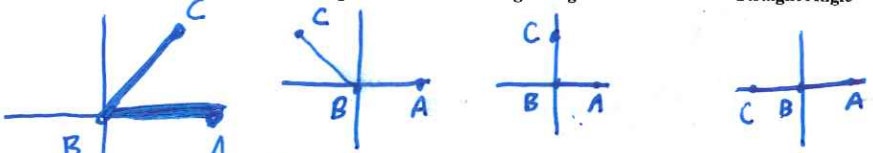
2.1: Unit 2, Chapter 1 – Angles, Right Triangles, Radicals

Notes

Draw a picture of each in standard position. Label the angle and name the vertex, terminal side and initial side.

Acute Angle **Obtuse Angle** **Right Angle** **Straight Angle**

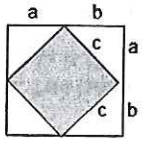


B-vertex
BA → T.S.
BC → I.S.
} For all angles

Complementary – Adds to 90°

Supplementary – Adds to 180°

Prove the Pythagorean Theorem.



Area of Big Square = Area of Little Square + Area 4 triangles.

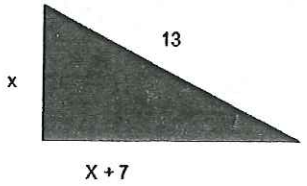
$(a+b)^2 = 4(\frac{1}{2}ab) + c^2$

$a^2 + 2ab + b^2 = 2ab + c^2$

$-2ab \quad -2ab$

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

Solve for x.



$x^2 + (x+7)^2 = 13^2$

$x^2 + x^2 + 14x + 49 = 169$

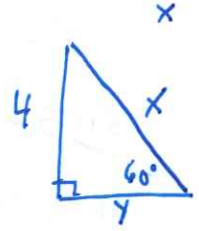
$2x^2 + 14x - 120 = 0$

$x^2 + 7x - 60 = 0$

$(x-5)(x+12) = 0$

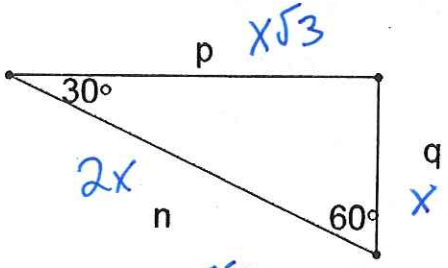
$x = 5, -7$

A ladder is leaning against a wall. The top of the ladder is 4 feet above the ground and the bottom of the ladder makes an angle of 60° with the ground. How long is the ladder and how far from the wall is the bottom of the ladder?



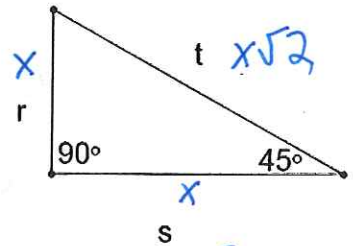
$y = \frac{4\sqrt{3}}{3}$

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



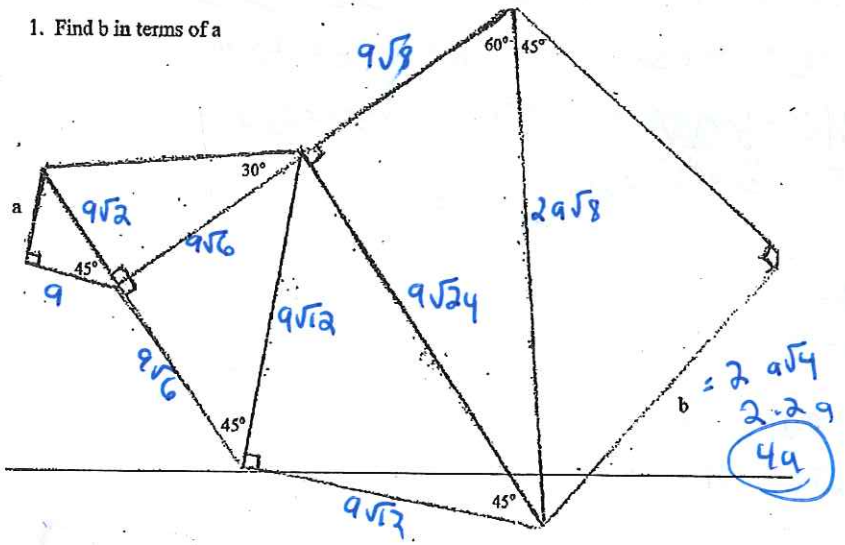
5. If q = 8, p = $8\sqrt{3}$ and n = 16.
6. If n = 20, q = 10 and p = $10\sqrt{3}$.
7. If p = $4\sqrt{3}$, q = 4 and n = 8.
8. If p = 9, q = $3\sqrt{3}$ and n = $6\sqrt{3}$.

Complete.



1. If r = 6, t = $6\sqrt{2}$.
2. If s = $2\sqrt{5}$, t = $2\sqrt{10}$
3. If t = $\sqrt{2}$, r = 1.
4. If t = 10, s = $5\sqrt{2}$.

1. Find b in terms of a

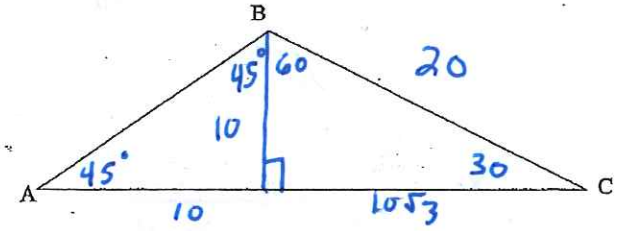


$b = 2a\sqrt{4}$

$2 \cdot 2a$

$4a$

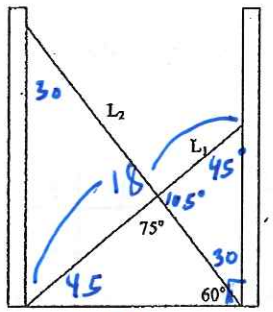
2. A man surveyed a triangular parcel of land and determined the following dimensions:
   Angle B is 105°
   Angle C is 30°
   Side BC is 20 meters
   Find the area of the triangle to the nearest square meter. [Hint: draw an altitude.]



$A = \frac{b \cdot h}{2} = \frac{(10+10\sqrt{3})(10)}{2} = 50+50\sqrt{3}$

3. Two ladders (L_1 and L_2) are leaning against two walls as shown in the figure below. L_1 is 18' long.

   a. *Exactly* how far apart are the walls? $9\sqrt{2}$
   b. *Approximately* how long is L_2 (to the nearest 0.1')? $18\sqrt{2}$



$\frac{18}{\sqrt{2}} = 9\sqrt{2}$

$x^2 + \sqrt{33}^2 = 7^2$

$x^2 + 33 = 49$

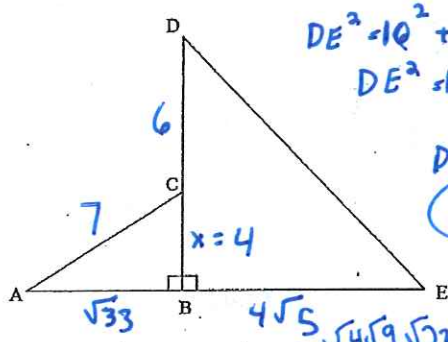
$x^2 = 16$

$x = 4$

4. For the figure below, you are given:

   $AC = 7$
   $CD = 6$
   $AB = \sqrt{33}$
   $BC = x$
   $BE = \sqrt{5}x$

   Find: DE (exact value)



$DE^2 = 12^2 + (4\sqrt{5})^2$

$DE^2 = 144 + 80$

$DE = \sqrt{180}$

$= 6\sqrt{5}$

5. $3\sqrt{75} = 3 \cdot 5\sqrt{3} = 15\sqrt{3}$

6. $\sqrt{828} = \sqrt{4}\sqrt{9}\sqrt{23} = 2 \cdot 3\sqrt{23} = 6\sqrt{23}$

7. $\sqrt{784} = \sqrt{16} \cdot \sqrt{49} = 4 \cdot 7 = 28$

8. $\sqrt{120} = \sqrt{4}\sqrt{30} = 2\sqrt{30}$

9. $\sqrt{90} = \sqrt{9}\sqrt{10} = 3\sqrt{10}$

10. $\sqrt{96} = \sqrt{4}\sqrt{24} = \sqrt{4}\sqrt{4}\sqrt{6} = 4\sqrt{6}$

11. $(4\sqrt{3})^2 = 16 \cdot 3 = 48$

12. $(2\sqrt{2})^2 = 4 \cdot 2 = 8$

13. $(5\sqrt{5})(\sqrt{3}) = 5\sqrt{15}$

14. $\left(\frac{\sqrt{2}}{3}\right)\left(\frac{\sqrt{6}}{4}\right) = \frac{\sqrt{12}}{12} = \frac{2\sqrt{3}}{12} = \frac{\sqrt{3}}{6}$

18. $\frac{7}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{7\sqrt{7}}{7} = \sqrt{7}$

19. $\frac{\sqrt{5}}{\sqrt{10}} = \sqrt{\frac{5}{10}} = \sqrt{\frac{1}{2}} = \frac{\sqrt{1}}{\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

20. $\frac{4}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$

21. $\frac{\sqrt{3}/2}{1/2} = \frac{\sqrt{3}}{2} \div \frac{1}{2} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$

22. $\frac{\frac{1}{2} \cdot 2}{\frac{\sqrt{3}}{2} \cdot 2} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

23. $\frac{3}{\sqrt{2}} \cdot \frac{2}{\sqrt{3}} = \frac{6}{\sqrt{6} \cdot \sqrt{6}} = \frac{6\sqrt{6}}{6} = \sqrt{6}$

24) $\sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{8} + \sqrt{12} + \sqrt{16} + \sqrt{20} + \sqrt{80}$

$\sqrt{2} + \sqrt{3} + 2 + 2\sqrt{2} + 2\sqrt{3} + 4 + 2\sqrt{5} + 4\sqrt{5}$

$3\sqrt{2} + 3\sqrt{3} + 6\sqrt{5} + 6$