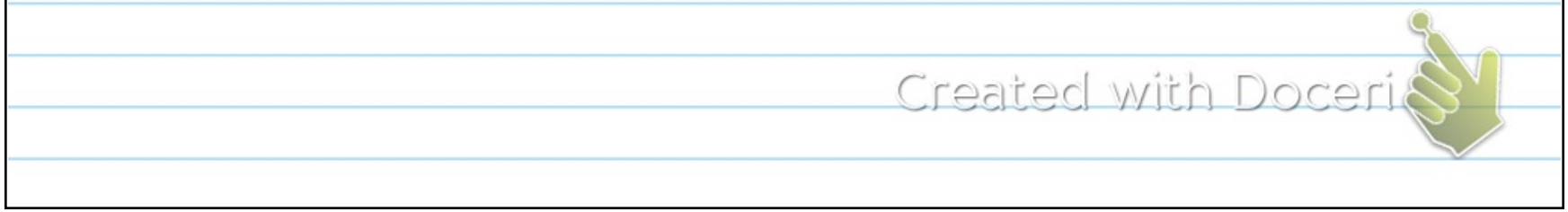
Unit 4
Lesson 3

Square + Cube Root Equations



There are four steps to solving a radical equation:

1) Isolate the radical.
2) Raise both sides to the power of the root.
3) Solve for x.
4) Check for extraneous solution(s).

What is an **EXTRANEOUS** solution? A solution to the final equation but not to the original equation.
Extraneous solutions can occur when solving a **square root equation** but not when solving linear or quadratic equations.

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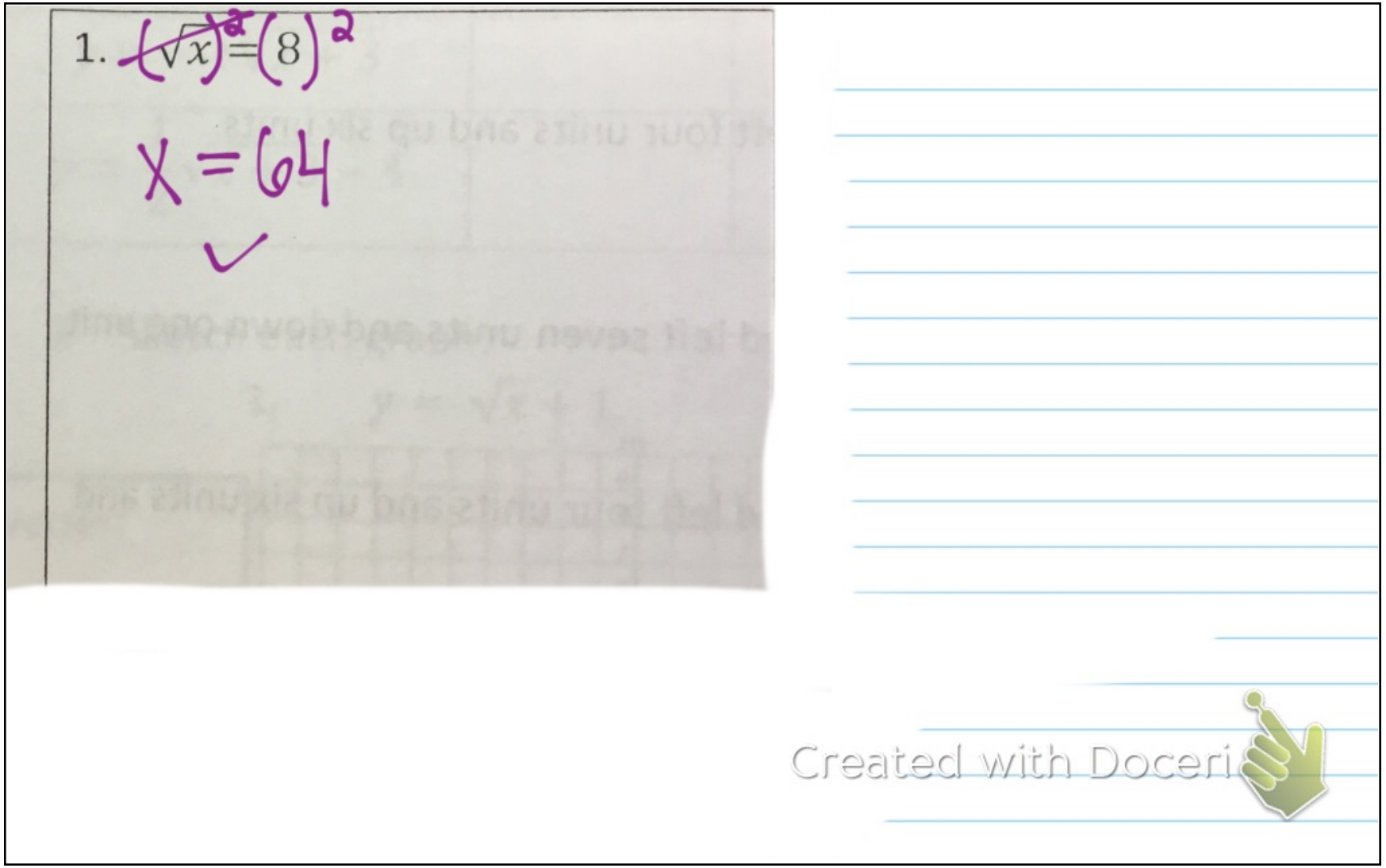
1. $(\sqrt{x})^2 = (8)^2$
$x = 64$
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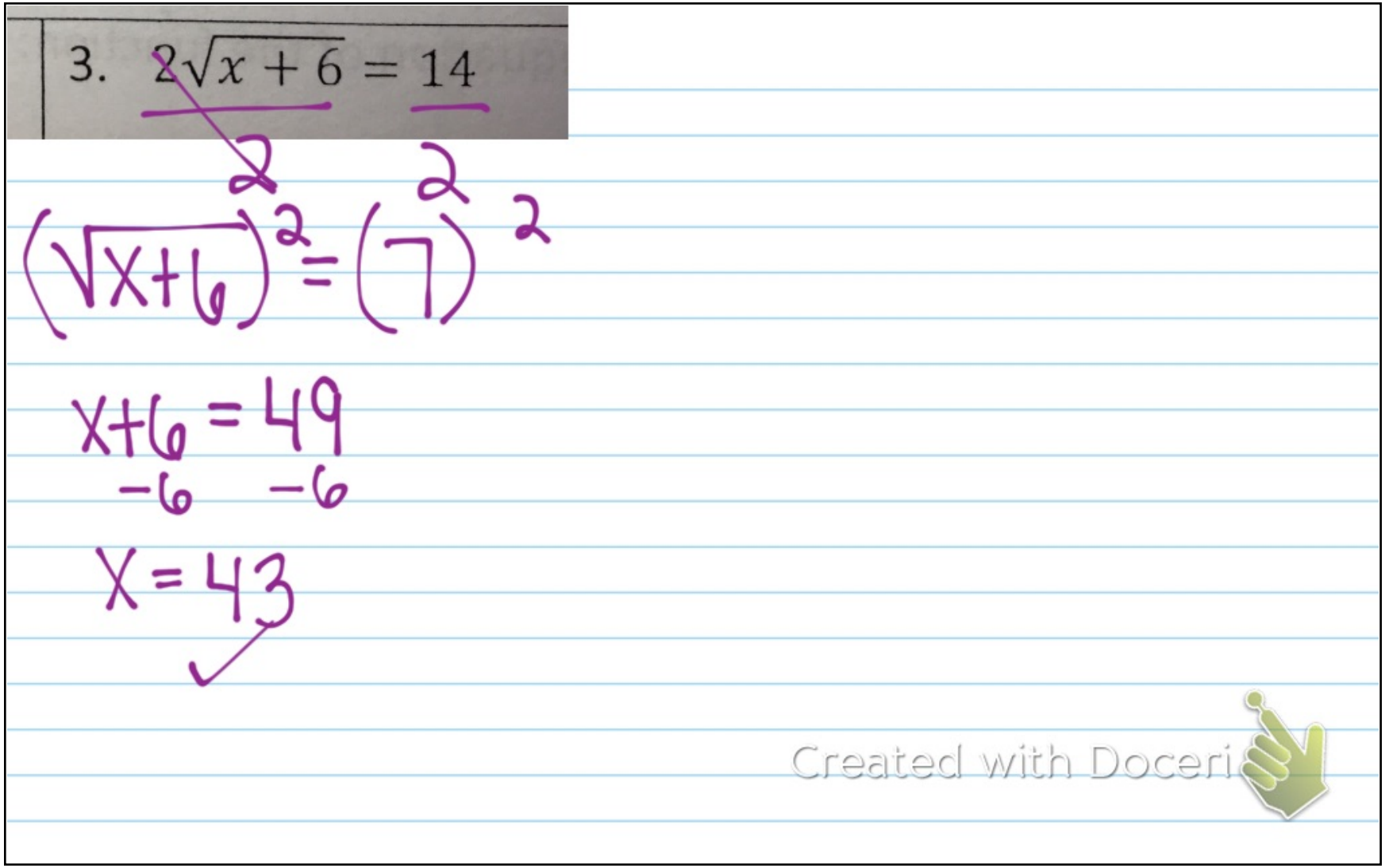
2. $(\sqrt{x+7})^2 = (8)^2$

$x+7=64$

$-7 \quad -7$

$x=57$

✓


3. $2\sqrt{x+6} = 14$
$\frac{2}{2}$
$(\sqrt{x+6})^2 = (7)^2$
$x+6 = 49$
$-6 \quad -6$
$x = 43$
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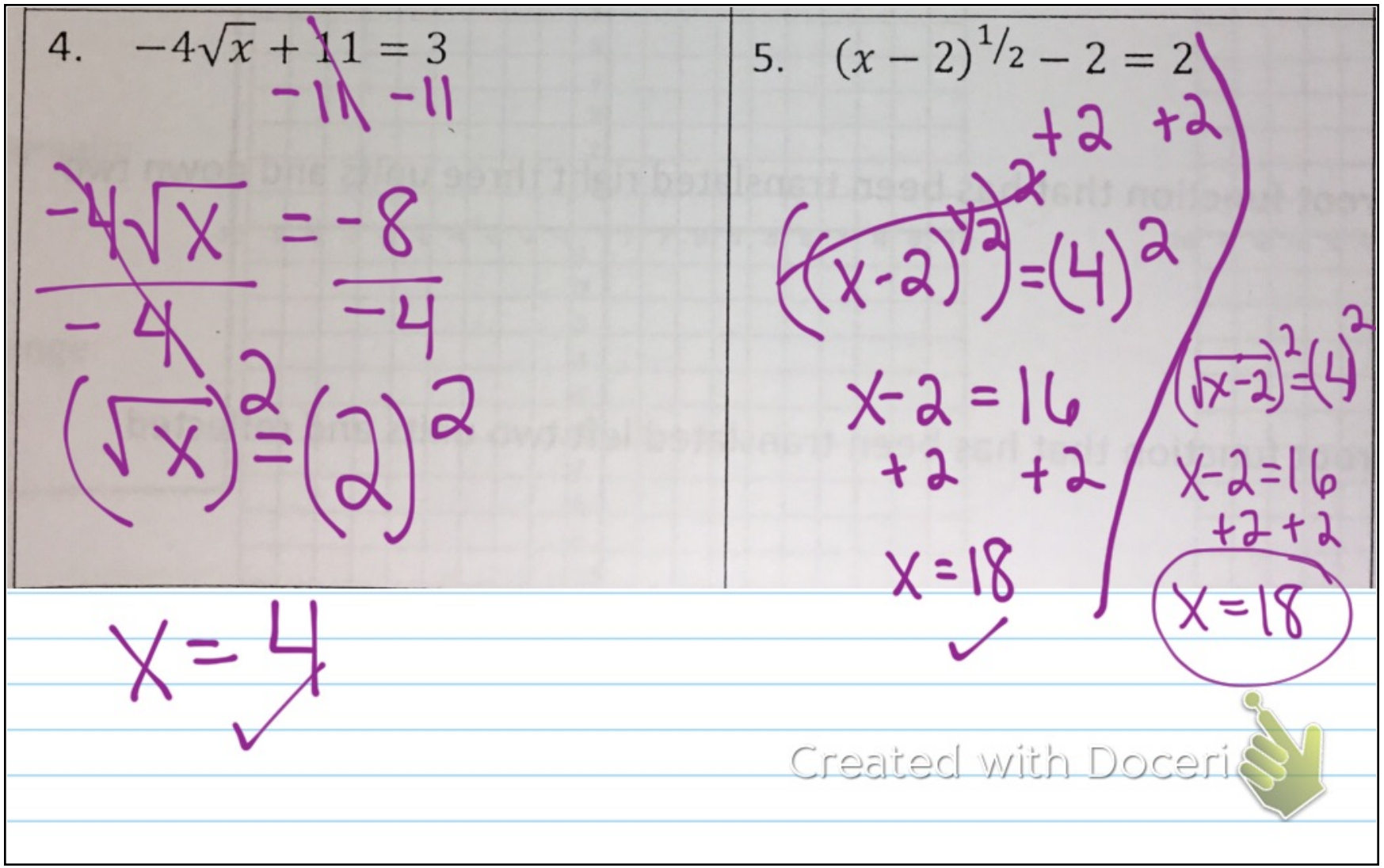
4. $-4\sqrt{x}+11=3$
-11 -11
$\frac{-4\sqrt{x}}{-4}=\frac{-8}{-4}$
$(\sqrt{x})^2=(2)^2$
$x=4$
5. $(x-2)^{1/2}-2=2$
+2 +2
$((x-2)^{1/2})^2=(4)^2$
$x-2=16$
+2 +2
$x=18$
$(\sqrt{x-2})^2=(4)^2$
$x-2=16$
+2 +2
$x=18$
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6. $10 - 3\sqrt[3]{2x+5} = -11$

$-10 \qquad\qquad -10$

$\frac{-3\sqrt[3]{2x+5}}{-3} = \frac{-21}{-3}$

$(\sqrt[3]{2x+5})^3 = (7)^3$

$2x+5 = 343$

$-5 \qquad -5$ ✓

$\frac{2x}{2} = \frac{338}{2} \quad x = 169$

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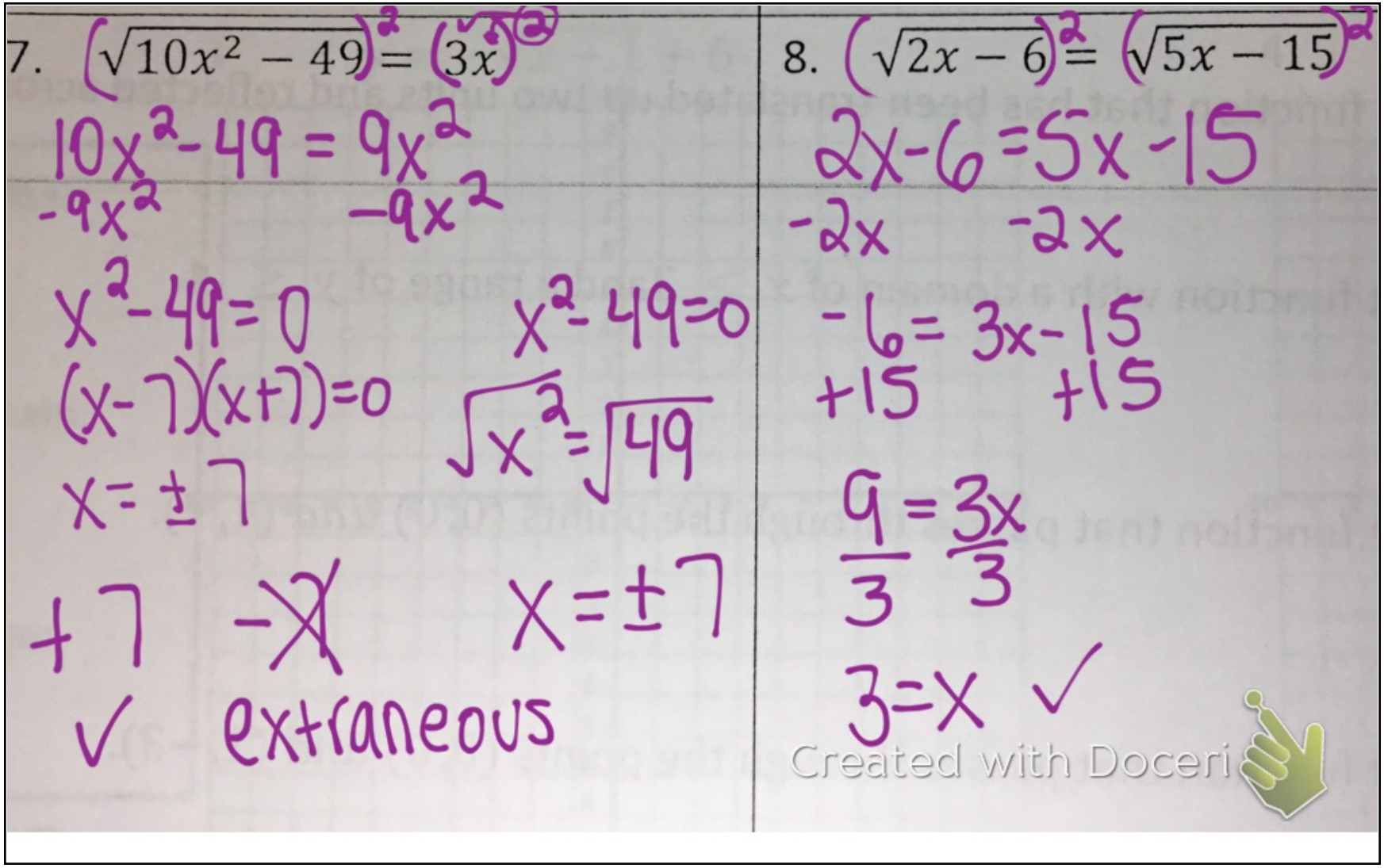
7. $(\sqrt{10x^2-49})^2=(3x)^2$
$10x^2-49=9x^2$
$-9x^2 \quad -9x^2$
$x^2-49=0$
$(x-7)(x+7)=0$
$x=\pm 7$
$+7 \quad -7$
✓ extraneous
$x^2-49=0$
$\sqrt{x^2}=\sqrt{49}$
$x=\pm 7$
8. $(\sqrt{2x-6})^2=(\sqrt{5x-15})^2$
$2x-6=5x-15$
$-2x \quad -2x$
$-6=3x-15$
$+15 \quad +15$
$\frac{9}{3}=\frac{3x}{3}$
$3=x$ ✓
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9. $\left((6x-5)^{1/3}\right)^3 = \left((3x+2)^{1/3}\right)^3$

$6x-5 = 3x+2$

$-3x+5 \quad -3x+5$

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

$x = 7/3$ ✓

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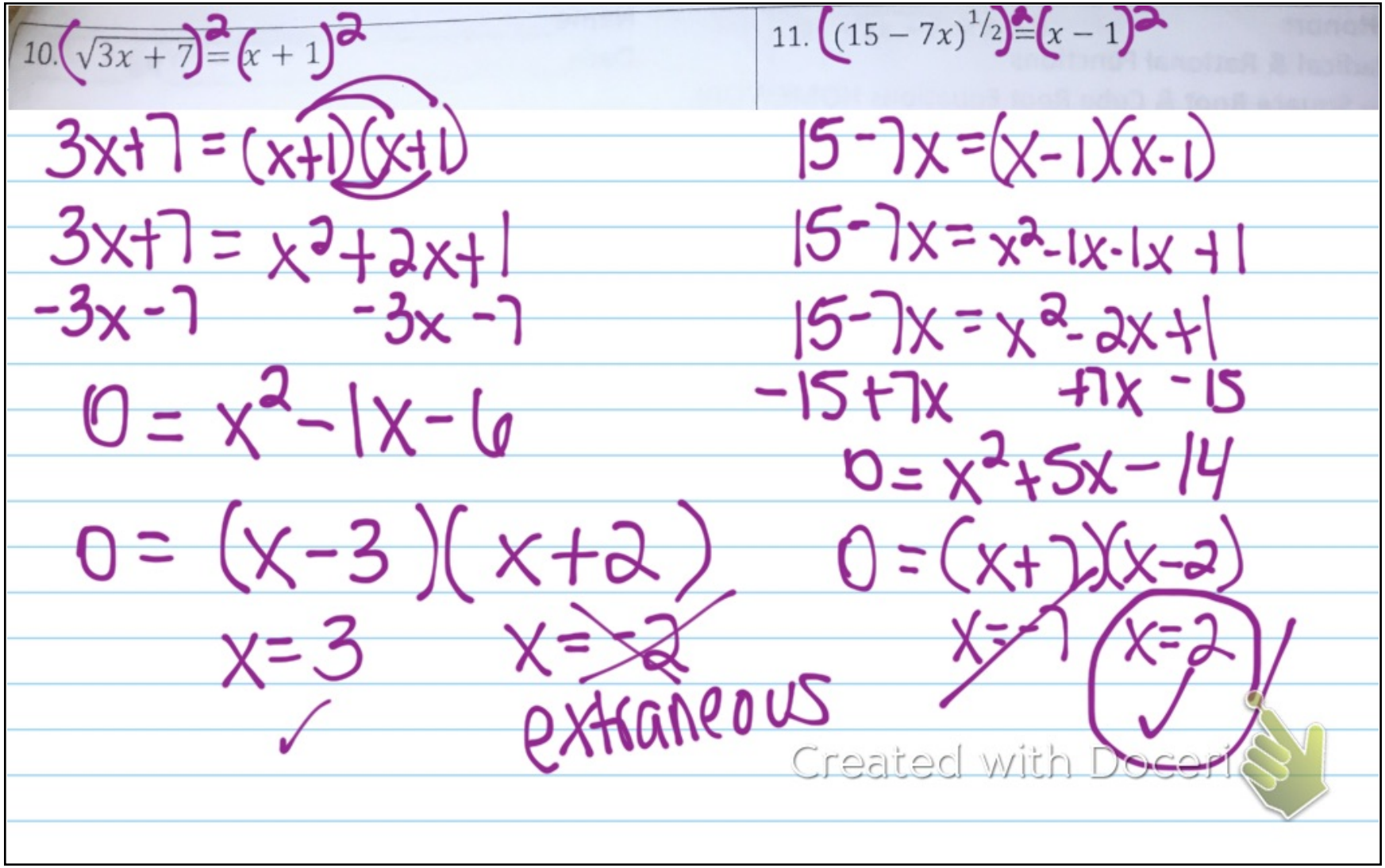
10. $(\sqrt{3x+7})^2 = (x+1)^2$
$3x+7 = (x+1)(x+1)$
$3x+7 = x^2+2x+1$
$-3x-7 \quad -3x-7$
$0 = x^2-1x-6$
$0 = (x-3)(x+2)$
$x=3$ ✓
$x=-2$ extraneous
11. $((15-7x)^{1/2})^2 = (x-1)^2$
$15-7x = (x-1)(x-1)$
$15-7x = x^2-1x-1x+1$
$15-7x = x^2-2x+1$
$-15+7x \quad +7x-15$
$0 = x^2+5x-14$
$0 = (x+7)(x-2)$
$x=-7$
$x=2$ ✓
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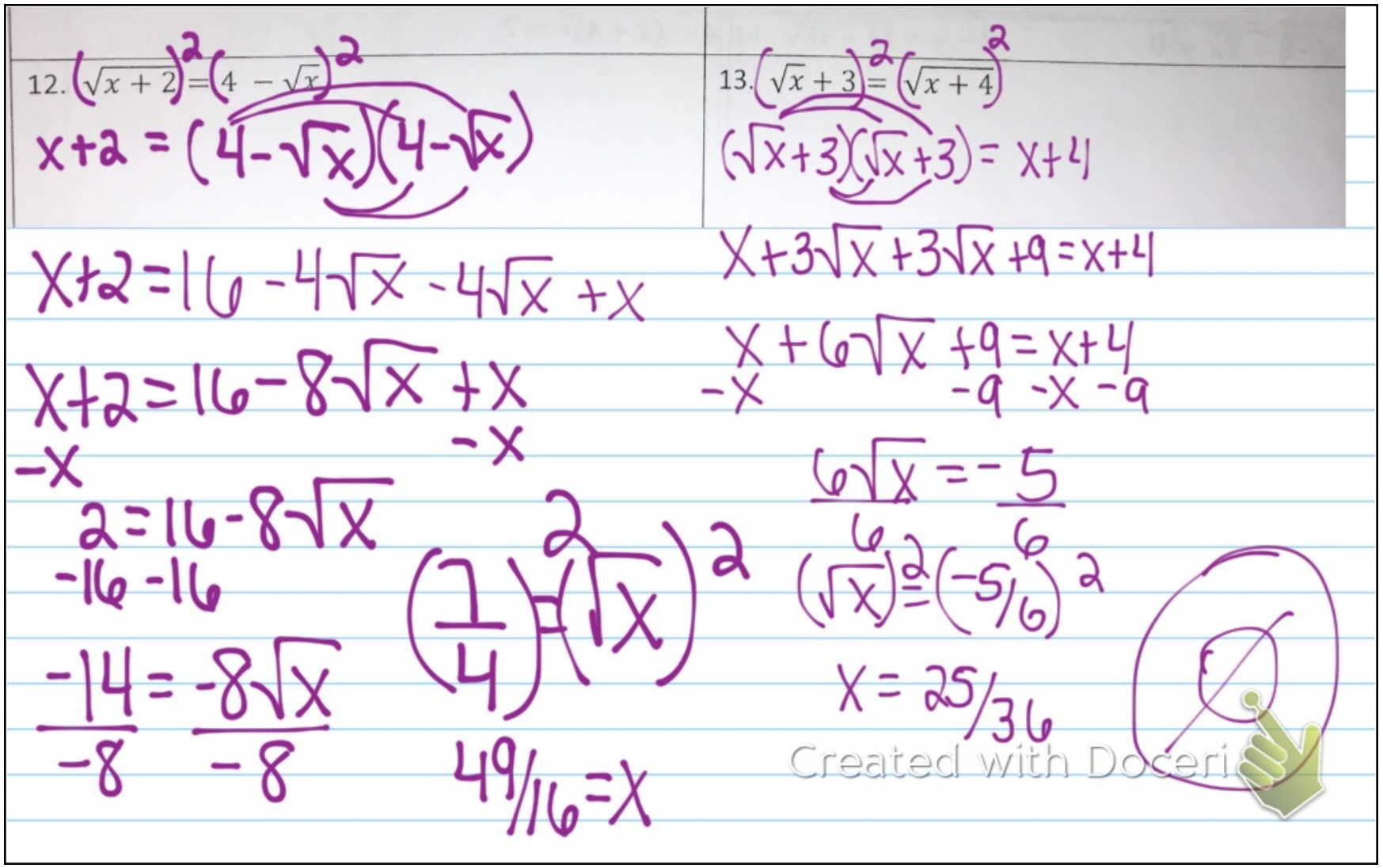
12. $(\sqrt{x+2})^2 = (4-\sqrt{x})^2$
$x+2 = (4-\sqrt{x})(4-\sqrt{x})$
$x+2 = 16-4\sqrt{x}-4\sqrt{x}+x$
$x+2 = 16-8\sqrt{x}+x$
$-x \quad -x$
$2 = 16-8\sqrt{x}$
$-16 \quad -16$
$\frac{-14}{-8} = \frac{-8\sqrt{x}}{-8}$
$(\frac{7}{4})^2 = (\sqrt{x})^2$
$49/16 = x$
13. $(\sqrt{x+3})^2 = (\sqrt{x+4})^2$
$(\sqrt{x}+3)(\sqrt{x}+3) = x+4$
$x+3\sqrt{x}+3\sqrt{x}+9 = x+4$
$x+6\sqrt{x}+9 = x+4$
$-x \quad -9 \quad -x \quad -9$
$\frac{6\sqrt{x}}{6} = \frac{-5}{6}$
$(\sqrt{x})^2 = (-5/6)^2$
$x = 25/36$
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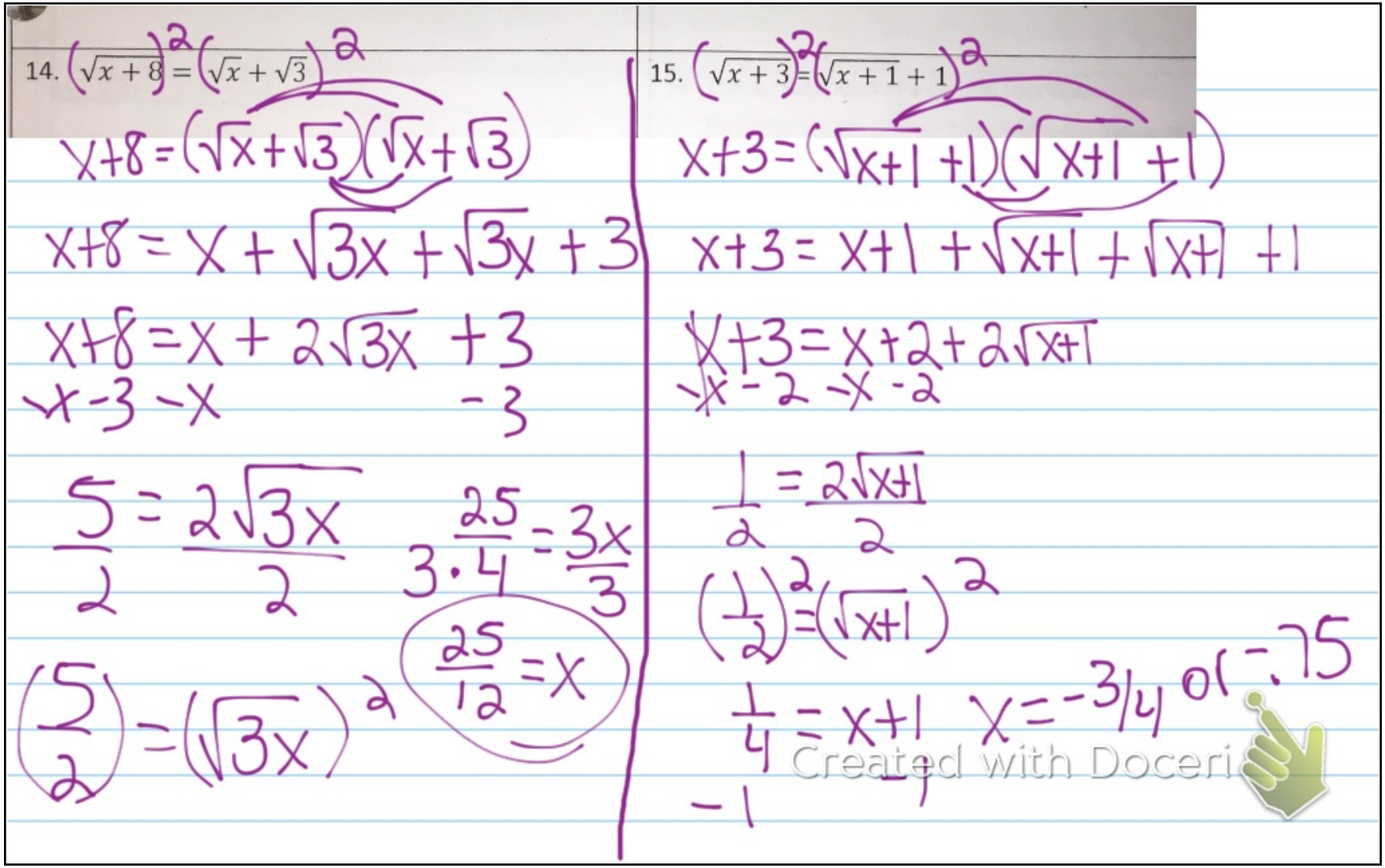
14. $(\sqrt{x+8})^2=(\sqrt{x}+\sqrt{3})^2$
$x+8=(\sqrt{x}+\sqrt{3})(\sqrt{x}+\sqrt{3})$
$x+8=x+\sqrt{3x}+\sqrt{3x}+3$
$x+8=x+2\sqrt{3x}+3$
$-x-3 \quad -x \quad -3$
$\frac{5}{2}=\frac{2\sqrt{3x}}{2}$
$\frac{25}{3\cdot 4}=\frac{3x}{3}$
$\frac{25}{12}=x$
$(\frac{5}{2})=(\sqrt{3x})^2$
15. $(\sqrt{x+3})^2=(\sqrt{x+1}+1)^2$
$x+3=(\sqrt{x+1}+1)(\sqrt{x+1}+1)$
$x+3=x+1+\sqrt{x+1}+\sqrt{x+1}+1$
$x+3=x+2+2\sqrt{x+1}$
$-x-2 \quad -x-2$
$\frac{1}{2}=\frac{2\sqrt{x+1}}{2}$
$(\frac{1}{2})^2=(\sqrt{x+1})^2$
$\frac{1}{4}=x+1$
$-1 \quad -1$
$x=-3/4$ or $-.75$
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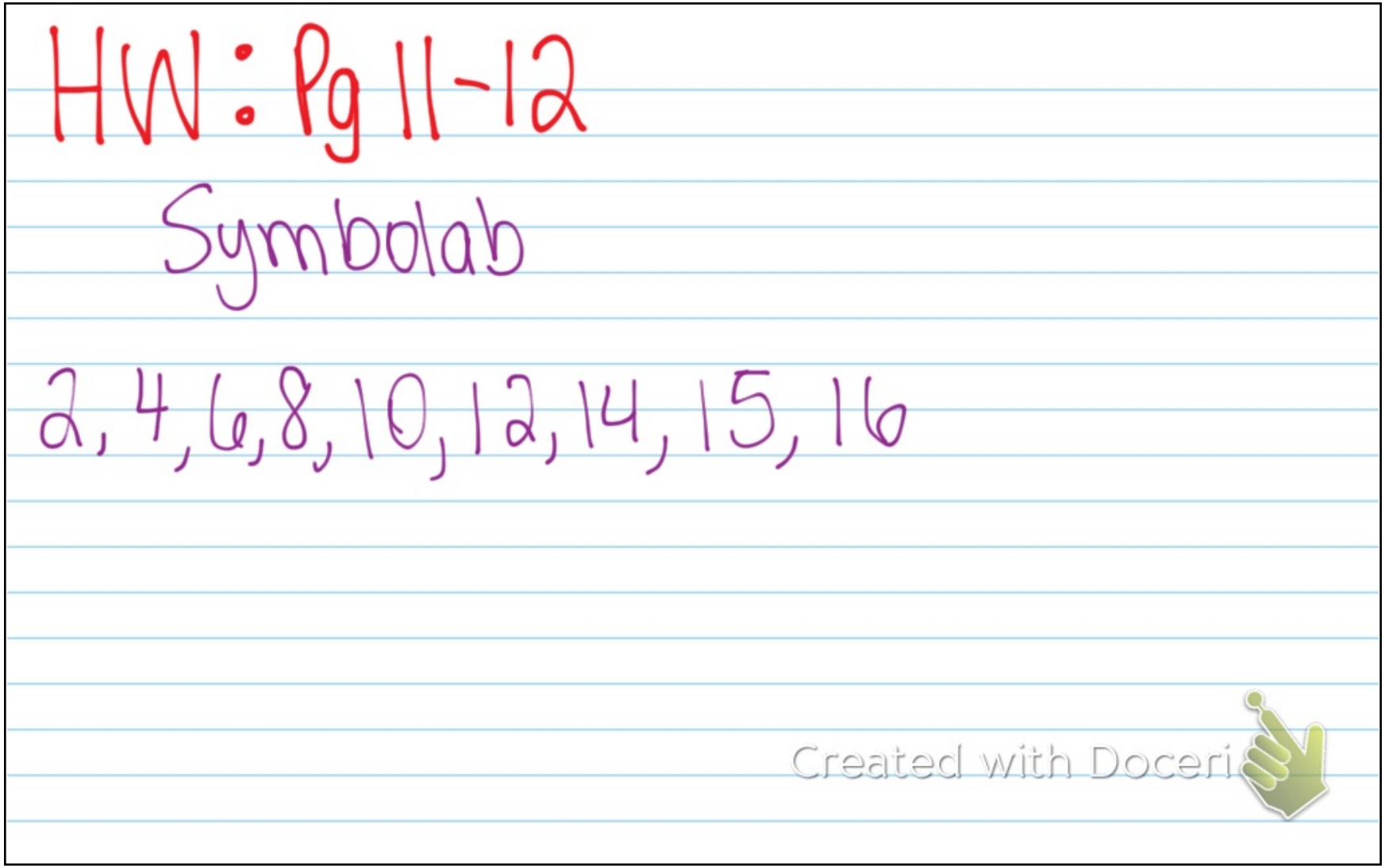
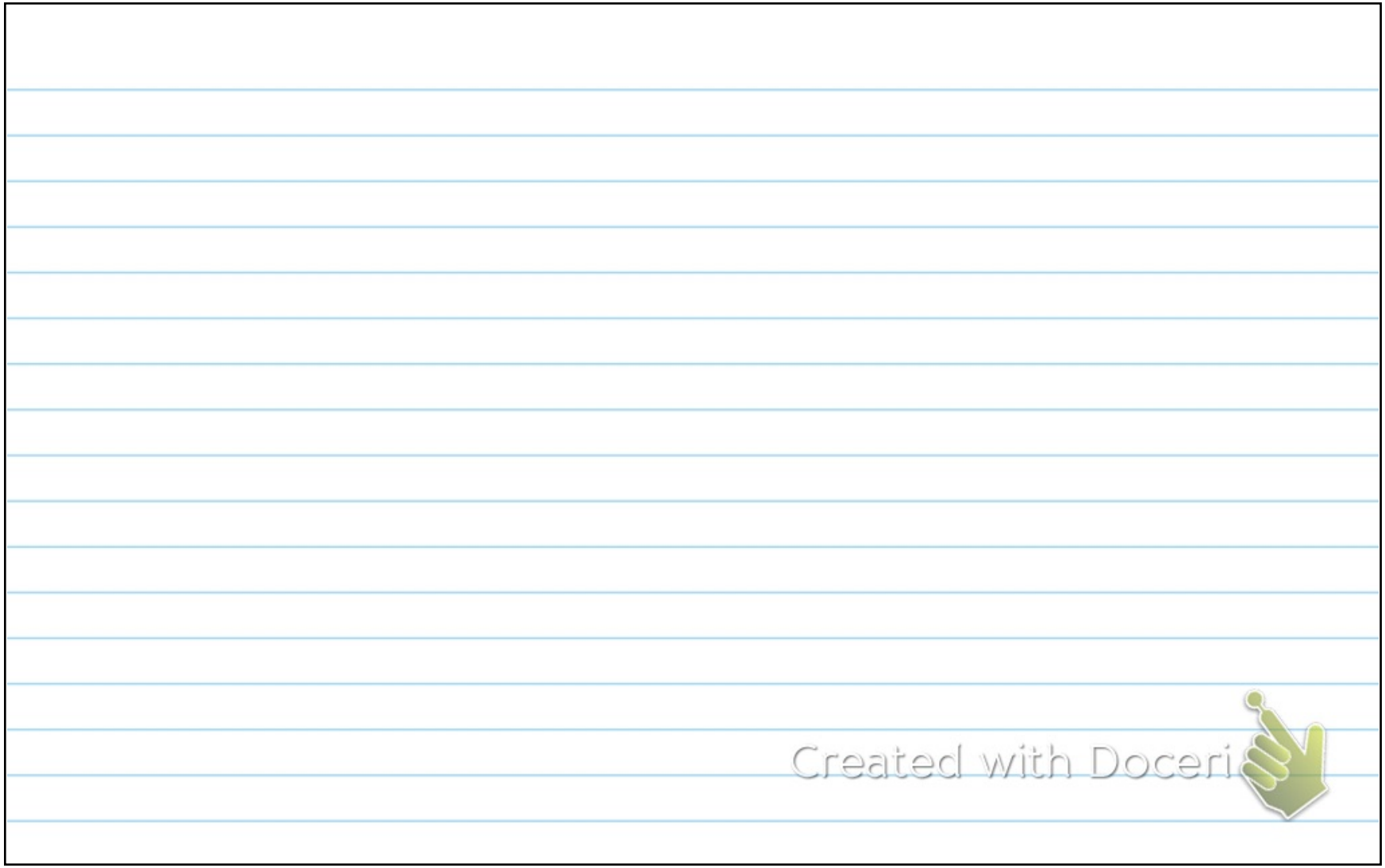
HW: Pg 11-12

Symbolab

2, 4, 6, 8, 10, 12, 14, 15, 16

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