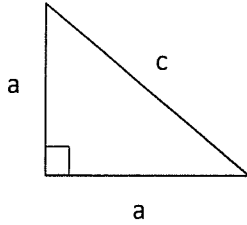


Special Right Triangles

Warm Up: Solve for  $c$  in terms of  $a$ .



**THEOREM:** The 45-45-90 Theorem (45-45 right triangle theorem or isosceles right triangle theorem)

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

**Theorem:** 30-60-90 Theorem

In a 30-60-90 triangle,

- the hypotenuse is two times as long as the shorter leg,
- the longer leg is  $\sqrt{3}$  times as long as the shorter leg.



# 8-4 Special Right Δs

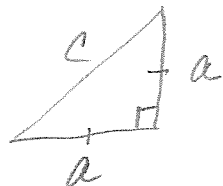
⊙ (A) Thm: 45-45-90 Theorem (Isosceles Rt Δ)

start

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

## Warm Up

Solve for  $c$  in terms of  $a$ .



$$a^2 + a^2 = c^2$$

$$2a^2 = c^2$$

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

} Proof for Thm.

Put up Thm 45-45-90.

Ex: Find  $x$ .



$$a\sqrt{2} = \text{hyp}$$

$$12\sqrt{2} = x$$

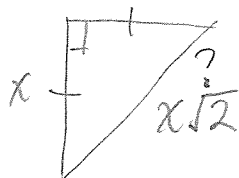


$$a\sqrt{2} = \text{hyp}$$

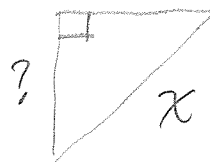
$$a\sqrt{2} = 8$$

$$a = \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = 4\sqrt{2}$$

TIP: Given leg, find hyp.



Given hyp, find leg.

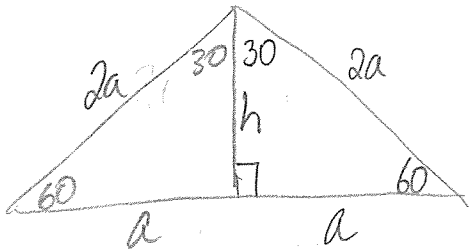


$$\text{use } \frac{x\sqrt{2}}{2}$$



⑥ Thm: 30-60-90 Thm

In a 30-60-90  $\Delta$ , the hyp is 2x as long as the shorter leg,  
the longer leg is  $\sqrt{3}$  times as long as the shorter leg



← Proof: use equilateral  $\Delta$  to get sides  $2a, 2a, a, a$ .

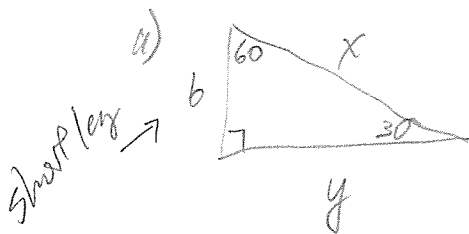
$$a^2 + h^2 = (2a)^2$$

$$h^2 = 4a^2 - a^2$$

$$h^2 = 3a^2$$

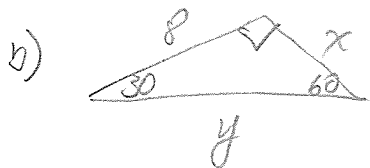
$$h = a\sqrt{3}$$

Ex: Find  $x$  &  $y$ .



$$x = 2(6) = 12$$

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



$$y = 2x$$

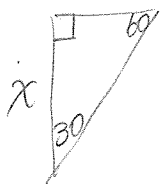
$$\text{long} = \sqrt{3}(\text{short})$$

$$8 = \sqrt{3}x$$

$$\frac{\sqrt{3}}{\sqrt{3}} \cdot \frac{8}{\sqrt{3}} = x$$

Given: long leg

Find short:  $\frac{x\sqrt{3}}{3}$



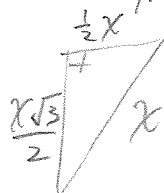
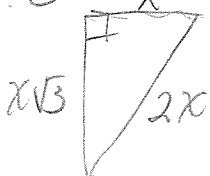
$$\text{short} = \frac{8\sqrt{3}}{3}$$

$$\text{hyp} = 2(\text{short})$$

$$2\left(\frac{8\sqrt{3}}{3}\right)$$

Given: short leg

Given hyp:



$$\frac{16\sqrt{3}}{3}$$

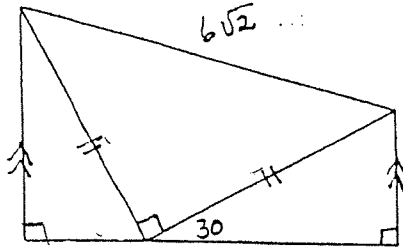


Geometry Honors  
Special Right Triangles

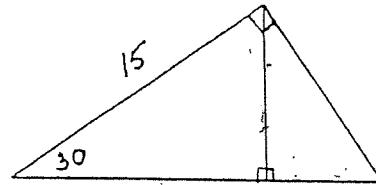
Name:  
Period:  
Date:

Find the missing lengths.

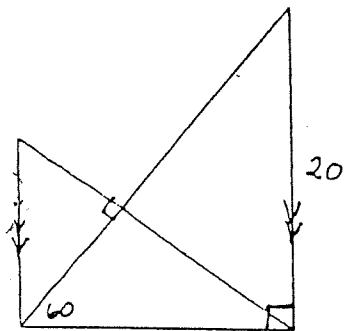
1.



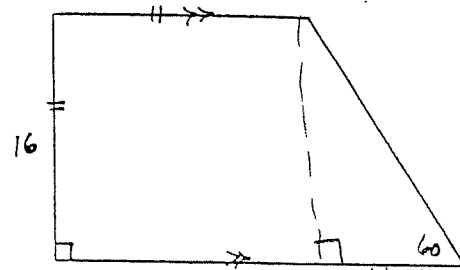
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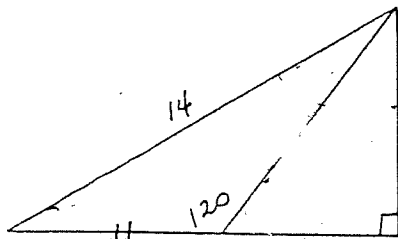
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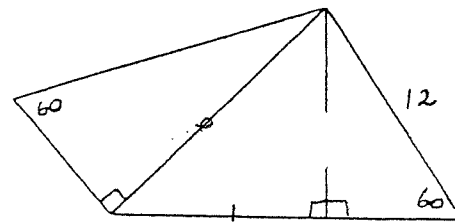
4.



5.



6.





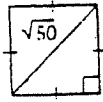


Geo CH)

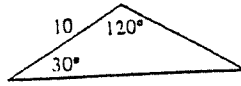
Sect 8.4 - more Practice Problems

1. Find the perimeter of each polygon.

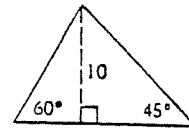
a.



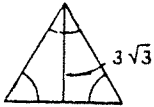
b.



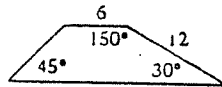
c.



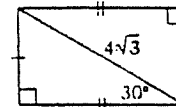
d.



e.

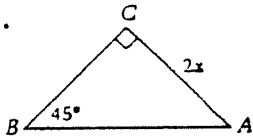


f.

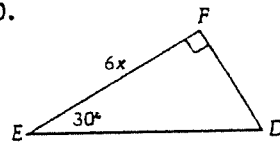


2. Find the length of the other two sides of each triangle in terms of  $x$ .

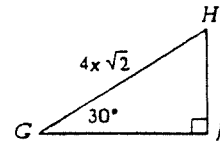
a.



b.

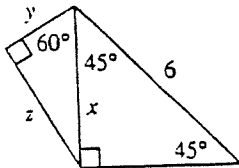


c.



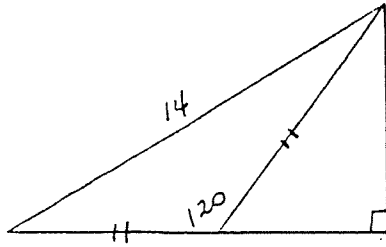
3. Find the length of the altitude of an equilateral triangle with perimeter 24.

4. Find lengths  $x$ ,  $y$  and  $z$ .

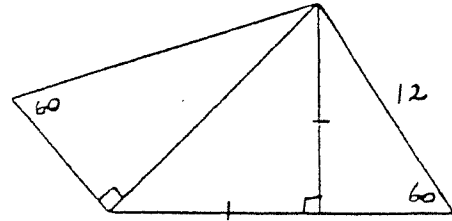


Find the missing lengths.

5.



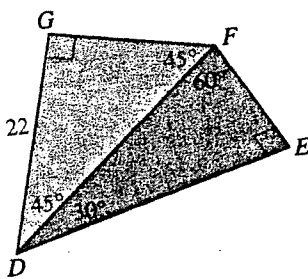
6.



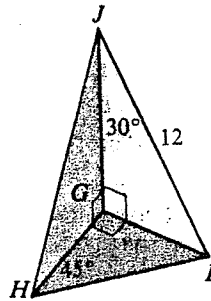
7. The diagonals of a rectangle are 8 units long and intersect at a  $60^\circ$  angle. Find the dimensions of the rectangle.

8. Find the lengths of as many segments as possible.

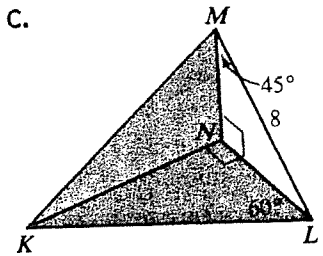
a.



b.



c.

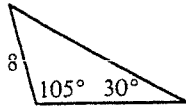


9. In quadrilateral QRST,  $m\angle R = 60$ ,  $m\angle T = 90$ ,  $QR = RS$ ,  $ST = 8$ , and  $TQ = 8$ .

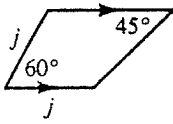
a. How long is the longer diagonal of the quadrilateral?

b. Find the ratio of RT to QS.

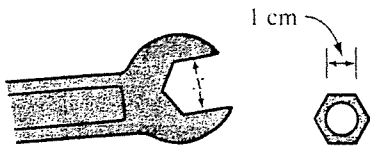
10. Find the perimeter of the triangle.



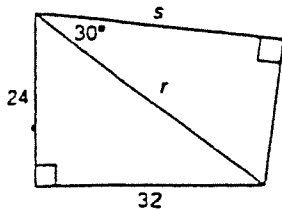
11. Find the length of the median of the trapezoid in terms of  $j$ .



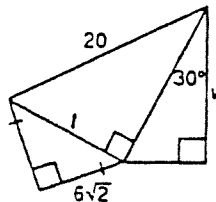
12. If the wrench just fits the hexagonal nut, what is the value of  $x$ ?



13.  $r = ?$   $s = ?$



14.  $t = ?$   $v = ?$



15. \*  $w = ?$   $y = ?$

