

$$\frac{x-2+x^2}{x}$$

$$\frac{2x+4}{x+1}$$

$$\frac{x^2+x-2}{x}$$

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

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