

PART I: Radicals

$$1. \sqrt{63} = \frac{\sqrt{9}\sqrt{7}}{3\sqrt{7}}$$

$$2. -2\sqrt{54} = \frac{-2\sqrt{9}\sqrt{6}}{-2 \cdot 3\sqrt{6}} = -6\sqrt{6}$$

$$3. -6\sqrt{121} = -6 \cdot 11 = -66$$

$$4. 5\sqrt{220} = \frac{5\sqrt{4}\sqrt{55}}{5 \cdot 2\sqrt{55}} = 10\sqrt{55}$$

$$5. \sqrt{72x^6y^9z} = \frac{\sqrt{36}\sqrt{2}}{6x^3y^4\sqrt{2yz}}$$

$$6. 4\sqrt{180x^9} = \frac{\sqrt{36}\sqrt{5}}{4 \cdot 6\sqrt{5x^9}} = 24x^4\sqrt{5x}$$

$$7. -3\sqrt{28x^5y^3} = \frac{\sqrt{4}\sqrt{7}}{-3 \cdot 2x^4y\sqrt{7xy}} = -6x^4y\sqrt{7xy}$$

$$8. -3\sqrt{44x^2y^{11}z} = \frac{\sqrt{4}\sqrt{11}}{-3 \cdot 2xy^5\sqrt{11yz}} = -6xy^5\sqrt{11yz}$$

$$9. \sqrt{3} \cdot \sqrt{7} = \sqrt{21}$$

$$10. 2\sqrt{6} \cdot \sqrt{6} = 2 \cdot 6 = 12$$

$$11. 4\sqrt{2} \cdot 6\sqrt{11} = 24\sqrt{22}$$

$$12. 5\sqrt{12} \cdot \sqrt{8} = \frac{5\sqrt{96}}{5\sqrt{16}\sqrt{6}} = \frac{5 \cdot 4\sqrt{6}}{20\sqrt{6}}$$

$$13. \sqrt{2a^2} \cdot \sqrt{30a^5} = \frac{\sqrt{60a^7}}{\sqrt{4}\sqrt{15}} = 2a^3\sqrt{15a}$$

$$14. 5\sqrt{11xy^3} \cdot 2\sqrt{5x^2y} = \frac{10\sqrt{55x^3y^4}}{10xy^2\sqrt{55x}}$$

$$15. -2\sqrt{2}(3+\sqrt{2}) = \frac{-6\sqrt{2}-2\sqrt{4}}{-6\sqrt{2}-2(2)} = -6\sqrt{2}-4$$

$$16. \sqrt{15}(5\sqrt{10}+\sqrt{6}) = \frac{5\sqrt{150}+\sqrt{90}}{5\sqrt{25}\sqrt{6}+\sqrt{9}\sqrt{10}} = \frac{5 \cdot 5\sqrt{6}+3\sqrt{10}}{25\sqrt{6}+3\sqrt{10}}$$

$$17. \sqrt{\frac{180}{5}} = \sqrt{36} = 6$$

$$18. \frac{8\sqrt{11}}{216\sqrt{2}} = \frac{\sqrt{11}}{27\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{22}}{2 \cdot 27} = \frac{\sqrt{22}}{54}$$

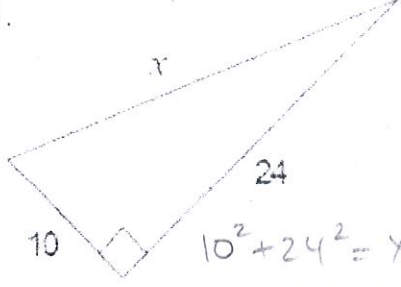
$$19. \sqrt{\frac{30}{90}} = \sqrt{\frac{3}{9}} = \frac{\sqrt{3}}{3}$$


$$20. \frac{-4\sqrt{5}}{7\sqrt{12}} = \frac{-4\sqrt{5}}{14\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{-4\sqrt{15}}{14 \cdot 3} = \frac{-4\sqrt{15}}{42} = \frac{-2\sqrt{15}}{21}$$


Simplify
 $\frac{7\sqrt{12}}{7\sqrt{4} \cdot \sqrt{3}}$
 $\frac{7 \cdot 2\sqrt{3}}{14\sqrt{3}}$


$$\frac{-2\sqrt{15}}{21}$$

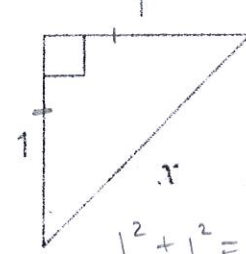
PART II: Pythagorean Theorem $a^2 + b^2 = c^2$ Simplify!

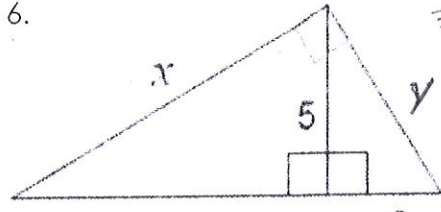
1.  $10^2 + 24^2 = x^2$
 $100 + 576 = x^2$
 $676 = x^2$
 $x = 24$

2.  $3^2 + 7^2 = x^2$
 $9 + 49 = x^2$
 $58 = x^2$
 $x = \sqrt{58}$

3.  $6^2 + 8^2 = x^2$
 $36 + 64 = x^2$
 $100 = x^2$
 $x = 10$

4.  $6^2 + 8^2 = x^2$
 $36 + 64 = x^2$
 $100 = x^2$
 $x = 10$


5.  $1^2 + 1^2 = x^2$
 $2 = x^2$
 $x = \sqrt{2}$

6.  $3^2 + 4^2 = x^2$
 $9 + 16 = x^2$
 $25 = x^2$
 $x = 5$

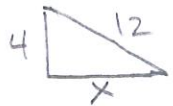
For the following applications, make sure you draw a picture, show your work, and answer the question.

7. Two sides of a right triangle are 4 and 12 in.

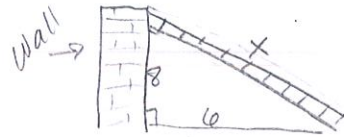
a. Find the missing side if these are the lengths of the legs.

 $4^2 + 12^2 = x^2$
 $16 + 144 = x^2$
 $160 = x^2$
 $x = \sqrt{160} = 4\sqrt{10}$


b. Find the missing side if these are the lengths of a leg and hypotenuse.

 $4^2 + b^2 = 12^2$
 $16 + b^2 = 144$
 $b^2 = 128$
 $b = \sqrt{128} = 8\sqrt{2}$

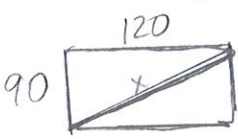
8. The foot of a ladder is placed 6 feet from a wall. If the top of the ladder rests 8 feet up on the wall, how long is the ladder?

 $8^2 + 6^2 = x^2$
 $64 + 36 = x^2$
 $100 = x^2$
 $x = 10$

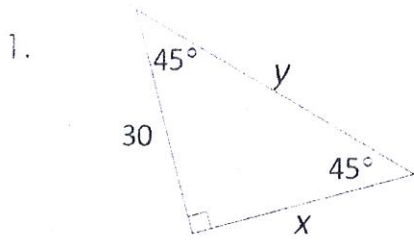
9. John leaves school to go home. He walks 6 blocks North and then 8 blocks west. How far is John from the school?

 $8^2 + 6^2 = x^2$
 $64 + 36 = x^2$
 $100 = x^2$
 $x = 10$

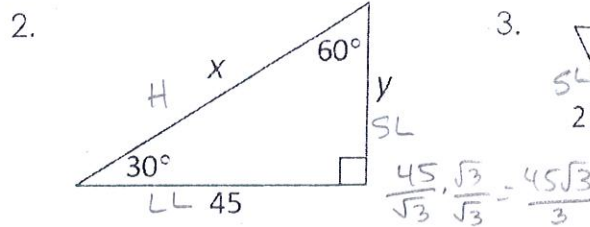
10. A soccer field is a rectangle 90 meters wide and 120 meters long. The coach asks players to run from one corner to the corner diagonally across. What is this distance?

 $90^2 + 120^2 = x^2$
 $8100 + 14400 = x^2$
 $22500 = x^2$
 $x = 150$

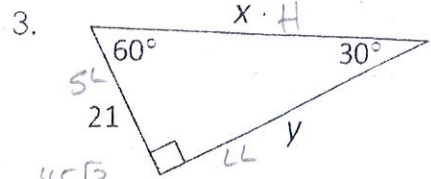
PART III: Find the value of each variable in radical form.



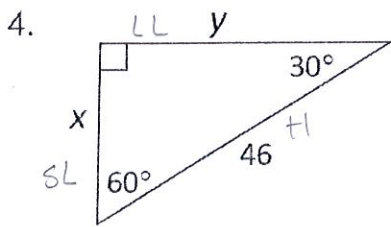
$x = 30$ $y = 30\sqrt{2}$



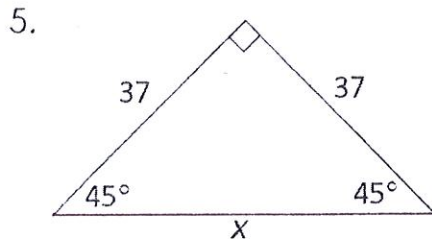
$x = 30\sqrt{3}$ $y = 15\sqrt{3}$



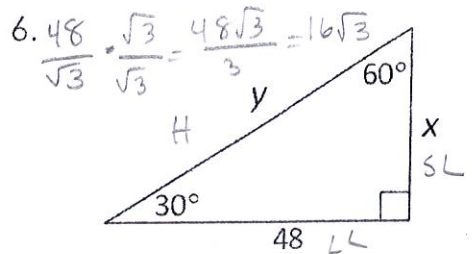
$x = 42$ $y = 21\sqrt{3}$



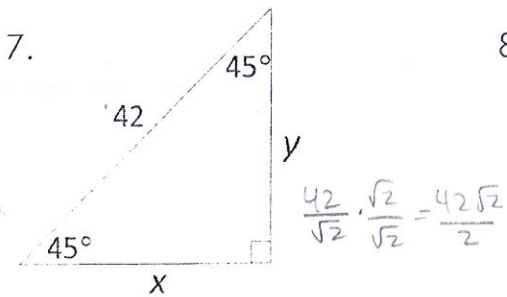
$x = 23$ $y = 23\sqrt{3}$



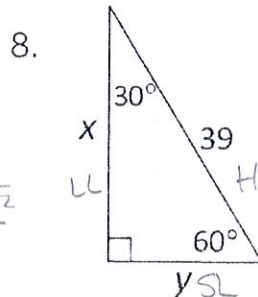
$x = 37\sqrt{2}$



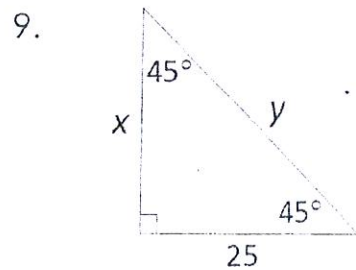
$x = 16\sqrt{3}$ $y = 32\sqrt{3}$



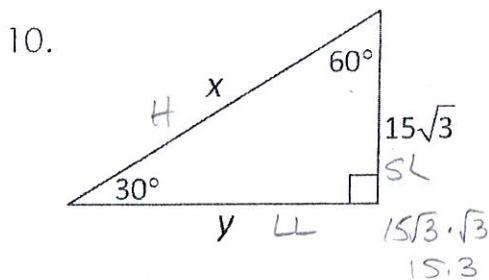
$x = 21\sqrt{2}$ $y = 21\sqrt{2}$



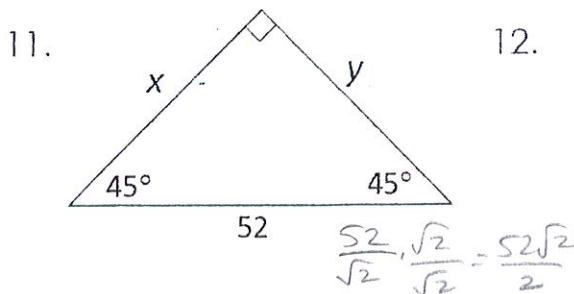
$x = \frac{39\sqrt{3}}{2}$ $y = \frac{39}{2}$



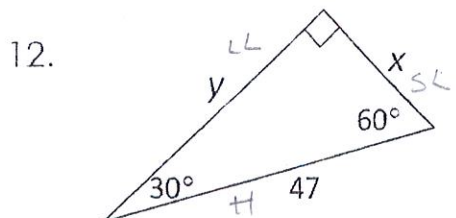
$x = 25$ $y = 25\sqrt{2}$



$x = 30\sqrt{3}$ $y = 45$



$x = 26\sqrt{2}$ $y = 26\sqrt{2}$



$x = \frac{47}{2}$ $y = \frac{47\sqrt{3}}{2}$