

Going straight to notes today...

Special Right Triangles

Discovering the ratios of their sides.

① 45-45-90 Triangle

Start on a new page in your notes.

Ratio sides $1:1:\sqrt{2}$ 

$$1^2 + 1^2 = c^2 \quad (\text{Pythagorean Theory})$$

$$1 + 1 = c^2$$

$$\sqrt{2} = \sqrt{c^2}$$

$$\sqrt{2} = c$$

For 45-45-90 triangleTwo legs are equal length, and the length of the hypotenuse = $\sqrt{2}$ times the length of the leg.

$$h = \sqrt{2} L$$

$$L = L \quad \text{if } L = 5 \text{ in}$$

$$h = 5\sqrt{2} \text{ in}$$

$$h = 5(1.41) = 7.07 \text{ in}$$

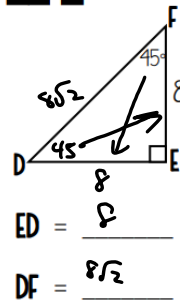
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45-45-90 triangles $1:1:\sqrt{2}$

X	X	$X\sqrt{2}$
8	8	$8\sqrt{2}$
7	7	$7\sqrt{2}$
6	6	$6\sqrt{2}$
4	4	$4\sqrt{2}$
$\sqrt{3}$	$\sqrt{3}$	$\sqrt{6}$
$5\sqrt{7}$	$5\sqrt{7}$	$5\sqrt{14}$
$2\sqrt{5}$	$2\sqrt{5}$	$2\sqrt{10}$
$3\sqrt{2}$	$3\sqrt{2}$	6
$7\sqrt{2}$	$7\sqrt{2}$	14
$15\sqrt{2}$	$15\sqrt{2}$	30
$10.5\sqrt{2}$	$10.5\sqrt{2}$	21

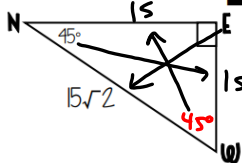
$\frac{X\sqrt{2}}{\sqrt{2}} = \frac{6\sqrt{2}}{\sqrt{2}} = \frac{6\sqrt{2}}{\sqrt{2}} = 6$
 $\frac{X\sqrt{2}}{\sqrt{2}} = \frac{14\sqrt{2}}{\sqrt{2}} = \frac{14\sqrt{2}}{\sqrt{2}} = 14$
 $\frac{X\sqrt{2}}{\sqrt{2}} = \frac{30\sqrt{2}}{\sqrt{2}} = \frac{30\sqrt{2}}{\sqrt{2}} = 30$
 $\frac{X\sqrt{2}}{\sqrt{2}} = \frac{21\sqrt{2}}{\sqrt{2}} = \frac{21\sqrt{2}}{\sqrt{2}} = 21$

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EX 1

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

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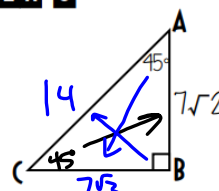
EX 2

$$NE = 15$$

$$EW = 15$$

45	45	90
X	X	$X\sqrt{2}$
15	15	$15\sqrt{2}$

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EX 3

$$BC = 14\sqrt{2}$$

$$AC = 14$$

45	45	90
X	X	$X\sqrt{2}$
$7\sqrt{2}$	$7\sqrt{2}$	14

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EX 4

45	45	90
X	X	$X\sqrt{2}$
$11\sqrt{2}$	$11\sqrt{2}$	22

$JK = 11\sqrt{2}$
 $KL = 11\sqrt{2}$

$\frac{X\sqrt{2}}{\sqrt{2}} = \frac{22}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$
 $= \frac{22\sqrt{2}}{2}$
 $X = 11\sqrt{2}$

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EX 5

45	45	90
X	X	$X\sqrt{2}$
$\sqrt{2}$	$\sqrt{2}$	2

$FU = \sqrt{2}$
 $FT = 2$

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

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EX 6

45	45	90
X	X	$X\sqrt{2}$
$6.5\sqrt{2}$	$6.5\sqrt{2}$	13

$UR =$
 $RE =$

$\frac{X\sqrt{2}}{\sqrt{2}} = \frac{13}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{13\sqrt{2}}{2}$
 $= 6.5\sqrt{2}$

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The 2nd Special Right Triangle.

30-60-90

$1^2 + b^2 = 2^2$
 $1 + b^2 = 4$
 $b^2 = 3$
 $b = \sqrt{3}$

Side: short - long - hyp
 Angle: 30-60-90
 Length: $L - \sqrt{3}L - 2L$

Short leg across to 30° angle

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30-60-90 triangles

short	long	hyp
X	$X\sqrt{3}$	$2X$
6	$6\sqrt{3}$	12
8	$8\sqrt{3}$	16
7	$7\sqrt{3}$	14
11.5	$11.5\sqrt{3}$	23
$2\sqrt{2}$	$2\sqrt{2}\sqrt{3}$	$4\sqrt{2}$
$5\sqrt{5}$	$5\sqrt{5}\sqrt{3}$	$10\sqrt{5}$
$10\sqrt{7}$	$10\sqrt{7}\sqrt{3}$	$20\sqrt{7}$
$3\sqrt{2}$	$3\sqrt{2}\sqrt{3}$	$6\sqrt{2}$
$10\sqrt{3}$	30	$20\sqrt{3}$
$7\sqrt{3}$	21	$14\sqrt{3}$
$6\sqrt{3}$	18	$12\sqrt{3}$

$\frac{X\sqrt{3}}{\sqrt{3}} = \frac{30}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{30\sqrt{3}}{\sqrt{3}} = 10\sqrt{3}$
 $\frac{X\sqrt{3}}{\sqrt{3}} = \frac{21}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{21\sqrt{3}}{\sqrt{3}} = 7\sqrt{3}$
 $\frac{X\sqrt{3}}{\sqrt{3}} = \frac{18}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{18\sqrt{3}}{\sqrt{3}} = 6\sqrt{3}$

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EX 1

30	60	90
X	$X\sqrt{3}$	$2X$
8	$8\sqrt{3}$	16

$ED =$
 $DF =$

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EX 2

30 | 60 | 90
X | X√3 | 2X
7 | 7√3 | 14

NE = 7
EW = 7√3

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EX 3

30 | 60 | 90
X | X√3 | 2X
9 | 9√3 | 18

BC = 9
AC = 18

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EX 4

30 | 60 | 90
X | X√3 | 2X
√3 | 3 | 2√3

JL = 2√3
KL = 3

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EX 5

30 | 60 | 90
X | X√3 | 2X
4√3 | 12 | 8√3

FU = 4√3
FI = 8√3

$\frac{X\sqrt{3}}{\sqrt{3}} = \frac{12}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{12\sqrt{3}}{3} = 4\sqrt{3}$

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EX 6

30 | 60 | 90
X | X√3 | 2X
2√3 | 6 | 4√3

UR = 2√3
RE = 6

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

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