

Accelerated Geometry CC
Rational Functions Review

Name: KEY
Date: _____ Period: _____

State the domain, holes, vertical and horizontal asymptotes, slant asymptote, and intercepts for each rational function.

$$1. f(x) = \frac{2x^2 - 8}{3x^2 - 3x - 6} = \frac{2(x-2)(x+2)}{3(x-2)(x+1)}$$

Domain: $x \neq 2, -1$

Holes: $x=2$

VA: $x=-1$

HA: $y=2/3$

SA: none

X-Int: $(-2, 0)$

Y-Int: $(0, 4/3)$

$$2. f(x) = \frac{3x+6}{8x+2} = \frac{3(x+2)}{2(4x+1)}$$

Domain: $x \neq -1/4$

Holes: none

VA: $x=-1/4$

HA: $y=3/8$

SA: none

X-Int: $(-2, 0)$

Y-Int: $(0, 3)$

3. State the domain, holes, vertical and horizontal asymptotes, slant asymptote, and intercepts for each rational function. Then graph the function.

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

Domain: $x \neq 2$

Holes: none

VA: $x=2$

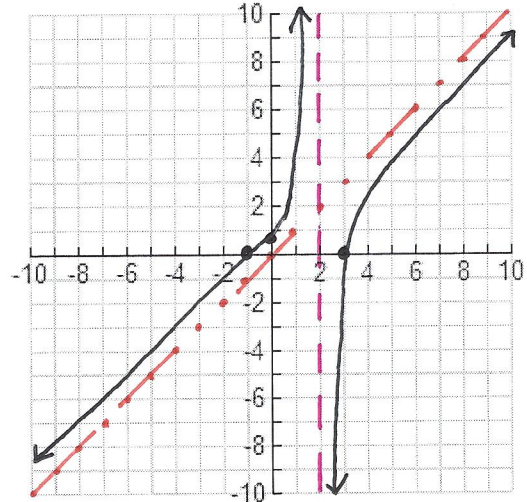
HA: none

SA: $y=x$

X-Int: $(3, 0)$ + $(-1, 0)$

Y-Int: $(0, 3/2)$

$$\rightarrow x-2 \overline{) \begin{array}{r} x^2 - 2x - 3 \\ x^2 - 2x \\ \hline -3 \end{array}}$$



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Simplify.

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

$$= \boxed{\frac{(2x-y)}{(4x-5)}}$$

$$5. \frac{x+2}{x-2} \div \frac{x^2-4}{2-x} \rightarrow -x+2$$

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

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

$$= \boxed{\frac{-1}{x-2}}$$

$$6. \frac{\frac{x^2+8x+16}{40x}}{\frac{x+4}{8x}} = \frac{x^2+8x+16}{40x} \cdot \frac{8x}{x+4}$$

$$= \frac{(x+4)\cancel{(x+4)}}{5\cancel{40}x} \cdot \frac{8\cancel{x}}{x+4} = \boxed{\frac{x+4}{5}}$$

$$7. \frac{-4x-5}{x^2-16} - \frac{-5x-9}{x^2-16} = \frac{-4x-5 - (-5x-9)}{x^2-16}$$

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

$$8. \frac{3x^2-4x-4}{4x^2-3x-10} = \frac{(3x+2)\cancel{(x-2)}}{(4x+5)\cancel{(x-2)}}$$

$$= \boxed{\frac{(3x+2)}{(4x+5)}}$$

$$9. \frac{6y^2}{y^2-9} \div \frac{3y^2}{2y^2+7y+3} =$$

$$\frac{2\cancel{6}y^2}{y^2-9} \cdot \frac{2y^2+7y+3}{3y^2}$$

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

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

$$10. \frac{a+9}{a+3} + \frac{12-5a}{a+3} = \frac{a+9+12-5a}{(a+3)}$$

$$= \boxed{\frac{-4a+21}{(a+3)}}$$

$$11. \frac{y+2}{y-3} + \frac{y}{3-y} \rightarrow -y+3$$

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

$$12. \frac{7}{x^2-81} - \frac{x-4}{3x^2-25x-18} =$$

$$\frac{(3x+2)7}{(3x+2)(x-9)(x+9)} - \frac{x-4}{(3x+2)(x-9)(x+9)}$$

$$\frac{21x+14 - (x^2+5x-36)}{(3x+2)(x-9)(x+9)} = \frac{-x^2+16x+50}{(3x+2)(x-9)(x+9)}$$

$$14. \frac{1}{2x} + \frac{4x}{x^2-1} - \frac{2}{x+1} =$$

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

$$= \frac{x^2-1+8x^2-(4x^2-4x)}{2x(x-1)(x+1)} = \frac{5x^2+4x-1}{2x(x-1)(x+1)}$$

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

Solve.

$$16. \frac{(x+3)x^2}{x+3} = \frac{9(x+3)}{x+3}$$

$$x^2 = 9$$

$$x = \pm 3$$

← -3 is extraneous!!
so $x=3$ is your only answer

$$18. \frac{2}{y+4} + \frac{2y-1}{y^2+2y-8} = \frac{1}{y-2}$$

$$\frac{2(y+4)(y-2)}{(y+4)(y-2)} + \frac{2y-1(y+4)(y-2)}{(y+4)(y-2)} = \frac{1(y+4)(y-2)}{y-2}$$

$$2y-4+2y-1 = y+4$$

$$4y-5 = y+4$$

$$3y = 9 \rightarrow y = 3$$

$$13. \frac{1}{3y} + \frac{4y}{y^2-1} + \frac{7}{y-1} = \frac{4y \cdot 3y}{(y+1)(y-1)3y} + \frac{7 \cdot 3y(y+1)}{3y(y-1)3y(y+1)}$$

$$= \frac{y^2-1+12y^2+21y^2+21y}{3y(y+1)(y-1)}$$

$$= \frac{34y^2+21y-1}{3y(y+1)(y-1)}$$

$$15. \frac{x^2-16}{x^2-3x-4} = \frac{x^2-16}{x^2-6x+9} \cdot \frac{x^2-2x-3}{x^2-3x-4}$$

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

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

$$17. \frac{15}{y} - \frac{15}{y-2} = -2$$

$$\frac{15y(y-2)}{y} - \frac{15y(y-2)}{y-2} = -2y(y-2)$$

$$15y-30-15y = -2y^2+4y$$

$$-2y^2-4y-30=0$$

$$2(y^2-2y-15)=0$$

$$2(y-5)(y+3)=0$$

$$y = 5, -3$$

$$19. \frac{12}{x-1} - \frac{8}{x} = 2$$

$$\frac{12x(x-1)}{x-1} - \frac{8x(x-1)}{x} = 2x(x-1)$$

$$12x - (8x-8) = 2x^2-2x$$

$$12x-8x+8 = 2x^2-2x$$

$$0 = 2x^2-6x-8$$

$$0 = 2(x^2-3x-4)$$

$$0 = 2(x-4)(x+1) \rightarrow x = 4, -1$$