Rationals:

What are rational functions?

Ratio

Comparison

$y = \frac{1}{x}$

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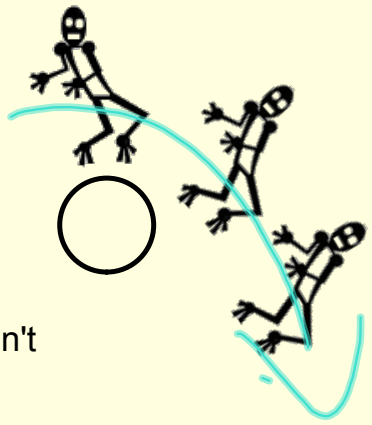
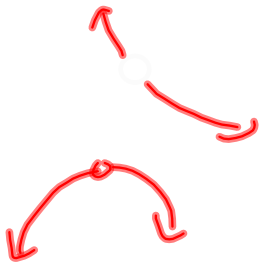
$$\frac{1}{x}$$

Can't Happen...
the crazy skeleton can't
dance on the ball !!!



Denominators = vertical asymptotes or holes



When do you have a hole?

When do you have a vertical asymptote?

hole
$x=-3$

$\frac{(x+3)}{(x+3)(x+5)}$

$x+5=0$

$x=-5 \Rightarrow$ Vertical asymptote

$\frac{(x+3)}{(x+3)(x+5)}$ FACTORS

$x+3=0$

$x=-3$

Template Formulas and Steps:

1) Factor the numerator (top) and denominator (bottom)

2) Cancel out parenthesis ( )

   ** Set parenthesis = 0 .... these x = ?# are the holes

3) Set the denominator (bottom) = 0

   ** These x = ?# are the vertical asymptotes

4) Graph the function using the parent shape of rational functions

   ** Draw the parent function

   ** Draw the vertical and horizontal asymptotes

   ** Draw the holes

1. $y = \frac{2}{3x^2}$

1) FACTOR

$\frac{2}{3x^2} = \frac{2}{3 \cdot x^2}$

2) Hole : None

3) VA : $3x^2 = 0$

$\frac{3}{3} \quad /3$

$\sqrt{x^2} = \sqrt{0}$

$x = 0$

VA: @ $x = 0$

2. $y = \frac{x^2 - 3x + 4}{(x+3)}$ $(x+3)$

1) FACTOR

$x^2 - 3x + 4$

$3 \times 4 = -3$

Does Not FACTOR

2) Holes : None

3) VA: $x + 3 = 0$

$x = -3$

2. $y = \dfrac{x^2 - 3x + 4}{x + 3}$

3. $y = \dfrac{x+3}{x^2-1}$

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

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

2) No holes

3) VA: $x+1=0 \quad x=-1$

$x-1=0 \quad x=1$

$x^2-1=0$

$x^2=1 \quad x=\pm 1$

4. $y = \dfrac{x^2+5x-2}{2x^2}$

Holes: None

* VA: $2x^2=0$

$x=0$

5. $y = \dfrac{x+3}{(x+1)(x-2)}$

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

6 = 4 · 2
8 = 4 + 2

6. $y = \dfrac{x^2+6x+8}{x^2+5x+6}$

$\dfrac{(x+4)(x+2)}{(x+3)(x+2)}$

Hole: $x+2=0$ $x+2=0$
$x=-2$

VA: $x=-3$ $x+3=0$

2(x+1)

7. $y = \dfrac{2x+1}{x+1}$

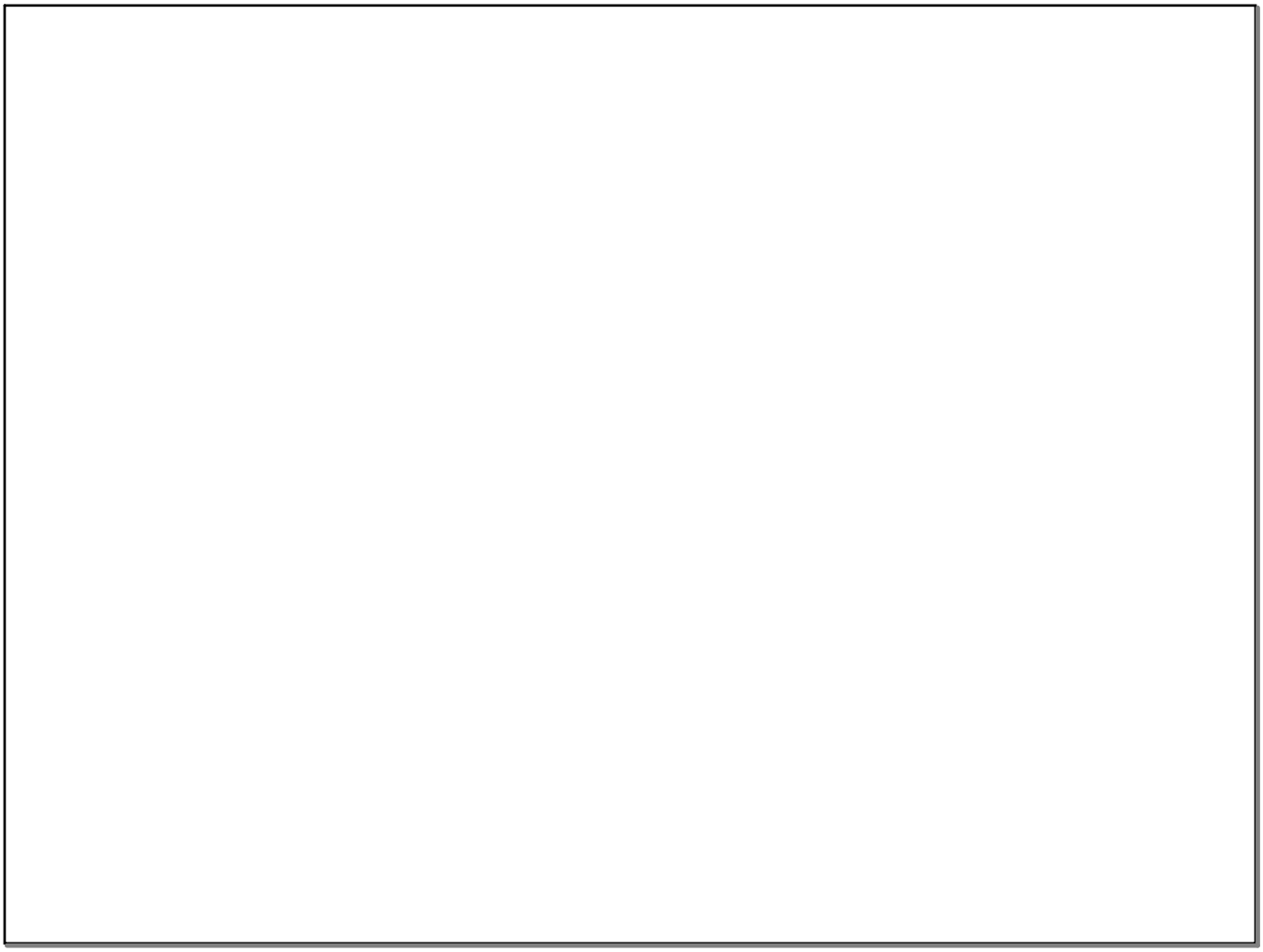
8. $y = \dfrac{4}{x^2+1}$

9. $y = \dfrac{3x}{x^2 + 5x}$

10. $y = \dfrac{5x^2 - 10x + 1}{x - 2}$

11. $y = \dfrac{x^2 - 1}{x + 1}$

12. $y = \dfrac{x - 2}{x^2 - 2x - 3}$



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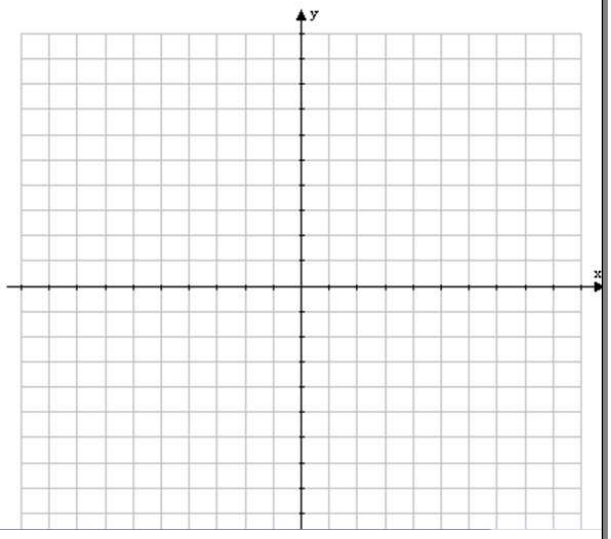
16. $y = \dfrac{x+3}{x^2-3x-18}$

17. $y = \dfrac{x^2+3x+1}{x}$

Graph each rational function.

18. $y = \frac{2}{x-1}$



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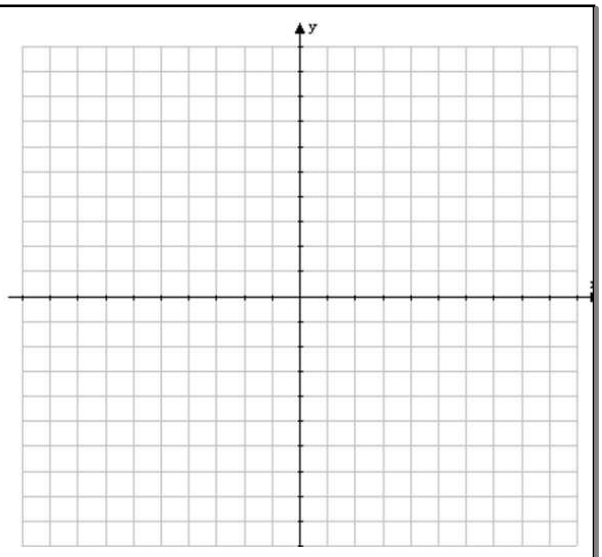
19. $y = \frac{3x-1}{x+1}$



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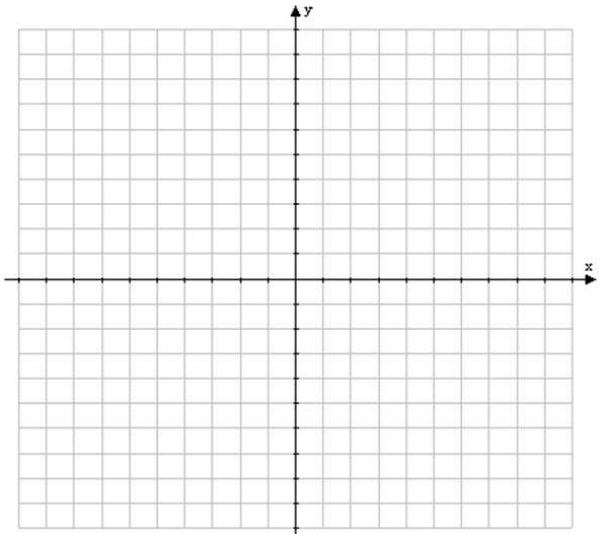
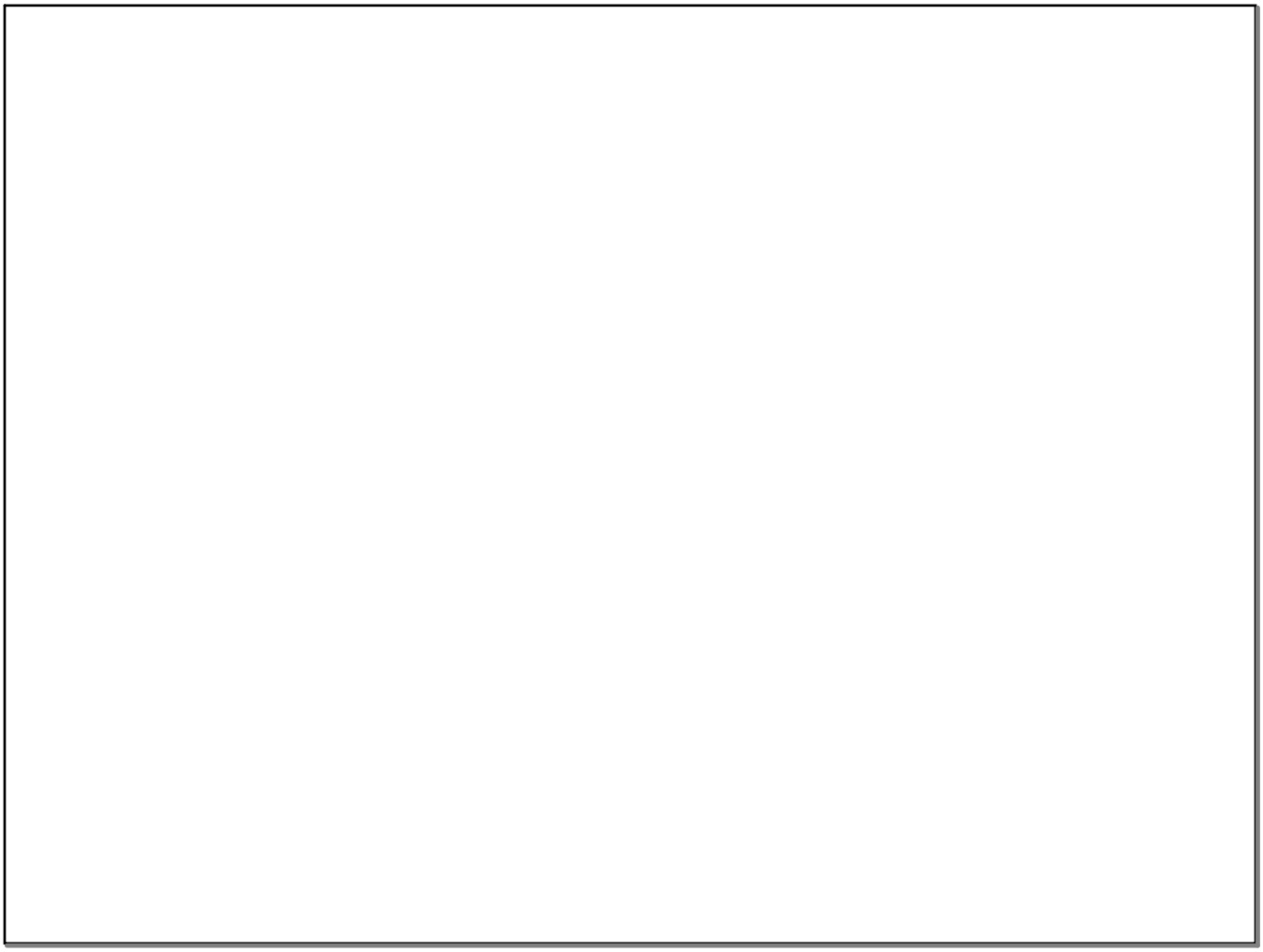
20. $y = \dfrac{2x+1}{x+1}$





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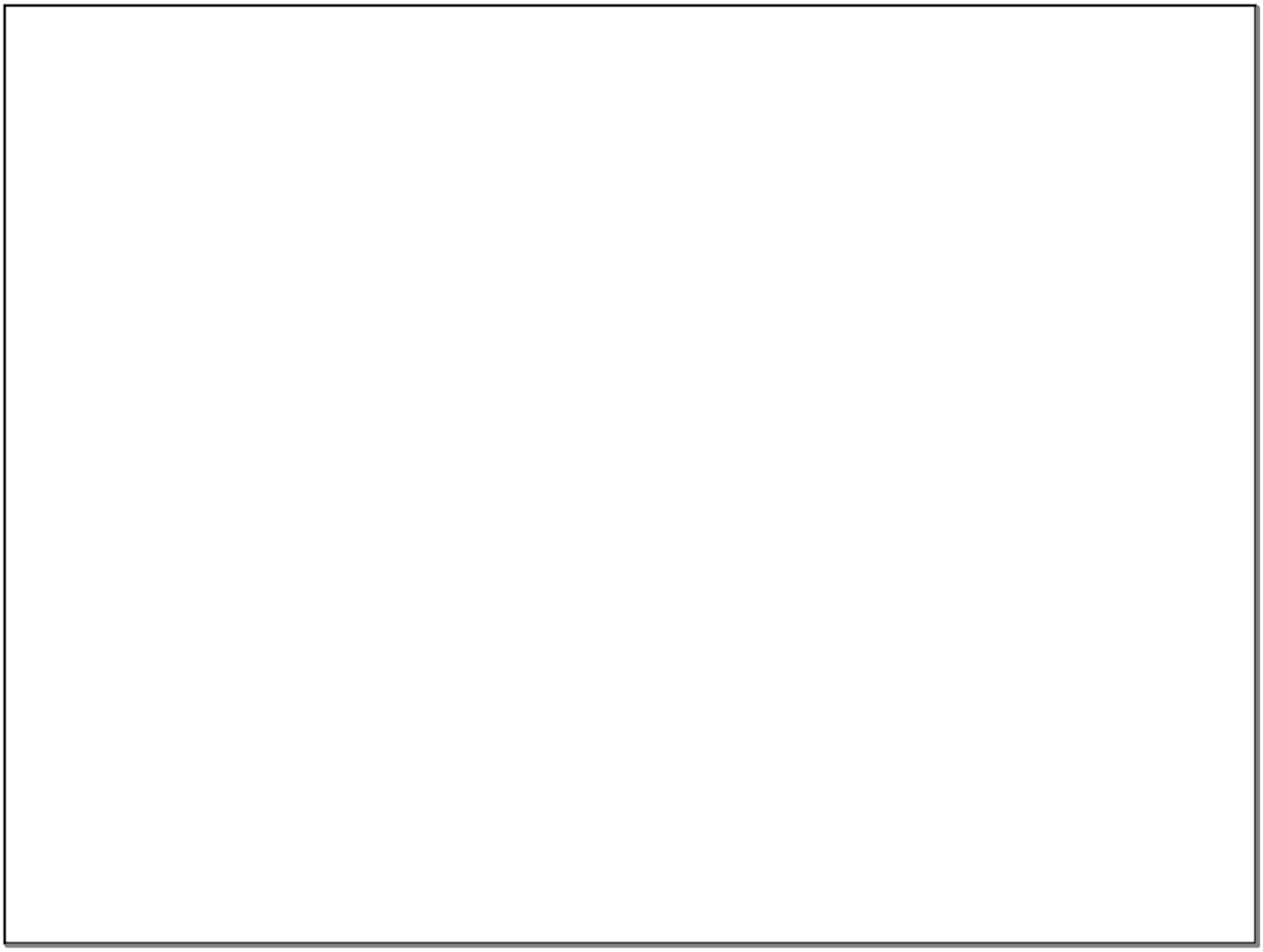

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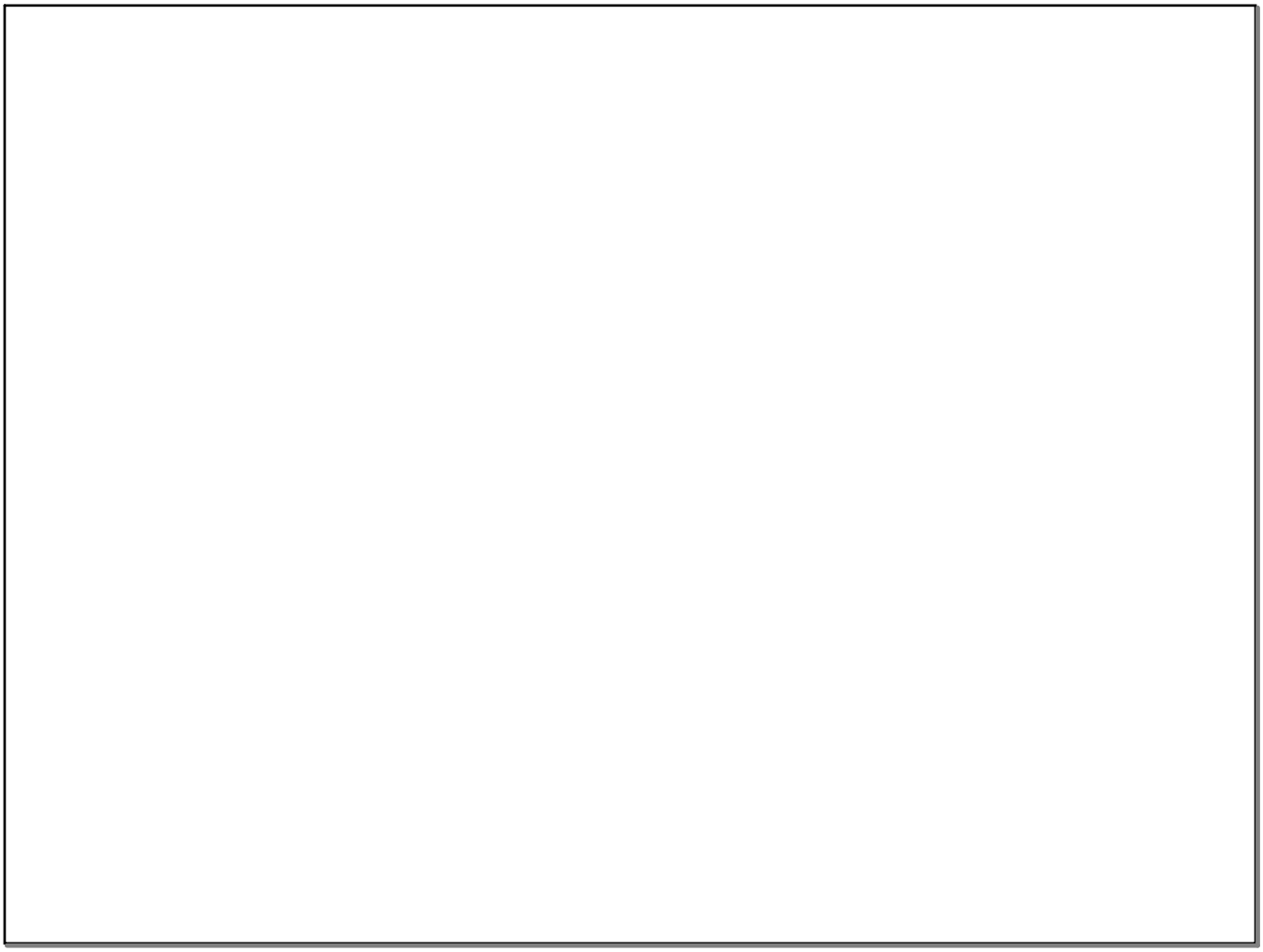

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