# Unit 7

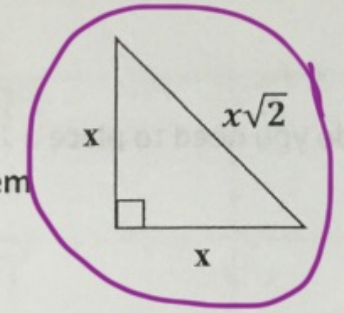
# Lesson 2

## Special Right Δ's

**Lesson 2 → Special Right Triangles**

➢ **SPECIAL RIGHT TRIANGLES:**

**$45° - 45° - 90°$ Triangle Theorem**




$$Hypotenuse = Leg * \sqrt{2}$$

$$Leg = \frac{Hypotenuse}{\sqrt{2}}$$

Fill in the table with the missing side lengths of the $45° - 45° - 90°$ triangle.
Leave all answers in simplified radical form.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Leg* $(x)$ | 5 | 3 | 6 | $5\sqrt{2}$ | $2\sqrt{6}$ | $\frac{15\sqrt{2}}{2}$ | $\sqrt{14}$ | $8\sqrt{3}$ |
| *Leg* $(x)$ | 5 | 3 | 6 | $5\sqrt{2}$ | $2\sqrt{6}$ | $\frac{15\sqrt{2}}{2}$ | $\sqrt{14}$ | $8\sqrt{3}$ |
| *Hypotenuse* $(x\sqrt{2})$ | $5\sqrt{2}$ | $3\sqrt{2}$ | $6\sqrt{2}$ | 10 | $4\sqrt{3}$ | 15 | $2\sqrt{7}$ | $8\sqrt{6}$ |

**$45° - 45° - 90°$ Rules:**

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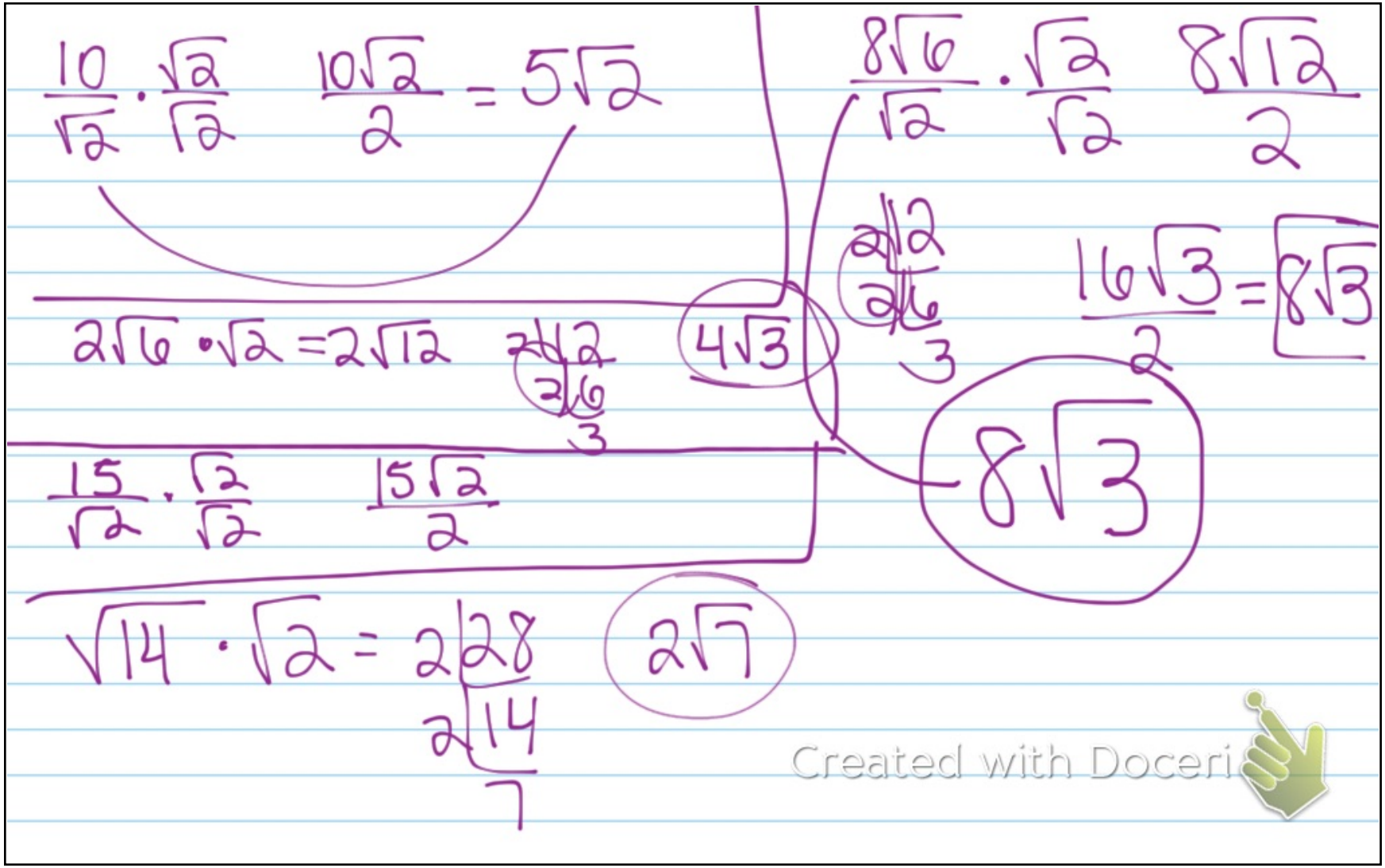
10/√2 · √2/√2 10√2/2 = 5√2
2√6 · √2 = 2√12 2|12 2|6 3 4√3
15/√2 · √2/√2 15√2/2
√14 · √2 = 2|28 2|14 7 2√7
8√6/√2 · √2/√2 8√12/2
2|12 2|6 3
16√3/2 = 8√3
8√3
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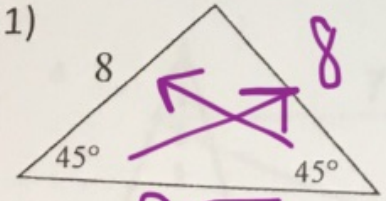
**$45° - 45° - 90°$ Rules:**

When you are given the length of a LEG Multiply by $\sqrt{2}$ to get the length of the HYPO

When you are given the length of the HYPOTENUSE Divide by $\sqrt{2}$ to get the length

- Find all the missing side lengths. Leave answers in **simplified radical form.**

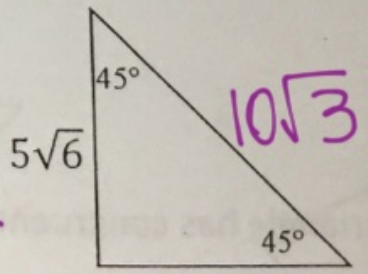
1)




8

$8\sqrt{2}$

2)




$10\sqrt{3}$

$5\sqrt{6} \cdot \sqrt{2}$

$5\sqrt{12}$

$10\sqrt{3}$

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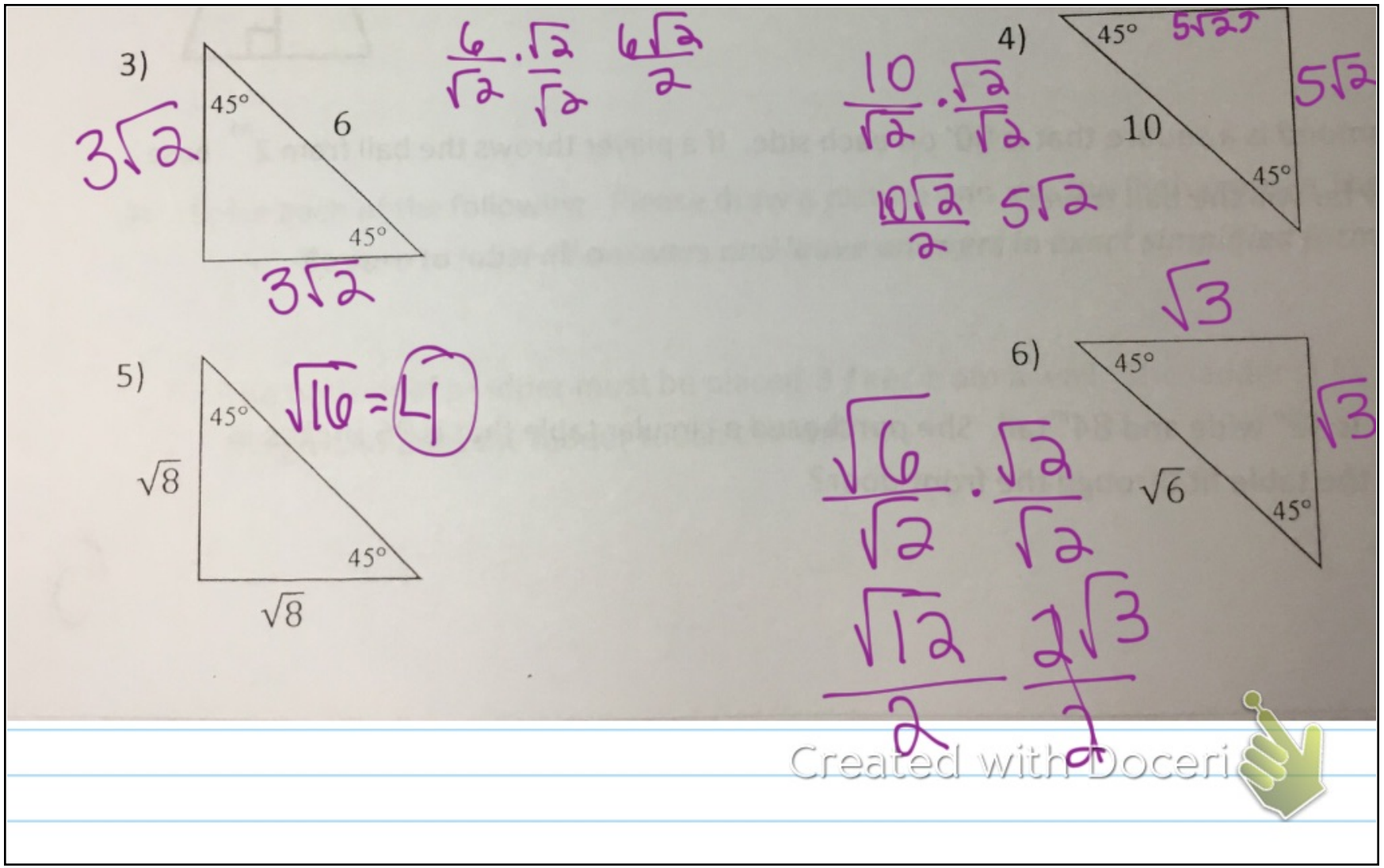
3)
45°
6
45°
$3\sqrt{2}$
$3\sqrt{2}$
$\frac{6}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$ $\frac{6\sqrt{2}}{2}$
4)
45°
$5\sqrt{2}$
10
45°
$5\sqrt{2}$
$\frac{10}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$
$\frac{10\sqrt{2}}{2}$ $5\sqrt{2}$
5)
45°
$\sqrt{8}$
45°
$\sqrt{8}$
$\sqrt{16} = 4$
6)
$\sqrt{3}$
45°
$\sqrt{6}$
45°
$\sqrt{3}$
$\frac{\sqrt{6}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$
$\frac{\sqrt{12}}{2}$ $\frac{2\sqrt{3}}{2}$
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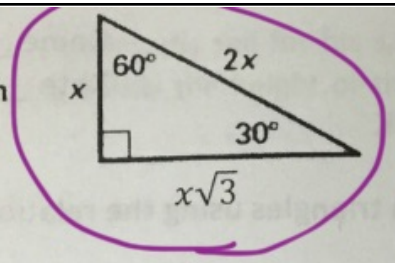
**30° – 60° – 90° Triangle Theorem**




$$Hypotenuse = Short\ Leg * 2$$
$$Long\ Leg = Short\ Leg * \sqrt{3}$$
$$Short\ Leg = \frac{Hypotenuse}{2}$$
$$Short\ Leg = \frac{Long\ Leg}{\sqrt{3}}$$

Fill in the table with the missing side lengths of the 30° – 60° – 90° triangle.
Leave all answers in simplified radical form. $2\sqrt{3}\cdot\sqrt{3}$

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Short Leg* $(x)$ | 6 | 10 | 4 | $2\sqrt{3}$ | $\frac{8\sqrt{3}}{3}$ | $9\sqrt{3}$ | $4\sqrt{6}$ | 18 |
| *Long Leg* $(x\sqrt{3})$ | $6\sqrt{3}$ | $10\sqrt{3}$ | $4\sqrt{3}$ | 6 | 8 | 27 | $12\sqrt{2}$ | $18\sqrt{3}$ |
| *Hypotenuse* $(2x)$ | 12 | 20 | 8 | $4\sqrt{3}$ | $\frac{16\sqrt{3}}{3}$ | $18\sqrt{3}$ | $8\sqrt{6}$ | 36 |

**30° – 60° – 90° Rules:**

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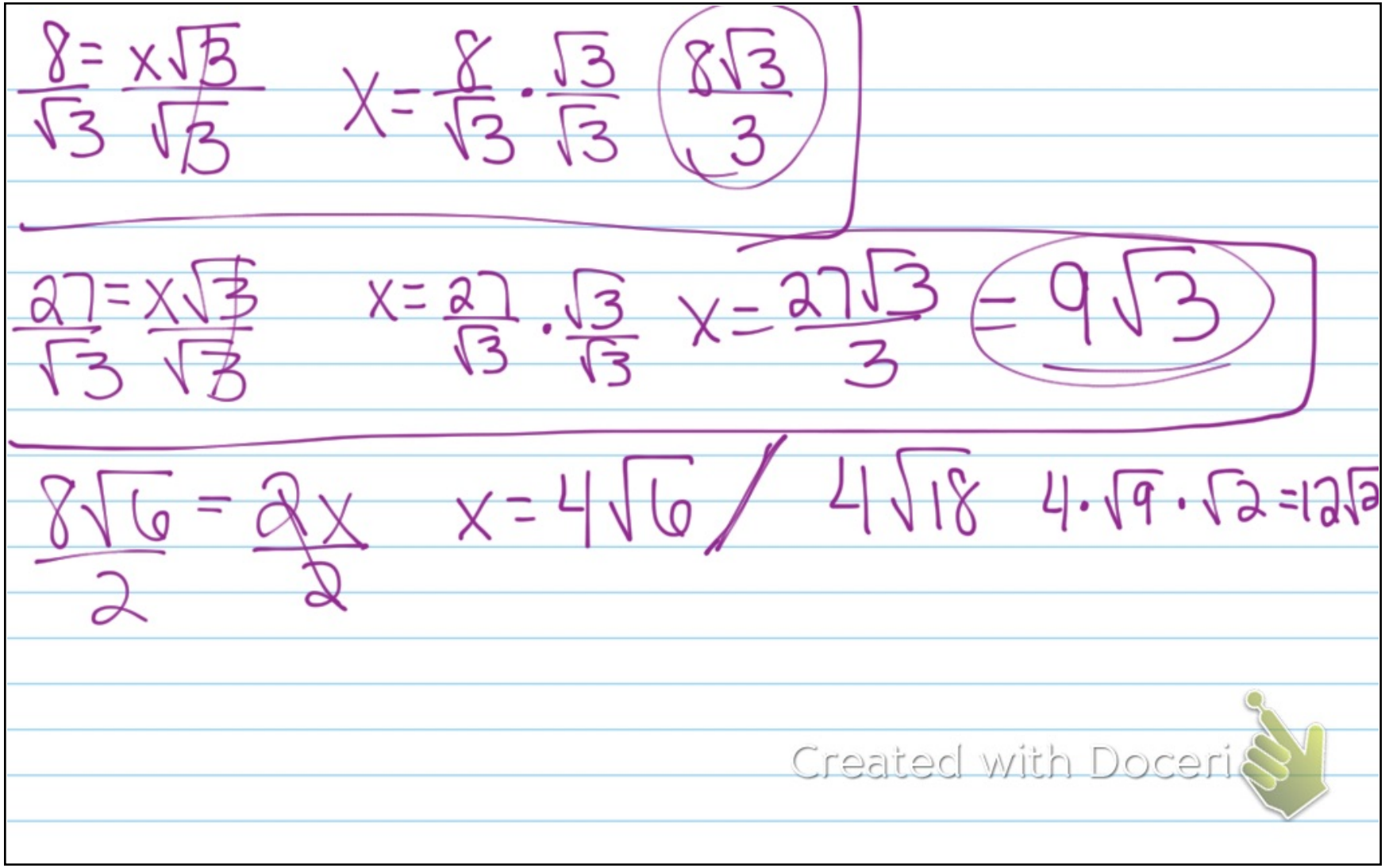
$\frac{8}{\sqrt{3}} = \frac{x\sqrt{3}}{\sqrt{3}}$ $x = \frac{8}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$ $\frac{8\sqrt{3}}{3}$
$\frac{27}{\sqrt{3}} = \frac{x\sqrt{3}}{\sqrt{3}}$ $x = \frac{27}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$ $x = \frac{27\sqrt{3}}{3} = 9\sqrt{3}$
$\frac{8\sqrt{6}}{2} = \frac{2x}{2}$ $x = 4\sqrt{6}$ / $4\sqrt{18}$ $4 \cdot \sqrt{9} \cdot \sqrt{2} = 12\sqrt{2}$
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**$30° - 60° - 90°$ Rules:**

When you are given the length of a SHORT LEG Multiply by 2 to get the length of the HYPOTENUSE.

When you are given the length of the HYPOTENUSE Divide by 2 to get the length of the SHORT LEG.

When you are given the length of a SHORT LEG Multiply by $\sqrt{3}$ to get the length of the LONG LEG.

When you are given the length of the LONG LEG Divide by $\sqrt{3}$ to get the length of the SHORT LEG.

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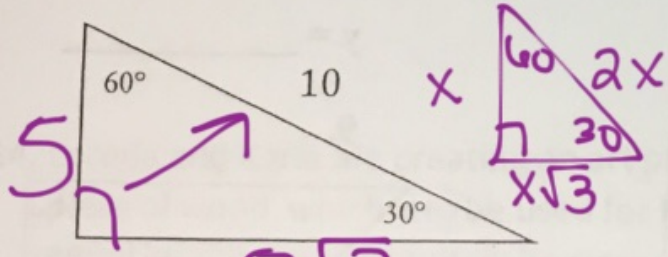
- Find all the missing side lengths. Leave answers in **simplified radical form.**




5

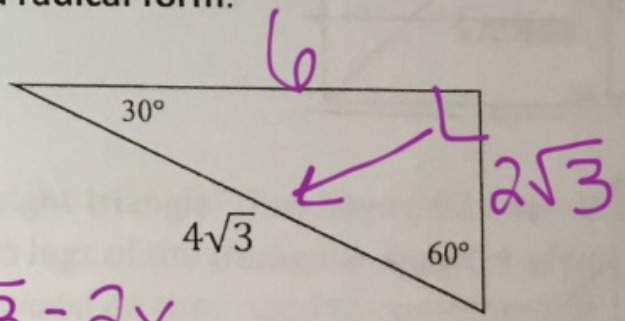
$\frac{10}{2} = \frac{2x}{2}$

$x = 5$




$5\sqrt{3}$

2.




$\frac{4\sqrt{3}}{2} = \frac{2x}{2}$

$x = 2\sqrt{3}$

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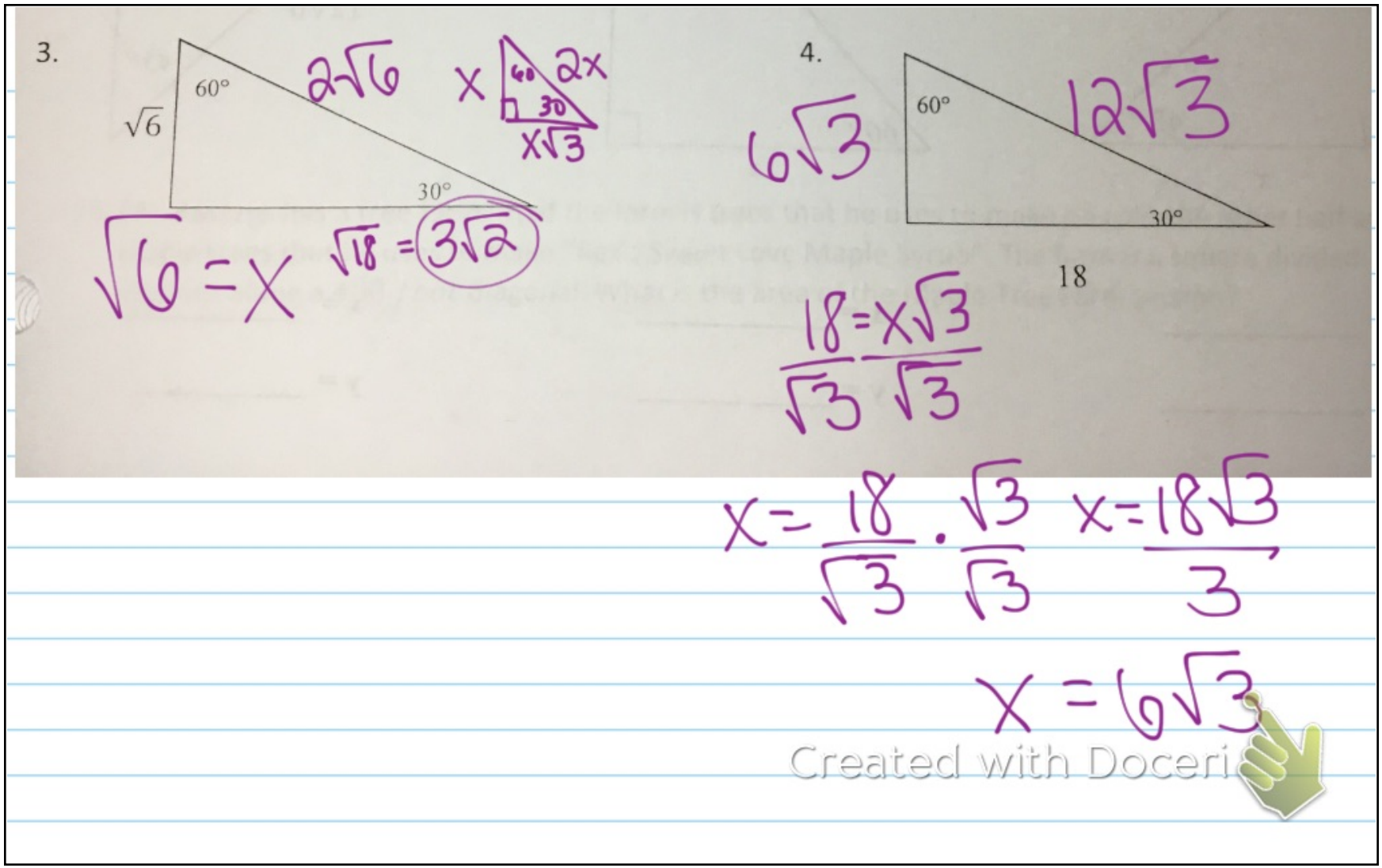
3.
60°
$\sqrt{6}$
30°
$2\sqrt{6}$
x
60
2x
30
$x\sqrt{3}$
$\sqrt{6} = x$
$\sqrt{18} = 3\sqrt{2}$
4.
$6\sqrt{3}$
60°
$12\sqrt{3}$
30°
18
$\frac{18}{\sqrt{3}} = \frac{x\sqrt{3}}{\sqrt{3}}$
$x = \frac{18}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$
$x = \frac{18\sqrt{3}}{3}$
$x = 6\sqrt{3}$
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Pg 8 CW

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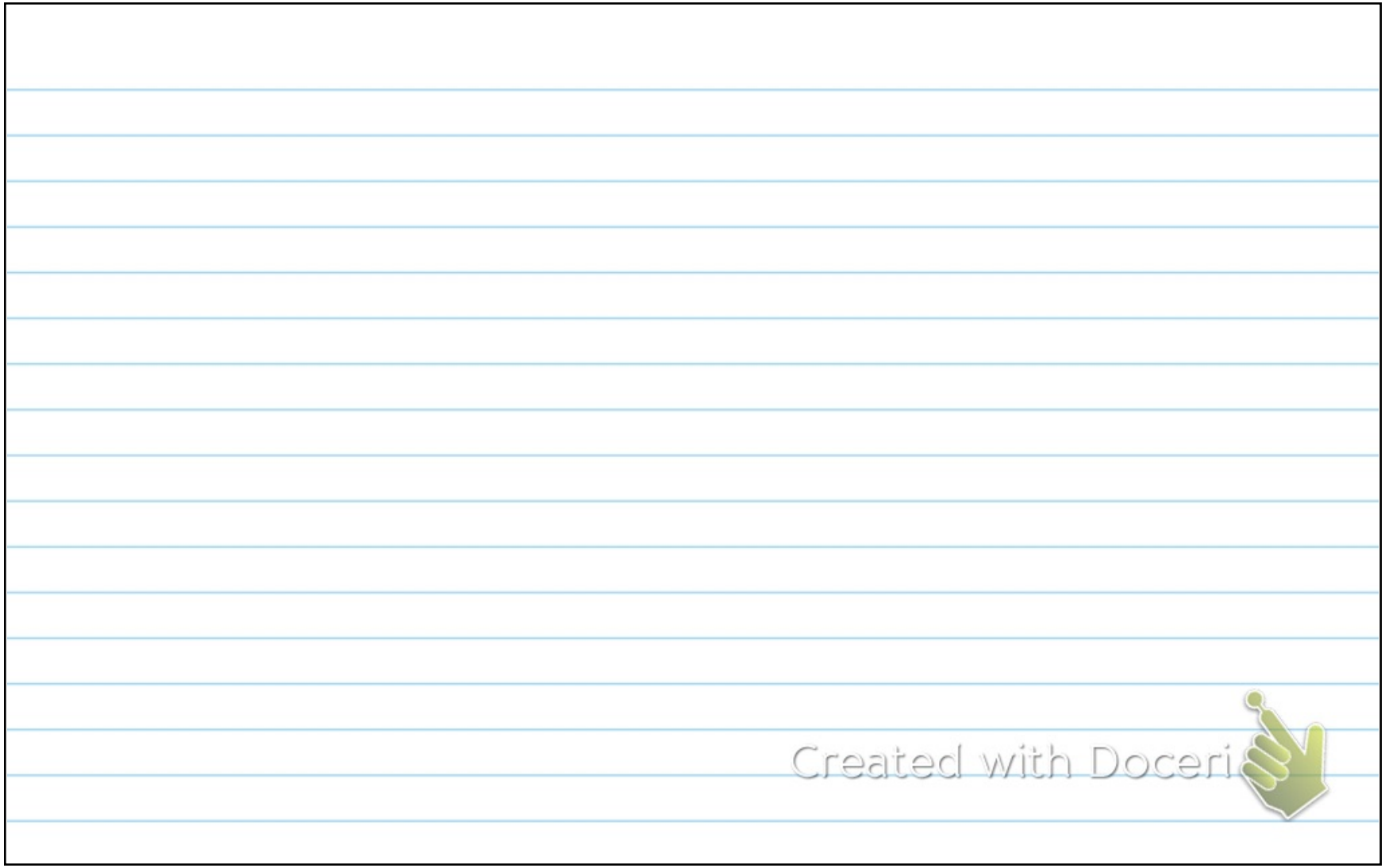
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