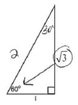
Geometry CC – Unit 8
Lesson 4: 45-45-90 Triangle
M2 L24

Homework: HW Handout 8.4

HW Answers 8.3

Write your answer in *simplest radical form.*

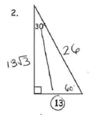
1.



30°	x	1
60°	x√3	√3
90°	2x	2

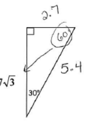
$x\sqrt{3} = \sqrt{3}$
$x = 1$

2.



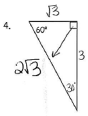
30°	x	13
60°	x√3	13√3
90°	2x	26

3.



30°	x	2.7
60°	x√3	2.7√3
90	2x	5.4

4.



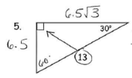
$\cancel{2}x = \frac{2\sqrt{3}}{\cancel{2}}$
$x = \sqrt{3}$

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

30°	x	√3
60°	x√3	3
90°	2x	2√3

Feb 1-8:10 AM

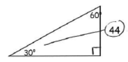
5.



$\frac{2x}{2} = \frac{13}{2}$
$x = 6.5$

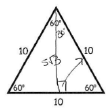
30°	x	6.5
60°	x√3	6.5√3
90°	2x	13

6.



30°	x	44
60°	x√3	44√3
90°	2x	88

7. What is the height of the equilateral triangle below, in simplest radical form?
(Hint: draw an altitude)

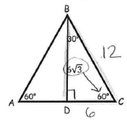


30°	x	5
60°	x√3	5√3
90°	2x	10

$\boxed{\text{height is } 5\sqrt{3}}$

$2x = 10$
$x = 5$

8. What is the length of the hypotenuse of triangle BCD, if the length of BD = 6√3 ?



30°	x	6
60°	x√3	6√3
90°	2x	12

$\boxed{\text{Hypotenuse is } 12}$

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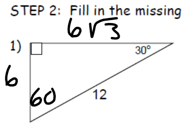
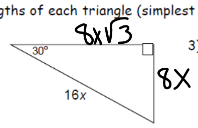
Do Now:
STEP 1: Fill in the missing angle values.
STEP 2: Fill in the missing side lengths of each triangle (simplest radical form).

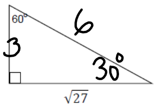
1)



2)



3)



$\sqrt{9}\,\sqrt{3}$
$3\sqrt{3}$

30	x	6
60	x√3	6√3
90	2x	12

30	x	3
60	x√3	3√3
90	2x	6

Feb 1-8:10 AM

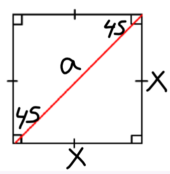
The 45° - 45° - 90° Special Right Triangle

Recall: Isosceles triangles have two ___≅___ sides and the angles opposite the congruent sides have equal measure.

An isosceles right triangle is formed by creating a square. The diagonal splits the 90° angle into two congruent angles that measure ___45°___.

*Let each congruent leg equal *x*. Use the Pythagorean Theorem to find the length of the hypotenuse.

$x^2 + x^2 = a^2$
$\sqrt{2x^2} = \sqrt{a^2}$
$x\sqrt{2} = a$



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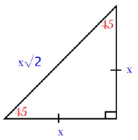
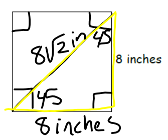
Special Right Triangle 45° - 45° - 90°

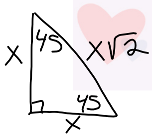
Use the table below to remember the relationship of the 45°- 45°- 90° special right triangle.



Angle Measure	Side Across from Angle
45°	x
45°	x
90°	x√2

1. Find the length of the diagonal of the square below:





45	x	8
45	x	8
90	x√2	8√2

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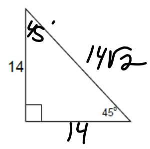
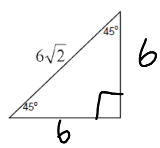
STEP 1: Fill in the missing angle values.
STEP 2: Fill in the missing 2 side lengths of each triangle (simplest radical form):

2.



Angle Measure	Side Across from Angle	Answer
45°	x	14
45°	x	14
90°	x√2	14√2

3.



Angle Measure	Side Across from Angle	Answer
45°	x	6
45°	x	6
90°	x√2	6√2

$x\sqrt{2} = 6\sqrt{2}$
$x = 6$

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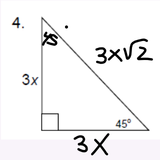
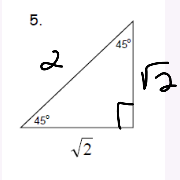
*Set up a table to find the missing side lengths of each triangle, in simplest radical form.





45	x	$\sqrt{2}$
45	x	$\sqrt{2}$
90	$x\sqrt{2}$	$\sqrt{2}\cdot\sqrt{2} = 2$

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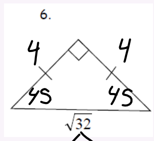
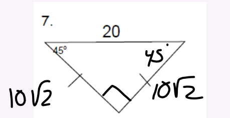


$\sqrt{16}$ $\sqrt{2}$

$4\sqrt{2}$

45	x	4
45	x	4
90	$x\sqrt{2}$	$4\sqrt{2}$



45	x	$10\sqrt{2}$
45	x	$10\sqrt{2}$
90	$x\sqrt{2}$	20

$\frac{x\cancel{\sqrt{2}}}{\cancel{\sqrt{2}}} = \frac{20}{\sqrt{2}}$

$\frac{20}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} \rightarrow \frac{20\sqrt{2}}{2}$

$10\sqrt{2}$

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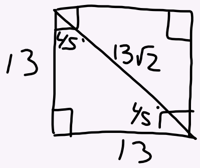
8. Find the area of the square that has a diagonal of $13\sqrt{2}$ units. *Draw a picture!



$A = 13^2$

$= 169\,un^2$

45	x	13
45	x	13
90	$x\sqrt{2}$	$13\sqrt{2}$

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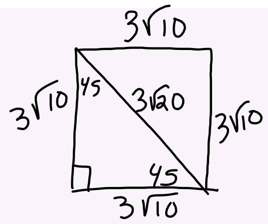
9. Find the perimeter of a square whose diagonal measures $3\sqrt{20}$ units.



$3\sqrt{20}$

$3\sqrt{4}\sqrt{5}$

$6\sqrt{5}$

$\frac{x\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{20}}{\sqrt{2}}$

$x = 3\sqrt{10}$

45	x	$3\sqrt{10}$
45	x	$3\sqrt{10}$
90	$x\sqrt{2}$	$3\sqrt{20}$

$4 \cdot 3\sqrt{10} \rightarrow$

$12\sqrt{10}$ units

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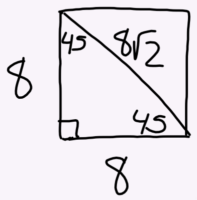
10. Find the length of a diagonal of a square, in simplest radical form, if one side measures 8 centimeters.



$8\sqrt{2}$ cm

45	x	8
45	x	8
90	$x\sqrt{2}$	$8\sqrt{2}$

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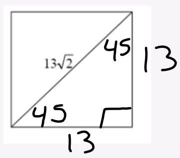
11. Find the area of the square below:



$A = 169\,un^2$

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