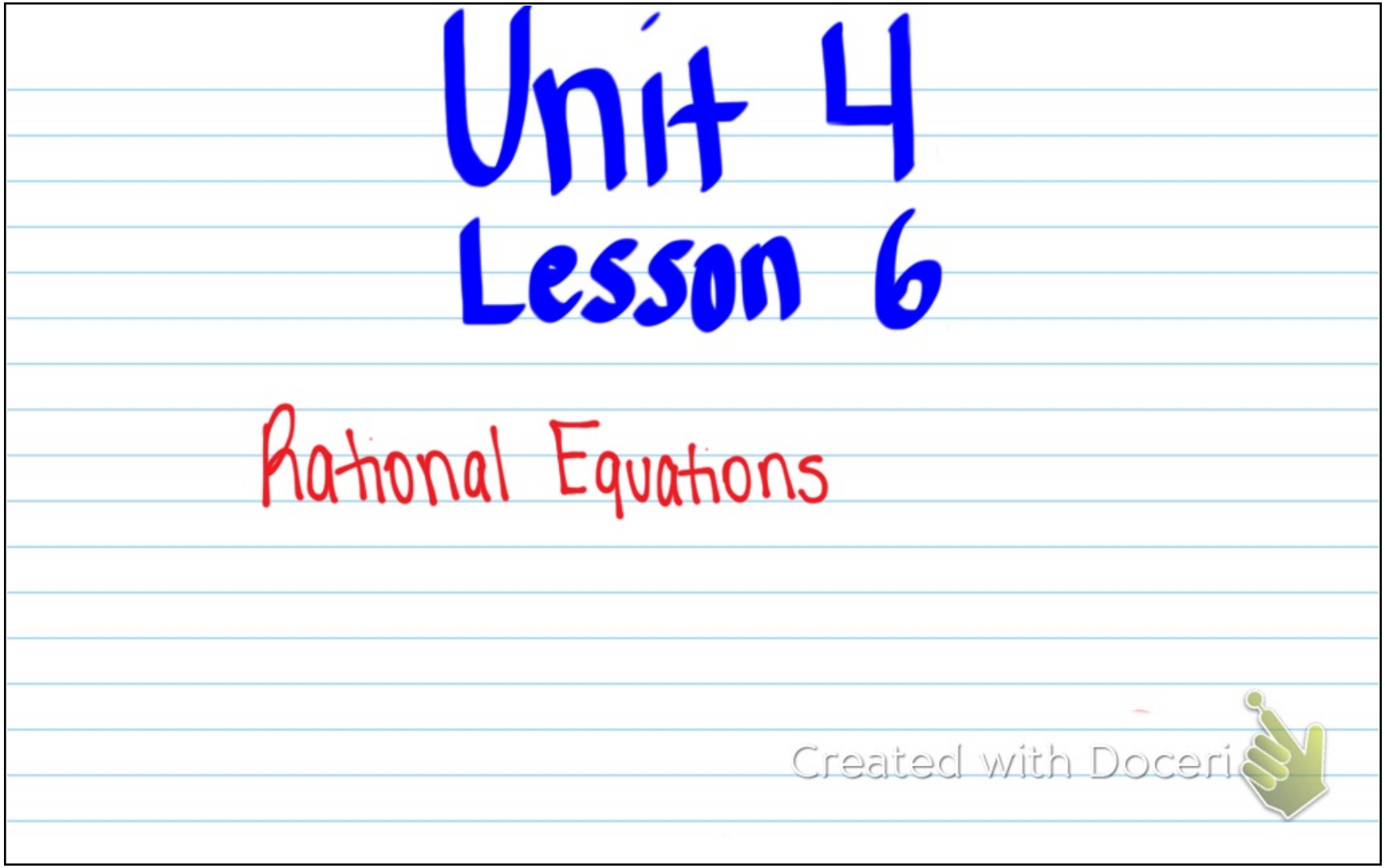
Unit 4
Lesson 6

Rational Equations



1. $\frac{7}{7} \cdot \frac{6}{x} = \frac{3}{7} \cdot \frac{x}{x}$ LCD: $7x$

$\frac{42}{7x} = \frac{3x}{7x}$

$\frac{42}{3} = \frac{3x}{3}$

$14 = x$

2. $\frac{x}{x} \cdot \frac{4}{(x-7)} = \frac{6}{x} \cdot \frac{(x-7)}{(x-7)}$

LCD: $x(x-7)$

$$\frac{4x}{x(x-7)} = \frac{6x-42}{x(x-7)}$$

$$4x = 6x - 42$$
$$-6x \quad -6x$$

$$\frac{-2x}{-2} = \frac{-42}{-2}$$

$$x = 21$$

3. $\frac{-5}{x+4} = \frac{1}{x+4}$

LCD: $x+4$

$-5 = 1$

$\emptyset$

$\frac{-5}{x+4} = \frac{-5}{x+4}$

$-5 = -5$

$\mathbb{R}, x \neq -4$

4. $\frac{6}{6} \cdot \frac{4}{(x+5)} = \frac{x}{6} \cdot \frac{(x+5)}{(x+5)}$

LCD: $6(x+5)$

$$\frac{24}{6(x+5)} = \frac{x^2+5x}{6(x+5)}$$

$$24 = x^2+5x$$

$$-24 \qquad -24$$

$$0 = x^2+5x-24$$

$$(x+8)(x-3)$$

$$x=-8 \quad x=3$$

5. $\frac{x-4}{4} + \frac{x}{3} = \frac{6}{1}$

LCD: 12

$\frac{3}{3} \cdot \frac{(x-4)}{4} + \frac{x}{3} \cdot \frac{4}{4} = \frac{6}{1} \cdot \frac{12}{12}$

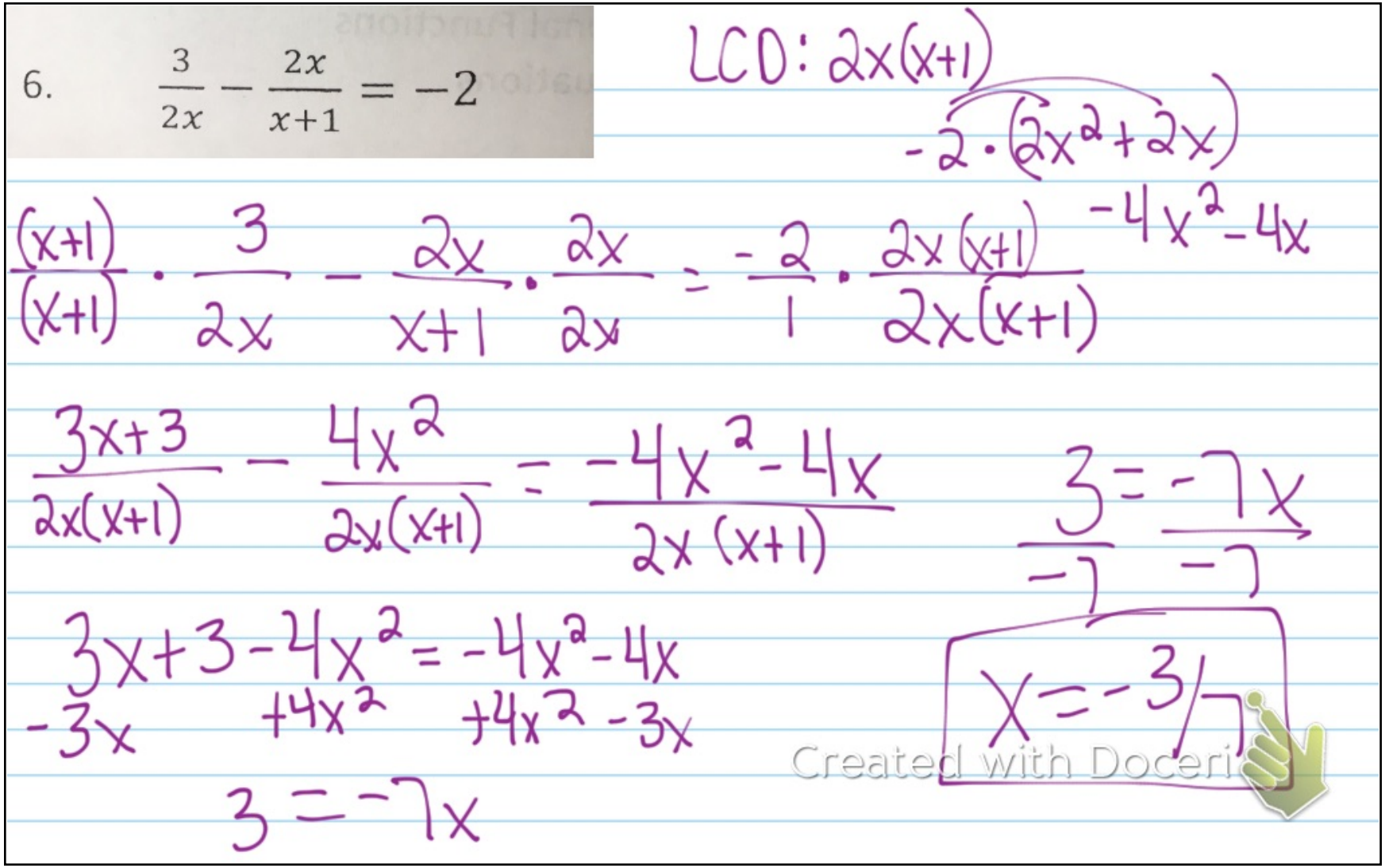
$\frac{3x-12}{12} + \frac{4x}{12} = \frac{72}{12}$

$3x-12+4x=72$

$7x-12=72$

$7x=84$

$x=12$


6. $\frac{3}{2x} - \frac{2x}{x+1} = -2$
LCD: $2x(x+1)$
$-2 \cdot (2x^2+2x)$
$-4x^2-4x$
$\frac{(x+1)}{(x+1)} \cdot \frac{3}{2x} - \frac{2x}{x+1} \cdot \frac{2x}{2x} = \frac{-2}{1} \cdot \frac{2x(x+1)}{2x(x+1)}$
$\frac{3x+3}{2x(x+1)} - \frac{4x^2}{2x(x+1)} = \frac{-4x^2-4x}{2x(x+1)}$
$3x+3-4x^2 = -4x^2-4x$
$-3x \quad +4x^2 \quad +4x^2 \quad -3x$
$3 = -7x$
$\frac{3}{-7} = \frac{-7x}{-7}$
$x = -3/7$
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7. $\frac{6}{x} = \frac{1}{4} + \frac{9}{x-1}$

LCD: $4x(x-1)$

$\frac{4(x-1)}{4(x-1)} \cdot \frac{6}{x} = \frac{1}{4} \cdot \frac{x(x-1)}{x(x-1)} + \frac{9}{(x-1)} \cdot \frac{4x}{4x}$

$\frac{(4x-4)6}{4(x-1)(x)} = \frac{x^2 - x}{4x(x-1)} + \frac{36x}{4x(x-1)}$

$\frac{24x-24}{4x(x-1)} = \frac{x^2 - x}{4x(x-1)} + \frac{36x}{4x(x-1)}$

$24x - 24 = x^2 - x + 36x$

$24x - 24 = x^2 + 35x$

$-24x \quad +24 \qquad -24x \quad +24$

$0 = x^2 + 11x + 24$

$0 = (x+8)(x+3)$

$x = -8 \quad x = -3$

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

LCD: $(x-1)(x+1)$

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

$$2x^2+2x+x-5 = x^2-1$$

$-x^2$ $\quad +1$ $\quad -x^2+1$

$$x^2+3x-4=0$$

$$(x+4)(x-1)=0$$

$x=-4$ $\quad$ ~~$x=1$~~

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7) $\frac{4x}{3x-2}\cdot\frac{(3x+2)}{(3x+2)}+\frac{2x}{3x+2}\cdot\frac{(3x-2)}{(3x-2)}=\frac{2}{1}\cdot\frac{(3x-2)(3x+2)}{(3x-2)(3x+2)}$ LCD: $(3x-2)(3x+2)$

$$\frac{12x^2+8x}{(3x-2)(3x+2)}+\frac{6x^2-4x}{(3x-2)(3x+2)}=\frac{2(9x^2-4)}{(3x+2)(3x-2)}$$

$$12x^2+8x+6x^2-4x=18x^2-8$$

$$18x^2+4x=18x^2-8$$
$$-18x^2 \qquad -18x^2$$

$$\frac{4x}{4}=\frac{-8}{4}$$

$$x=-2$$

8) $\frac{5}{5-x} - \frac{x^2}{5-x} = \frac{-2}{1}, \frac{(5-x)}{(5-x)}$ LCD: $(5-x)$

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

$-5 + x^2 \quad -5 \quad +x^2$

$0 = x^2 + 2x - 15$

$0 = (x+5)(x-3)$

$x = -5 \quad x = 3$

9) $\frac{(x+2)}{(x+2)} \cdot \frac{2x-5}{x-2} - \frac{2}{1} \cdot \frac{(x-2)(x+2)}{(x-2)(x+2)} = \frac{3}{x+2} \cdot \frac{(x-2)}{x-2}$ LCD: $(x-2)(x+2)$

$$\frac{2x^2-1x-10}{(x+2)(x-2)} - \frac{2(x^2-4)}{(x-2)(x+2)} = \frac{3x-6}{(x+2)(x-2)}$$

$$2x^2-1x-10-(2x^2-4)=3x-6$$

$$2x^2-1x-10-2x^2+8=3x-6$$

$$-1x-2=3x-6$$

$$+1x \qquad +1x$$

$$-2=4x-6$$

$$+6 \qquad +6$$

$$4=4x$$

$$\boxed{x=1}$$

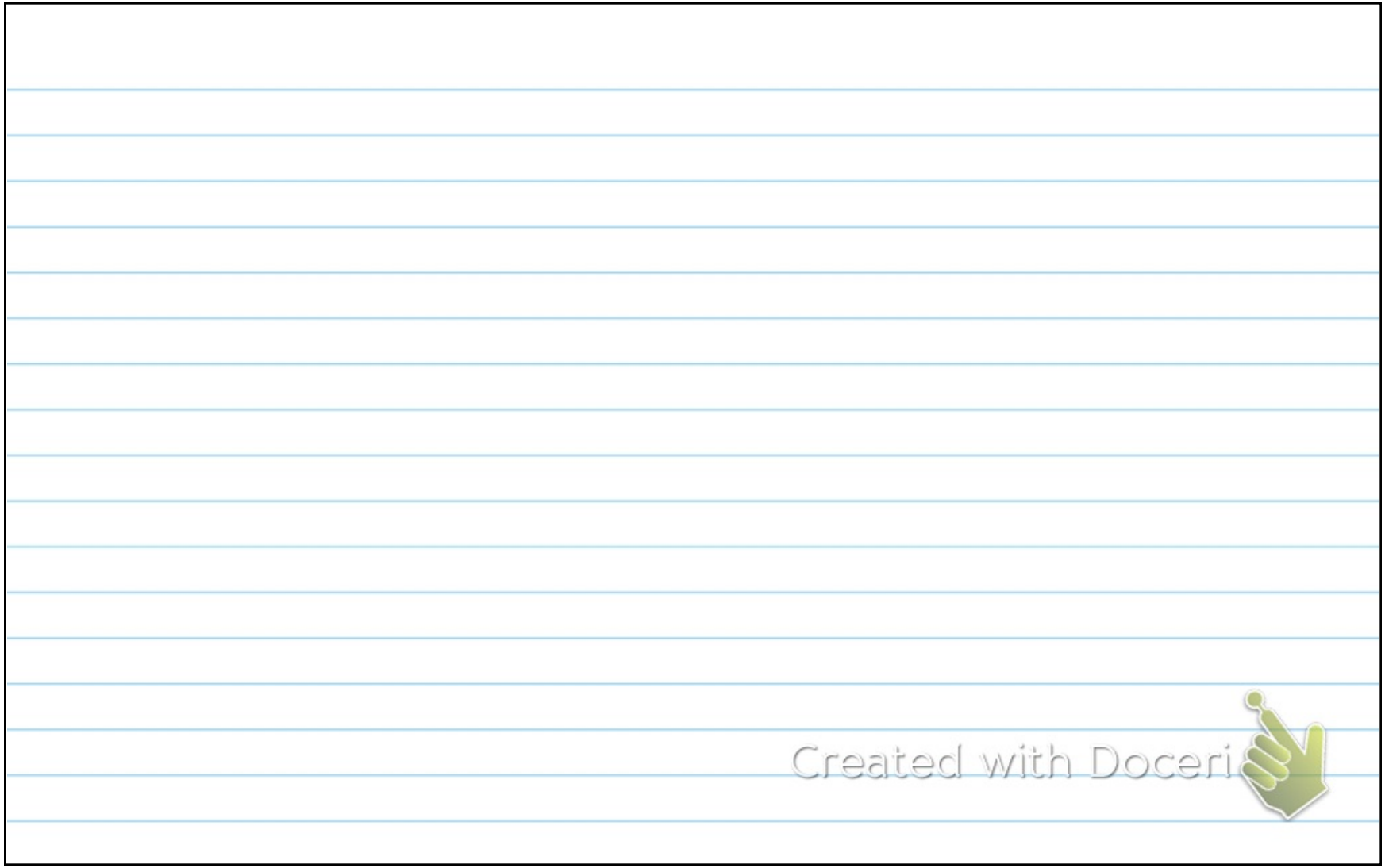
$$\frac{4}{(x-2)(x-6)} = \frac{x}{(x-2)} \cdot \frac{(x-6)}{(x-6)} + \frac{1}{(x-6)} \cdot \frac{(x-2)} \quad LCD: (x-2)(x-6)$$

$$4 = x^2 - 6x + x - 2$$

$$0 = x^2 - 5x - 6$$

$$0 = (x-6)(x+1)$$

$x = 6$ $x = -1$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