Advanced Algebra 2   Ch.8 Review   Name: Key

Part 1 - NO Calculator

1. The variables x and y vary inversely. When y = 9, x = 1. ① Write an equation relating x & y. ②Then, find y when x = -3.

① $y = \dfrac{9}{x}$ ② $y = \dfrac{9}{-3} = -3$

2. The variable z varies jointly with x and y. Also, z = 24 when x = 2 and y = -6. ① Write an equation that relates x, y, and z. ②Then, find z when x = -4 and y = 5.

① $z = ayx$
$24 = a \cdot -6 \cdot 2$
$a = -2$

$\boxed{z = -2yx}$

② $z = -2 \cdot 5 \cdot -4$
$\boxed{z = 40}$

Translate each sentence into an equation.

3. x varies inversely with the square of y

$x = \dfrac{a}{y^2}$

4. t varies directly with b and c and inversely with the fourth root of z

$t = \dfrac{abc}{\sqrt[4]{z}}$ or $t = abc \cdot z^{-\frac{1}{4}}$

5. The current in a simple electrical circuit varies inversely with the resistance. If the current is 40 amps when the resistance is 2.5 ohms, find the current when the resistance is 4 ohms.

1st find "a", then write equation with "a"

$C = \dfrac{a}{r}$

$40 = \dfrac{a}{2.5}$ $a = 100$

Equation: $C = \dfrac{100}{r}$

$C = \dfrac{100}{4}$ Current: 25

Find the vertical and horizontal asymptotes of the function.

6. $f(x) = \dfrac{3}{x-4} + 1$

VA: $x = 4$

HA: $y = 1$

7. $f(x) = \dfrac{3x+1}{x-2}$ same degree HA $\frac{3}{1}$

VA: $x = 2$

HA: $y = 3$

8. $f(x) = \dfrac{x^2-4}{5x^2+3}$ same degree so HA is $\frac{1}{5}$

VA: none $5x^2 = -3$ $x^2 = \dfrac{-3}{5}$

HA: $y = \frac{1}{5}$

9. Give an example of a rational function whose graph has a vertical asymptotes at x = -3 and x = 1, a horizontal asymptote at y = 2, and x-intercepts at (4, 0) and (5, 0). Do not leave answer in factored form.

X-int	Y-int	VA	HA
set top = 0	✗	bottom = 0	same degree $\frac{2}{1}$
(x-4)(x-5)		(x+3)(x-1)	

$\dfrac{2(x-4)(x-5)}{1(x+3)(x-1)} = \boxed{\dfrac{2x^2-18x+40}{x^2+2x-3}}$

Simplify the rational expression. SHOW WORK!

10. $\dfrac{2x^2-x-3}{3x+3}$ $\dfrac{(\cancel{x+1})(2x-3)}{3(\cancel{x+1})}$

$\begin{array}{c|c|c} & x & 1 \\ \hline 2x & 2x^2 & 2x \\ \hline -3 & -3x & -3 \end{array}$ $\begin{array}{c} -6 \\ \wedge \\ -3 \quad 2 \end{array}$ $\boxed{\dfrac{2x-3}{3}}$

11. $\dfrac{6x^2-12x}{x^2-4x+4}$ $\dfrac{6x(\cancel{x-2})}{(\cancel{x-2})(x-2)} = \boxed{\dfrac{6x}{x-2}}$

Multiply or Divide the expressions. Simplify the result. SHOW WORK!

12. $\dfrac{4x^2y^5}{39xy^2} \cdot \dfrac{12x^3}{520y^2} = \dfrac{4x^5y^5}{15xy^4} = \boxed{\dfrac{4x^4y}{15}}$ or $\boxed{\dfrac{4}{15}x^4y}$

13. $\dfrac{x^2-3x}{x^2-8x+15} \cdot \dfrac{x^2-10x+25}{2x} = \dfrac{x(\cancel{x-3}) \cdot (\cancel{x-5})(x-5)}{(\cancel{x-5})(\cancel{x-3}) \cdot 2x} = \boxed{\dfrac{x-5}{2}}$

14. $\dfrac{25-x^2}{3x-3} \div \dfrac{3x^2-12x-15}{x^2-1}$ $\overset{3(x^2-4x-5)}{}$ $= \dfrac{-1(\cancel{x-5})(x+5)}{3(\cancel{x-1})} \cdot \dfrac{(\cancel{x-1})(\cancel{x+1})}{3(\cancel{x-5})(\cancel{x+1})} = \boxed{\dfrac{-1(x+5)}{9}}$

$\boxed{\text{OR} \quad -\dfrac{1}{9}(x+5)}$

Part 2 - Calculator Allowed

Add or subtract each expression. Show work.

1. $\dfrac{x}{x} \cdot \dfrac{x+5}{12} - \dfrac{2x-3}{3x} \cdot \dfrac{4}{4}$

   $3 \cdot 4 \qquad 3 \cdot x$

   $\dfrac{x^2+5x}{12x} - \dfrac{(8x-12)}{12x}$

   $\dfrac{x^2+5x-8x+12}{12x} = \boxed{\dfrac{x^2-3x+12}{12x}}$

2. $\dfrac{(x-2)}{(x-2)} \dfrac{3x-1}{x+2} + \dfrac{x+4}{x^2-4}$

   $(x+2)(x-2)$

   $\dfrac{3x^2-7x+2}{(x-2)(x+2)} + \dfrac{x+4}{(x+2)(x-2)} = \boxed{\dfrac{3x^2-6x+6}{x^2-4}}$

   $\text{OR } \boxed{\dfrac{3(x^2-2x+2)}{x^2-4}}$

3. Simplify the complex fraction. Show work.

$\left(\dfrac{\dfrac{5}{x-4}}{\dfrac{2}{x+1}+\dfrac{3}{x-4}}\right)(x+1)(x-4)$

NUM: $5(x+1)$

DEN: $2(x-4)+3(x+1) = 5x-5 = 5(x-1)$ *answer*

$\dfrac{5(x+1)}{5(x-1)} = \boxed{\dfrac{x+1}{x-1}}$

Solve the equation. Show work.

4. $\dfrac{x-2}{x+4} = \dfrac{x+1}{x+10}$

   $(x-2)(x+10) = (x+4)(x+1)$

   $x^2+8x-20 = x^2+5x+4$

   $3x = 24$

   $\boxed{x=8}$ ✓

5. $\left(\dfrac{5}{x}+\dfrac{x+1}{x+2} = \dfrac{2x+9}{x+2}\right)(x)(x+2)$

   $5(x+2) + x(x+1) = x(2x+9)$

   $5x+10 + x^2+x = 2x^2+9x$

   $x^2+6x+10 = 2x^2+9x$

   $x^2+3x-10 = 0$

   $(x+5)(x-2) = 0 \qquad x = \boxed{-5, 2}$

6. $\left(\dfrac{3}{x-5}-\dfrac{2}{x+1} = \dfrac{9}{x^2-4x-5}\right)(x-5)(x+1)$

   $(x-5)(x+1)$

   $3(x+1) - 2(x-5) = 9$

   $3x+3-2x+10 = 9$

   $x+13 = 9$

   $\boxed{x=-4}$ ✓

Graph each function. State the domain, range, and equations of the asymptotes. Clearly mark 3 points on each side of the graph.

8. $y = \dfrac{2}{x+3} - 1$ VA:__$x = -3$__

                                 HA:__$y = -1$__
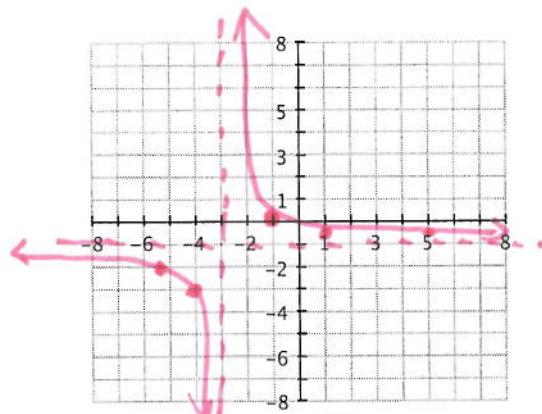
D:__$\mathbb{R} \neq -3$__ R:__$\mathbb{R} \neq -1$__

9. $y = \dfrac{3x+3}{x-2}$ VA:__$x = 2$__

                                 HA:__$y = 3$__
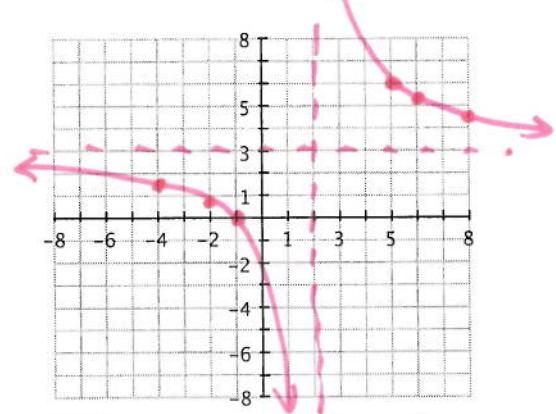
D:__$\mathbb{R} \neq 2$__ R:__$\mathbb{R} \neq 3$__

Graph the function. State the x & y-intercepts, domain, range, and equations of the asymptotes.

10. $y = \dfrac{6}{x^2 - 4}$
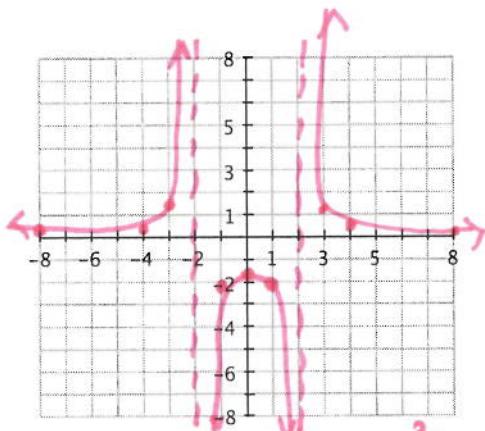
x-int:__NONE__   y-int:__$-\frac{3}{2}$__

VA:__$x = \pm 2$__   HA:__$y = 0$__

D:__$\mathbb{R} \neq 0$__   R:__$y \leq -\frac{3}{2}$__
                              $y > 0$

x.int. $6 \neq 0$

y-int. $\dfrac{6}{0-4} = -\dfrac{3}{2}$

11. $y = \dfrac{x^2 - x - 2}{x - 3}$
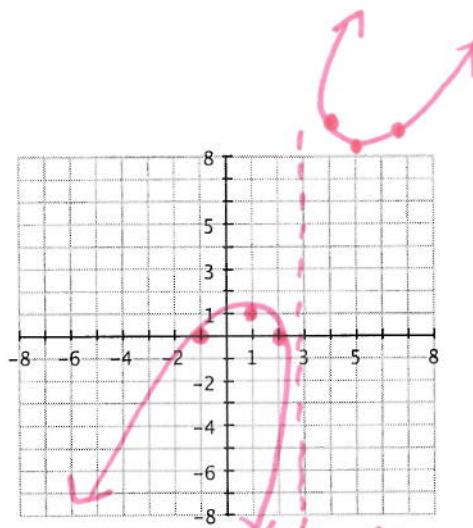
x-int:__$-1, 2$__   y-int:__$\frac{2}{3}$__

VA:__$x = 3$__   HA:__NONE__

D:__$\mathbb{R} \neq 3$__   R:__$y \leq 1 \quad y \geq 9$__

$(x-2)(x+1) = 0$ $y = \dfrac{0-0-2}{0-3} = \frac{2}{3}$
$x = 2, -1$