Warm Up

Simplify:

1. $6\sqrt{2} \cdot \sqrt{2}$
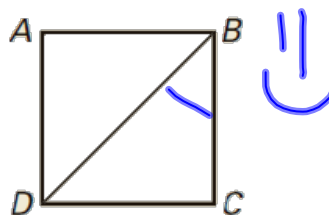
$6\sqrt{4}$

$6 \cdot 2$,

$\boxed{12}$

2. $\dfrac{6 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}}$

$\dfrac{6\sqrt{3}}{3}$

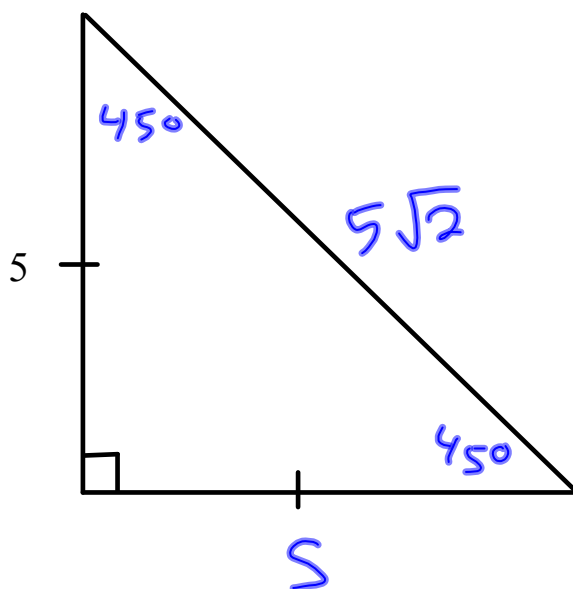$\boxed{2\sqrt{3}}$

3. $\dfrac{5 \cdot \sqrt{3}}{\sqrt{2} \cdot \sqrt{2}}$

$\boxed{\dfrac{5\sqrt{2}}{2}}$

4.   Find $m\angle DBC$ in square $ABCD$.

$45°$

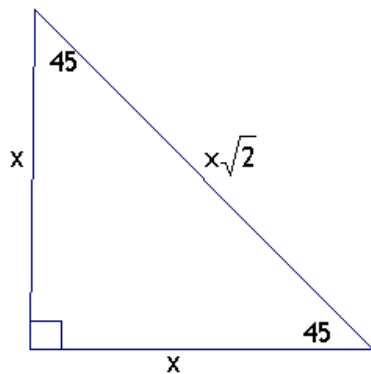7-4   NOTES ON SPECIAL RIGHT TRIANGLES

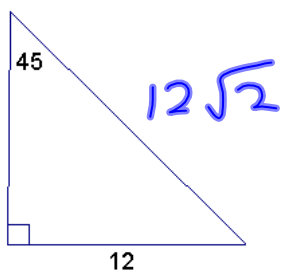$5^2 + 5^2 = c^2$

$25 + 25 = c^2$

$50 = c^2$
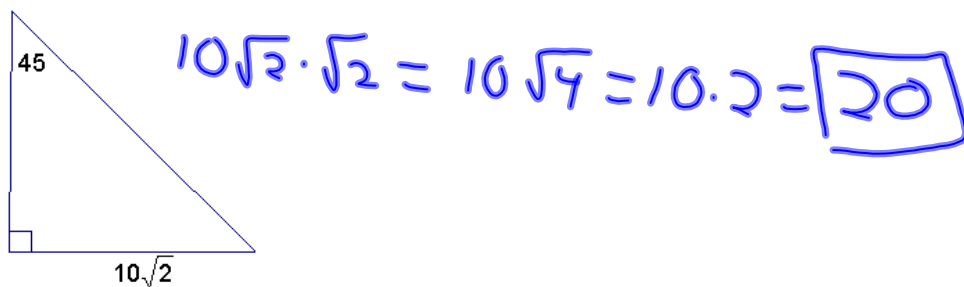
$c = \sqrt{50}$

$c = \sqrt{25 \cdot 2}$

$c = 5\sqrt{2}$

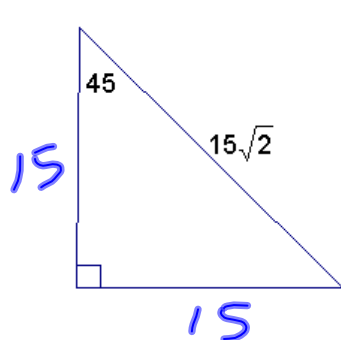45-45-90 Triangle Theorem-   In a 45-45-90 triangle, the hypotenuse is $\sqrt{2}$ times as long as each leg.

Triangle with angles 45, 45, 90. Legs labeled x and x, hypotenuse labeled $x\sqrt{2}$.

Ex 1   Find the length of the hypotenuse

Triangle with 45° angle, leg labeled 12. $12\sqrt{2}$

Ex 2

Triangle with 45° angle, leg labeled $10\sqrt{2}$.

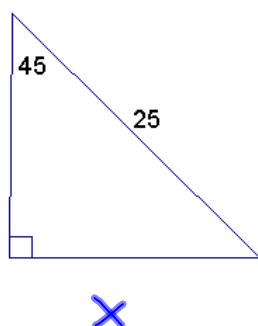$10\sqrt{2} \cdot \sqrt{2} = 10\sqrt{4} = 10 \cdot 2 = \boxed{20}$

Ex 3   Find the length of the legs

45

15

15√2

15

$$x \cdot \sqrt{2} = 15\sqrt{2}$$

Ex 4

45

25

x

$$\frac{x \cdot \sqrt{2}}{\sqrt{2}} = \frac{25}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$x = \frac{25\sqrt{2}}{2}$$

60°

10

5

30°

5√3
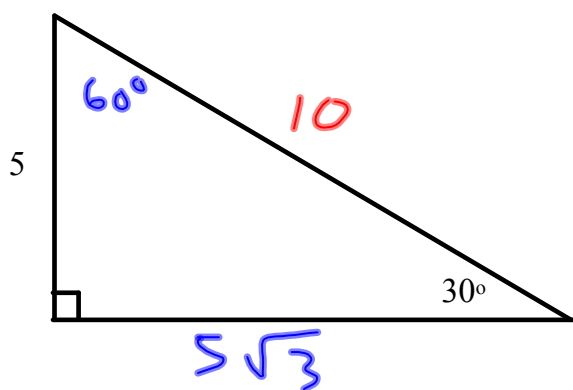
$$5^2 + b^2 = 10^2$$

$$25 + b^2 = 100$$

$$b^2 = 75$$

$$b = \sqrt{75}$$

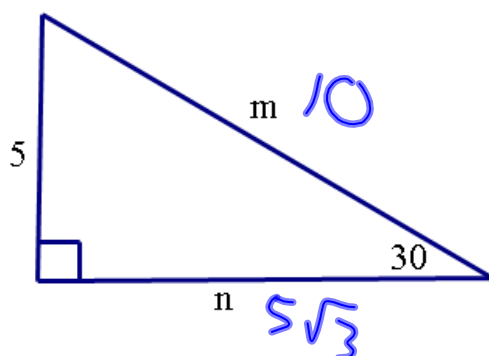$$= \sqrt{25 \cdot 3}$$

$$b = 5\sqrt{3}$$

30-60-90 Triangle Theorem - In a 30-60-90 triangle, the hypotenuse is twice as long as the shorter leg, and the longer leg is $\sqrt{3}$ times as long as the shorter leg.
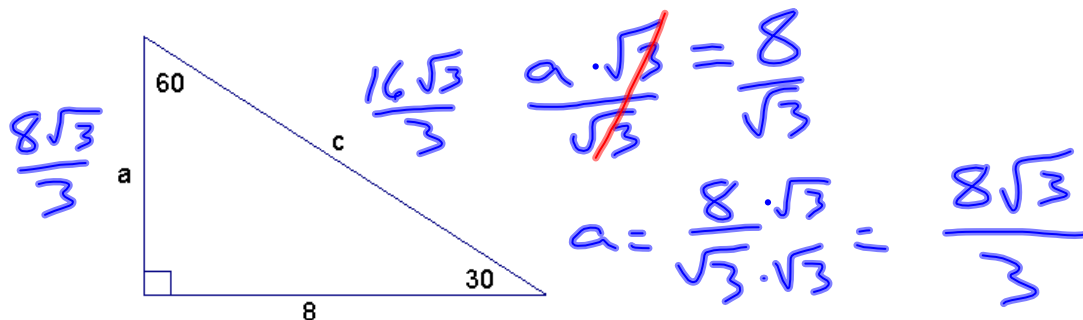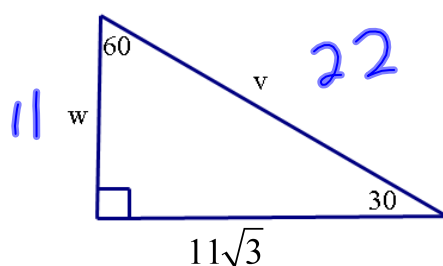
60

2x

x

30

$x\sqrt{3}$
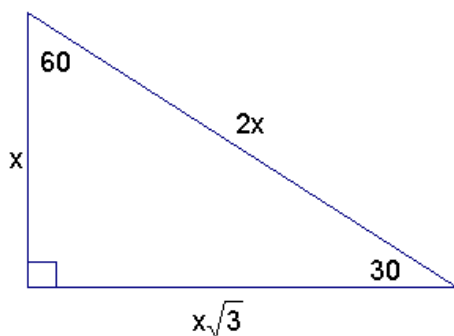
Ex 5   Find the values of b and c.

60

c 20

10

30

b $10\sqrt{3}$

Ex 6

m 10

5

30

n $5\sqrt{3}$
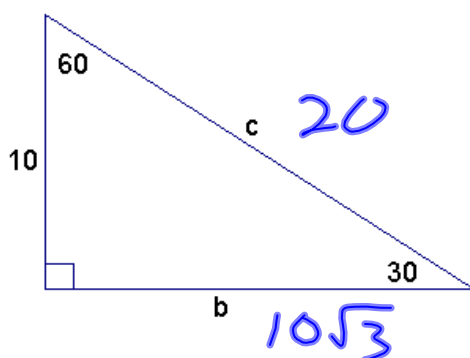
Ex 7   Find the values of a and c.

$\dfrac{8\sqrt{3}}{3}$ 60 c 30   8

a

$\dfrac{16\sqrt{3}}{3}$ $\dfrac{a \cdot \sqrt{3}}{\sqrt{3}} = \dfrac{8}{\sqrt{3}}$

$a = \dfrac{8 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \dfrac{8\sqrt{3}}{3}$

Ex 8

11 60 w v 22 30 $11\sqrt{3}$

Ex 9   What is the height of an equilateral triangle that has a side equal to 5 inches?

$\dfrac{5\sqrt{3}}{2}$ $2.5\sqrt{3}$ h 5   2.5
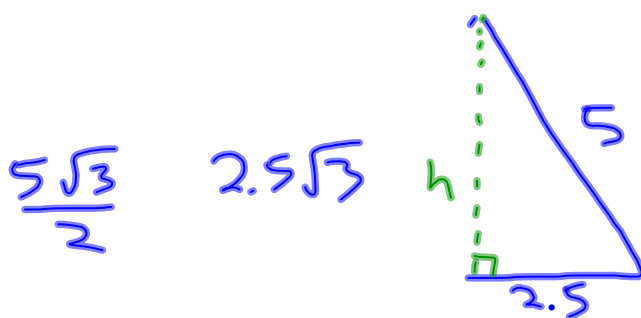
Ex 10   What is the height of an equilateral triangle that has a side equal to $\sqrt{3}$ inches?

$\dfrac{\sqrt{9}}{2} = \dfrac{3}{2}$ h $\sqrt{3}$ $\dfrac{\sqrt{3}}{2}$