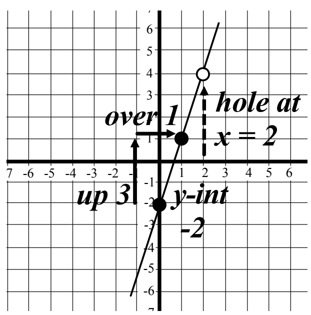
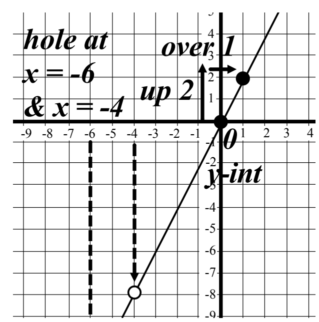
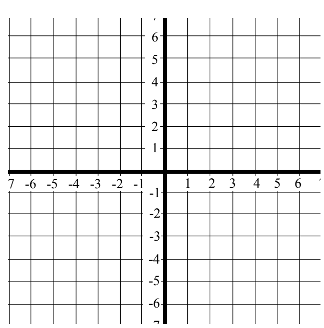
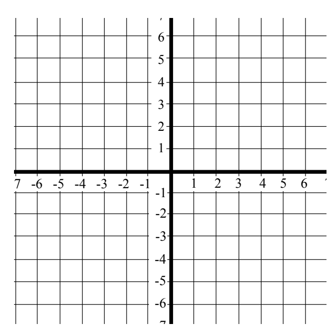
Name: ____________________________

Graphing Lines from Rational Expressions

Rational expressions, like anything else, can be represented on a graph. The difficulty of the graph depends entirely on how much you can simplify the rational. If you can cancel enough factors to have x^2 as your highest power, then it's a quadratic—graph the parabola. If you can cancel enough factors to simply have x as your highest power, then it's a line—use $mx + b$ to graph it. Be careful, though. Any factors that you canceled create **a hole** in the graph, meaning a point that cannot exist (which is represented by a small bubble on the graph that circles the impossible point). Today, you'll be graphing lines from rational expressions and identifying the **holes** (zeros that canceled out).

Simplify the rational expression, identify the hole(s) and graph the line.

Solve	Graph	Solve	Graph
EXAMPLE $\frac{3x^2-8x+4}{x-2}$ *Factor first.* *Top: AC = 12, B = -8→-6 & -2* $\frac{\underline{3x^2-6x}\quad\underline{-2x+4}}{x-2}$ $\frac{3x(x-2)-2(x-2)}{x-2}$ $\frac{(x-2)(3x-2)}{x-2}$ *Cancel, & identify holes.* $\frac{\cancel{(x-2)}(3x-2)}{\cancel{x-2}}$ *$x-2$ was canceled, so the hole is at:* $x-2=0,$ $x=2$ *What's left is a line:* $3x-2$.	**Hole(s) at: x =** 2 **Equation of the line:** $y = 3x - 2$ **Slope:** $\frac{3}{1}$ **Y-int:** -2  *Graph it, starting at the intercept (0, -2) and going up 3, over 1.*	**EXAMPLE** $\frac{2x^3+20x^2+48x}{x^2+10x+24}$ *Factor the top and the bottom (there's a 2x in all the top terms!!!).* $\frac{2x(x^2+10x+24)}{x^2+10x+24}$ *Even though you can cancel it as is, you need the holes…so keep factoring. If I group, the numbers that multiply to AC =* $\frac{2x(x+6)(x+4)}{(x+6)(x+4)}$ *Cancel.* $\frac{2x\cancel{(x+6)(x+4)}}{\cancel{(x+6)(x+4)}}$ *The holes are at* $x+6=0 \quad x+4=0$ $x=-6 \quad x=-4$ *The line is: 2x.*	**Hole(s) at: x =** -6, -4 **Equation of the line:** $y = 2x$ **Slope:** $\frac{2}{1}$ **Y-int:** 0  *Graph it, starting at the intercept (0, 0) and going up 2, over 1.*
1. $\frac{x^2+8x+12}{x+2}$	**Hole(s) at: x =** _____ **Equation of the line:** ____________________ **Slope:** ______ **Y-int:** ______ 	2. $\frac{3x^2+x-4}{x-1}$	**Hole(s) at: x =** _____ **Equation of the line:** ____________________ **Slope:** ______ **Y-int:** ______ 

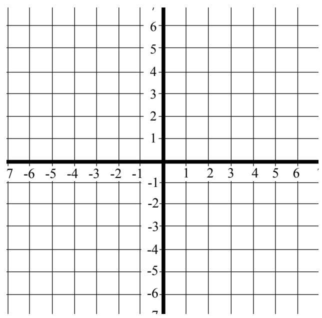
3.

$$\frac{2x^2 + 12x - 14}{x + 7}$$

Hole(s) at: x = _____
Equation of the line:

____

Slope: ______ Y-int: ______



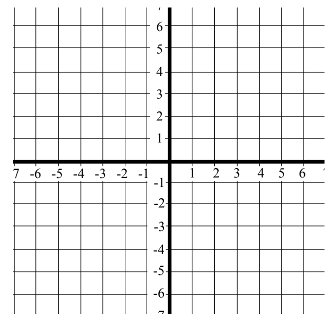
4.

$$\frac{5x^2 + 9x - 18}{x + 3}$$

Hole(s) at: x = _____
Equation of the line:

____

Slope: ______ Y-int: ______



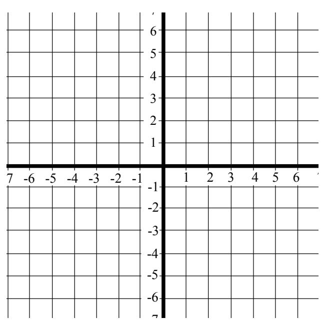
5.

$$\frac{x^2 - 16}{x + 4}$$

Hole(s) at: x = _____
Equation of the line:

____

Slope: ______ Y-int: ______



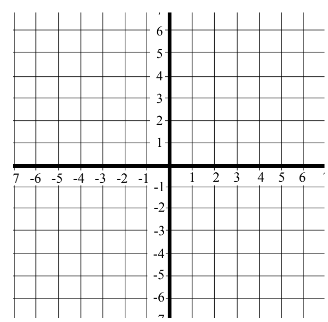
6.

$$\frac{x^3 - 5x^2 + 6x}{x^2 - 3x}$$

Hole(s) at: x = _____
Equation of the line:

____

Slope: ______ Y-int: ______



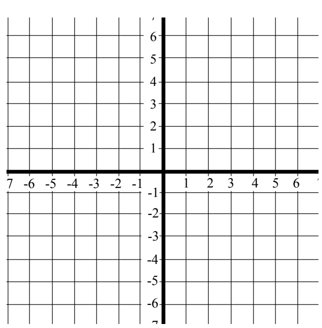
7.

$$\frac{4x^2 + 17x - 15}{x + 5}$$

Hole(s) at: x = _____
Equation of the line:

____

Slope: ______ Y-int: ______



8.

$$\frac{2x^3 + 7x^2 - 15x}{2x^2 - 3x}$$

Hole(s) at: x = _____
Equation of the line:

____

Slope: ______ Y-int: ______