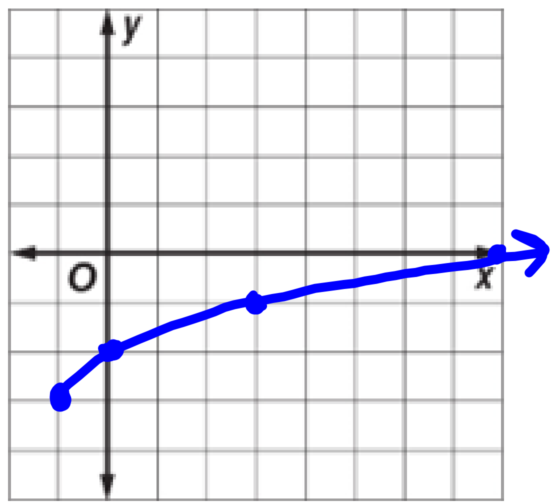
1. Graph $y = \sqrt{x+1} - 3$.
State the domain and range.

1.



Parent Function: $y = \sqrt{x}$

x	0	1	4	9
y	0	1	2	3

D: $x \geq 0$
R: $y \geq 0$

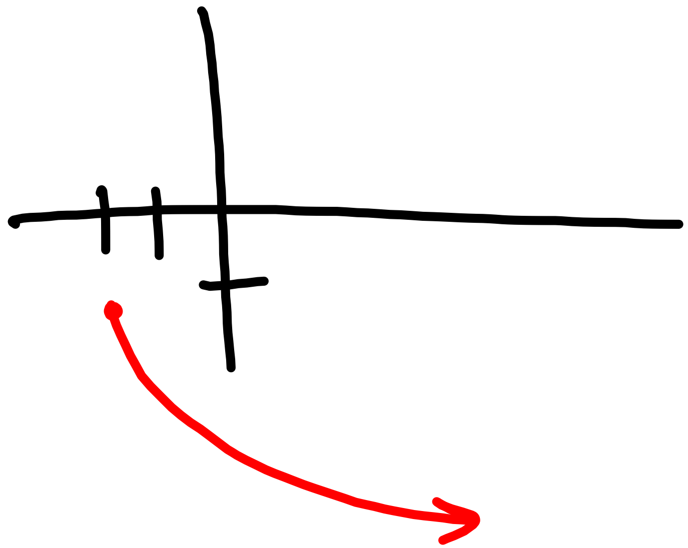
$y = \sqrt{x+1} - 3$ shifts graph left 1 and down 3

x	-1	0	3	8
y	-3	-2	-1	0

$\boxed{\begin{array}{l} D: x \geq -1 \\ R: y \geq -3 \end{array}}$

2. State the domain and range of $y = -2\sqrt{x+2} - 1$.

This graph shifts $y=\sqrt{x}$ left 2 and down 1. The -2 makes it steeper and upside down.



$$\boxed{\begin{array}{l} D: x \geq -2 \\ R: y \leq -1 \end{array}}$$

3. $\sqrt{40} \cdot \sqrt{5}$ $= \sqrt{4}\sqrt{10} \cdot \sqrt{5}$

$2\sqrt{10}\sqrt{5}$

$2\sqrt{50}$

$2\sqrt{25}\sqrt{2}$

$2 \cdot 5 \cdot \sqrt{2} = \boxed{10\sqrt{2}}$

4. $\sqrt{50x^3y^2}$

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

$5\sqrt{2}\,x\sqrt{x}\,y$

$\boxed{5xy\sqrt{2x}}$

5. $\frac{28\sqrt{5}-8\sqrt{5}}{2} = \frac{20\sqrt{5}}{2} = \boxed{10\sqrt{5}}$

6. $2\sqrt{24} + \sqrt{54} + 3\sqrt{150}$

$$2\sqrt{4}\sqrt{6} + \sqrt{9}\sqrt{6} + 3\sqrt{25}\sqrt{6}$$

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

$$4\sqrt{6} + 3\sqrt{6} + 15\sqrt{6} = \boxed{22\sqrt{6}}$$

7. $(\sqrt{11} - \sqrt{6})(\sqrt{2} + \sqrt{33})$

$$\sqrt{22} + \sqrt{363} - \sqrt{12} - \sqrt{198}$$

$$\sqrt{22} + \sqrt{121}\sqrt{3} - \sqrt{4}\sqrt{3} - \sqrt{9}\sqrt{22}$$

$$\sqrt{22} + 11\sqrt{3} - 2\sqrt{3} - 3\sqrt{22}$$

$$\boxed{9\sqrt{3} - 2\sqrt{22}}$$

8. $\left(\sqrt{7x-3}\right)^2 = 5^2$

$7x - 3 = 25$

$7x = 28$

$\boxed{x = 4}$

9. $\sqrt{\frac{4x}{3}} - 2 = 0$

$$\left(\sqrt{\frac{4x}{3}}\right)^2 = 2^2$$

$$\frac{4x}{3} = 4 \rightarrow 4x = 12 \rightarrow \boxed{x = 3}$$

10. $(x + 3)^2 = \left(\sqrt{3x + 37}\right)^2$

$$(x+3)^2 = 3x+37$$

$$x^2+6x+9 = 3x+37$$

$$x^2+3x-28=0$$

$$(x+7)(x-4)=0$$

$\cancel{x=-7}$ $\boxed{x=4}$

extraneous

11. $a = 4$, $b = 7$, $c = ?$

$4^2 + 7^2 = c^2$

$16 + 49 = c^2$

$\sqrt{65} = c$

$\boxed{8.06 = c}$

12. $b = 15$, $c = 17$, $a = ?$

$$a^2 + 15^2 = 17^2$$

$$a^2 + 225 = 289$$

$$a^2 = 64$$

$$\boxed{a = 8}$$

13. 15, 20, 25

$$15^2 + 20^2 = 625$$

$$25^2 = 625$$

equal, so yes

14. 16, 20, 30

$16^2 + 20^2 = 656$

$30^2 = 900$

Not equal, so

$\boxed{\text{no}}$

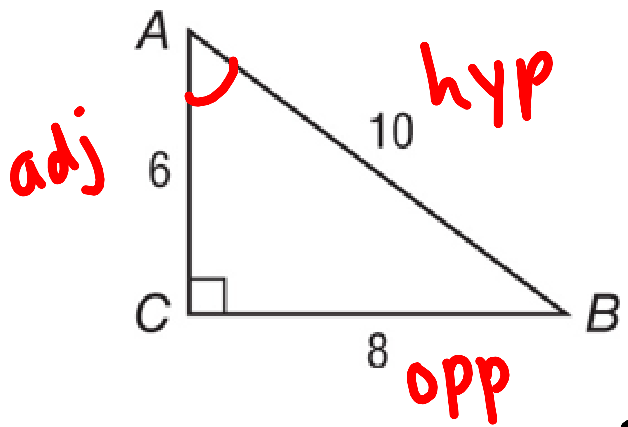
15. $\sin 73^\circ \approx 0.9563$

16. $\cos 62^\circ \approx 0.4695$

17. $\tan 12^\circ \approx 0.2126$

SOH-CAH-TOA

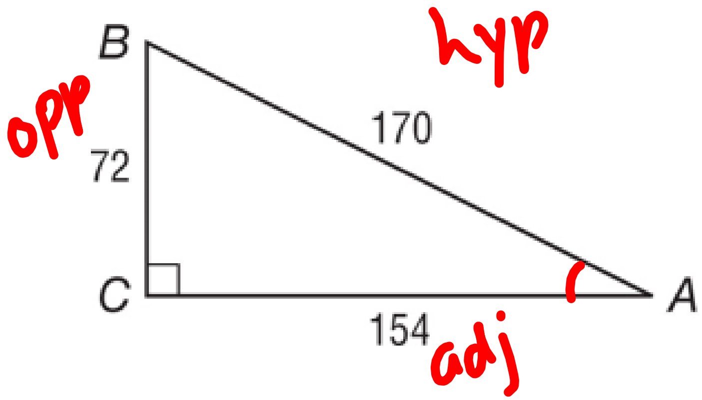
18.



$\sin(A) = \frac{8}{10} = \boxed{\frac{4}{5}}$ $\cos(A) = \frac{6}{10} = \boxed{\frac{3}{5}}$

$\tan(A) = \frac{8}{6} = \boxed{\frac{4}{3}}$

19.



$$\sin(A) = \frac{72}{170} = \frac{36}{85} \qquad \cos(A) = \frac{154}{170} = \frac{77}{85}$$

$$\tan(A) = \frac{72}{154} = \frac{36}{77}$$

20. The perimeter of a square P with area A can be found using the formula $P = 4\sqrt{A}$. If a square has a perimeter of 36.8 inches, find the area to the nearest tenth of a square foot.

$$\frac{36.8}{4} = \frac{4\sqrt{A}}{4}$$

$$(9.2)^2 = (\sqrt{A})^2$$

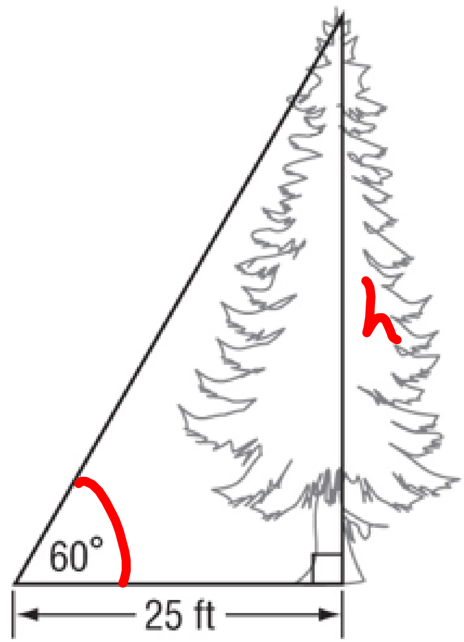
$$\boxed{84.6 = A \quad ft^2}$$

21. Find the height of the tree to the nearest tenth of a foot.

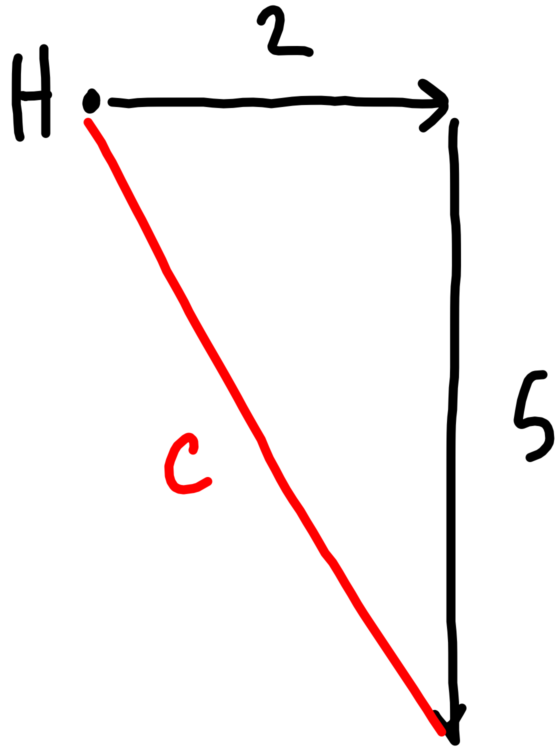
$$25 \cdot \tan(60) = \frac{h}{25} \cdot 25$$

$$25 \cdot \tan(60) = h$$

$$\boxed{43.3 \text{ ft} = h}$$



22. Mandy leaves her home for a walk. How far is she from her home after walking 2 miles due east and then 5 miles due south?



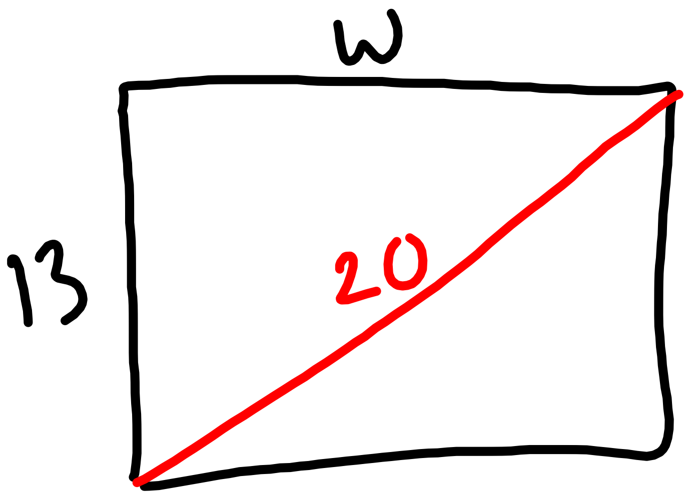
$$2^2 + 5^2 = c^2$$

$$4 + 25 = c^2$$

$$29 = c^2$$

$$\boxed{5.39 = c \text{ miles}}$$

23. What is the width of a rectangle if the length is 13 centimeters and the diagonal is 20 centimeters?



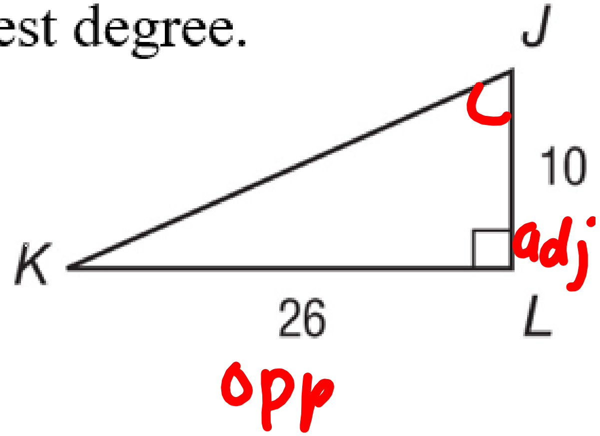
$w^2 + 13^2 = 20^2$

$w^2 + 169 = 400$

$w^2 = 231$

$\boxed{w = 15.20 \text{ cm}}$

24. Solve $m\angle J$ for the right triangle to the nearest degree.

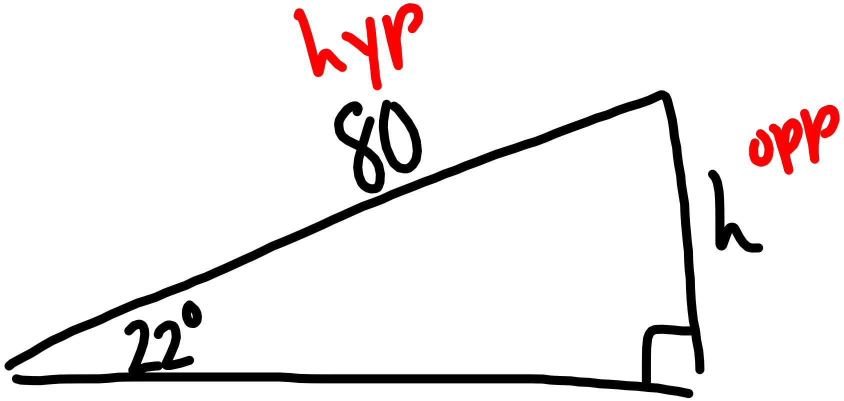


$$\tan(J) = \frac{26}{10} \quad \text{so}$$

$$\tan^{-1}\left(\frac{26}{10}\right) = J$$

$$\boxed{69° = J}$$

25. At a loading dock, a ramp is 80 feet long. The angle the ramp makes with the ground is 22°.Find the height reached by the ramp.



$$\sin(22) = \frac{h}{80}$$

$$80 \cdot \sin(22) = h$$

$$\boxed{30 \text{ ft} = h}$$

Bonus Solve $12 + \sqrt{5x^2 + 36} = 12 - 3x$.

$-12 \qquad -12$

$$\left(\sqrt{5x^2+36}\right)^2 = (-3x)^2$$

$$5x^2+36 = 9x^2$$

$$0 = 4x^2 - 36$$

$$0 = 4(x^2-9)$$

$$0 = 4(x+3)(x-3)$$

$$\boxed{x=-3} \qquad \cancel{x=3}$$

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