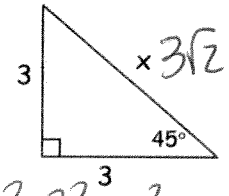
8-3 Special Right Triangles

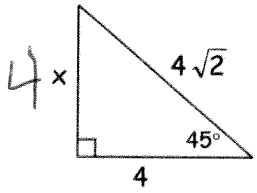
Find the value of x using the Pythagorean Theorem. Keep your answers in simplified radical form.

1. x = $3\sqrt{2}$



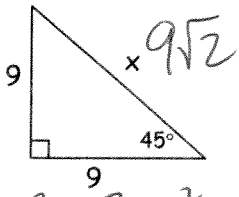
$3^2+3^2=x^2$
$\sqrt{18}=\sqrt{x^2}$
$\sqrt{9}\cdot\sqrt{2}$
$3\sqrt{2}$

2. x = 4



$x^2+4^2=(4\sqrt{2})^2$
$x^2+16=32$
$x^2=16$

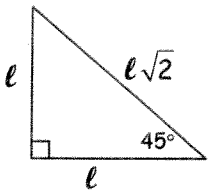
3. x = $9\sqrt{2}$



$9^2+9^2=x^2$
$\sqrt{162}=\sqrt{x^2}$
$x=\sqrt{81}\cdot 2$

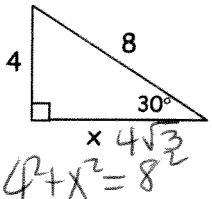
Do you see a pattern? In a 45-45-90° Δ:

- the 2 legs (ℓ) are always congruent, and
- the length of the hypotenuse (h) is $\sqrt{2}$ times the length of the leg (ℓ).
- You can also work backwards to find the lengths of the legs given the length of its hypotenuse.



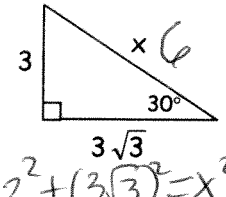
Find the value of x using the Pythagorean Theorem. Keep your answers in simplified radical form.

4. x = $4\sqrt{3}$



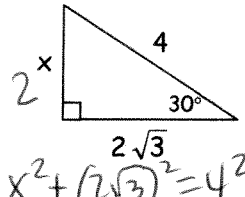
$4^2+x^2=8^2$
$16+x^2=64$
$x^2=48$
$\sqrt{48}$
$\sqrt{16}\cdot\sqrt{3}$

5. x = 6



$\sqrt{36}=\sqrt{x^2}$
$6=x$
$3^2+(3\sqrt{3})^2=x^2$
$9+27=x^2$

6. x = 2

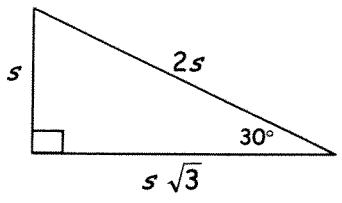


$x^2+(2\sqrt{3})^2=4^2$
$x^2+12=16$
$x^2=4$
$x=2$

Do you see a pattern? In a 30-60-90° Δ:

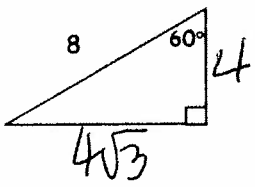
- the length of the hypotenuse (h) is 2 times the length of the shorter leg (s), and
- the length of the longer leg (ℓ) is $\sqrt{3}$ times the shorter leg (s).
- Remember, the shortest side of a triangle is opposite the smallest angle.

So the shorter leg is opposite the 30° angle, and the longer leg is opposite the 60° angle



8-3 Practice: Fill in all the missing sides. DO NOT USE THE CALCULATOR!

1.



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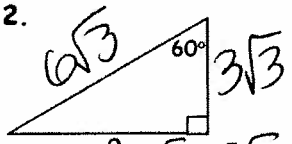
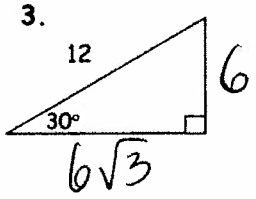


$\frac{9}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{9\sqrt{3}}{3}$

3.



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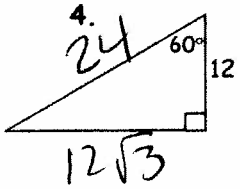
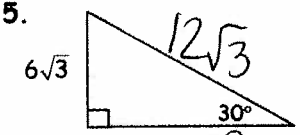
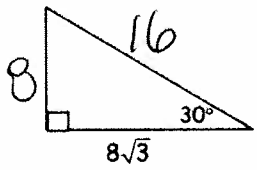


5.



$6\sqrt{3}\sqrt{3} = 6 \cdot 3$

6.



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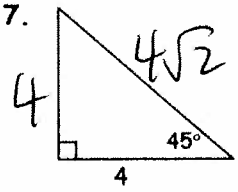

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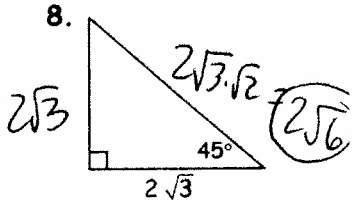
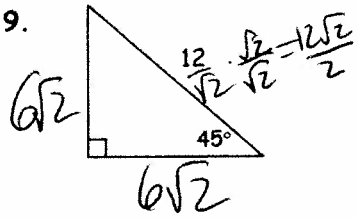
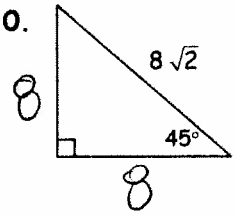


9.



$\frac{12}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{2}$

10.



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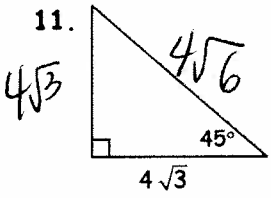

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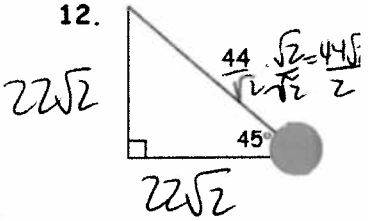
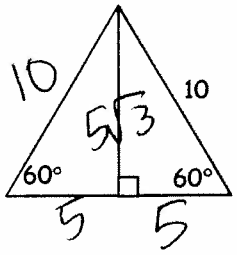


$\frac{44}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{44\sqrt{2}}{2}$

13.



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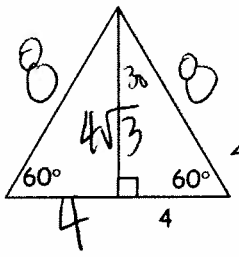
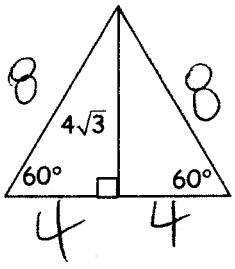
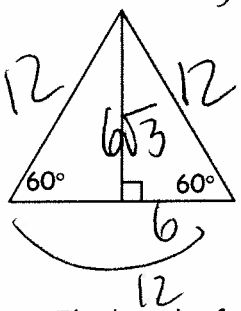


same Δ!

15.



16. Perimeter = $\frac{36}{3} = 12$



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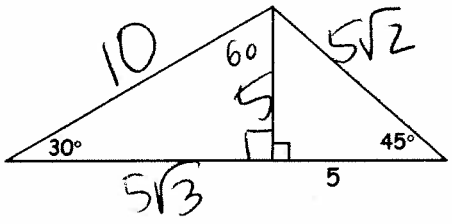
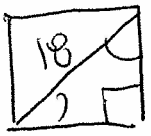


18. The length of the diagonal of a square is 18. Find the length of the side.



$\frac{18}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{18\sqrt{2}}{2}$

$9\sqrt{2}$