

Test on Radicals

Name KEY

Simplifying Radicals

$$1. \frac{\sqrt{48}}{\sqrt{4 \cdot 3}} = \frac{3\sqrt{48}}{4\sqrt{3}}$$

1. $4\sqrt{3}$

$$2. \frac{2\sqrt{45}}{2\sqrt{3 \cdot 5}} = \frac{5\sqrt{45}}{3\sqrt{15}}$$

2. $6\sqrt{5}$

$$3. \frac{\sqrt{72x^3y^4}}{\sqrt{6 \cdot 2x^2 \cdot y^2 \cdot y^2}} = \frac{2\sqrt{72}}{6\sqrt{36}}$$

3. $\frac{6|x|y^2\sqrt{2x}}{6}$

$$4. \frac{\sqrt{18a^3b^5}}{\sqrt{3 \cdot 2 \cdot a^2 \cdot b^2 \cdot b^3}} = \frac{2\sqrt{18}}{3\sqrt{9}}$$

4. $\frac{3|A|B^2\sqrt{2AB}}{3}$

$$5. \frac{6}{2-\sqrt{7}} \cdot \frac{(2+\sqrt{7})}{(2+\sqrt{7})} = \frac{12+6\sqrt{7}}{4-7} = \frac{12+6\sqrt{7}}{-3}$$

5. $-4-2\sqrt{7}$

$$6. \frac{6\sqrt{2}}{5-\sqrt{13}} \cdot \frac{5+\sqrt{13}}{5+\sqrt{13}} = \frac{\sqrt{2}(5+\sqrt{13})}{25-13} = \frac{5\sqrt{2}+\sqrt{26}}{12}$$

6. $\frac{5\sqrt{2}+\sqrt{26}}{2}$

$$7. \frac{3\sqrt{12}-5\sqrt{27}+2\sqrt{75}}{3\sqrt{2 \cdot 3}-5\sqrt{3 \cdot 3}+2\sqrt{5 \cdot 3}} = \frac{6\sqrt{3}-15\sqrt{3}+10\sqrt{3}}{6\sqrt{3}-15\sqrt{3}+10\sqrt{3}} = \sqrt{3}$$

7. $\sqrt{3}$

$$8. 3\sqrt{5}(2\sqrt{10}+5\sqrt{3}) = 6 \cdot 5\sqrt{2} + 15\sqrt{15} = 30\sqrt{2} + 15\sqrt{15}$$

8. $30\sqrt{2} + 15\sqrt{15}$

$$9. (3\sqrt{12}-2\sqrt{8})(2\sqrt{75}-3\sqrt{50})$$

9. $300 - 130\sqrt{6}$

$$(6\sqrt{3}-4\sqrt{2})(10\sqrt{3}-15\sqrt{2}) = 60 \cdot 3 - 90\sqrt{6} - 40\sqrt{6} + 60 \cdot 2 = 180 - 130\sqrt{6} + 120 = 300 - 130\sqrt{6}$$

Solve each equation by **Completing the Square**.

10. $4t^2 - 16t + 15 = 0$

$$4t^2 - 16t = -15$$

$$4[t^2 - 4t + 4] = -15 + 16$$

$$4(t-2)^2 = 1$$

$$\sqrt{(t-2)^2} = \pm \sqrt{\frac{1}{4}}$$

$$t = \{1\frac{1}{2}, 2\frac{1}{2}\}$$

$$t - 2 = \pm \frac{1}{2}$$

10. $t = \{1\frac{1}{2}, 2\frac{1}{2}\}$

11. $g^2 - 6g + 17 = 0$

$$g^2 - 6g + 9 = -17 + 9$$

$$\sqrt{(g-3)^2} = \pm \sqrt{-8}$$

$$g = \{ \}$$

CANNOT HAVE NEGATIVE UNDER RADICAL

11. $g = \{ \}$

Use the **quadratic formula** to find and identify {rational, irrational, DNE} the solutions to each of the following:

12. $2w^2 - 7w - 15 = 0$

I. $b^2 - 4ac$
 $49 - 4(2)(-15)$
 169

II. $x = \frac{-b \pm \sqrt{\text{DISC}}}{2a}$
 $x = \frac{7 \pm 13}{4}$

12. $w = \{-1\frac{1}{2}, 5\}$

Type of Solution RATIONAL

13. $3w^2 - 2w + 7 = 0$

I. $b^2 - 4ac$
 $4 - 4(3)(7)$
 -80

$$x = \frac{-6}{4}, \frac{20}{4}$$

13. $w = \{ \}$

Type of Solution NO SOLUTION

14. $5w^2 - 3w - 4 = 0$

I. $b^2 - 4ac$
 $9 - 4(5)(-4)$
 89

II. $x = \frac{-b \pm \sqrt{\text{DISC}}}{2a}$
 $= \frac{3 \pm \sqrt{89}}{10}$

14. $w = \left\{ \frac{3 - \sqrt{89}}{10}, \frac{3 + \sqrt{89}}{10} \right\}$

Type of Solution IRRATIONAL

Determine if the three sides could be a triangle, if so, then classify it as **obtuse**, **acute**, or **right**.
If not write **not a triangle**.

15. 6, 8, 10

$[2, 14]$ ✓

$$36 + 64 = 100$$

15. RIGHT

16. 2, 11, 15

$[9, 13]$

16. NOT A TRIANGLE

17. 7, 8, 11

$[1, 15]$ ✓

$$49 + 64 ? 121$$

$$113 < 121$$

17. OBTUSE

Find the distance of each of the following. Write answers in **simplified radical form**.

18. $8 < (-6, 7) > -11$
 $(2, -4)$

$$d = \sqrt{\Delta x^2 + \Delta y^2}$$

$$d = \sqrt{8^2 + (-11)^2}$$

$$= \sqrt{64 + 121}$$

$$= \sqrt{185}$$

18. $\sqrt{185}$

19. $5 < (3, 5) > 12$
 $(8, 17)$

$$d = \sqrt{5^2 + 12^2}$$

$$= \sqrt{25 + 144}$$

$$= \sqrt{169}$$

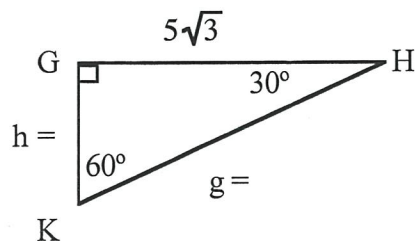
19. 13

Special Right Triangles

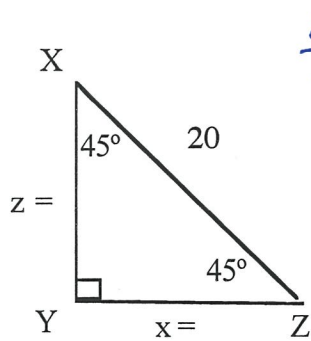
20.

20. h = 5

20. g = 10



21.

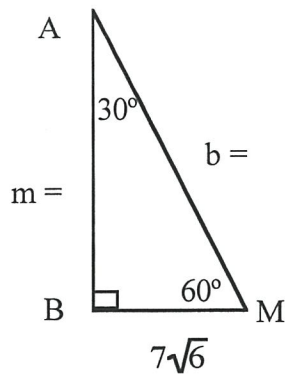


$$\frac{20}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{20\sqrt{2}}{2}$$

21. z = $10\sqrt{2}$

21. x = $10\sqrt{2}$

22.

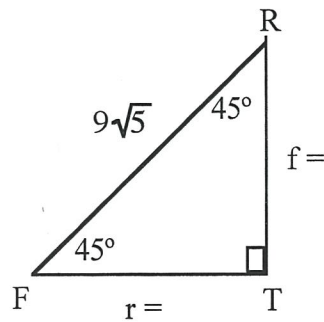


$$\begin{aligned} m &= 7\sqrt{6} \cdot \frac{\sqrt{3}}{2} \\ &= 7 \cdot 3\sqrt{2} \\ &= 21\sqrt{2} \\ b &= 2 \cdot 7\sqrt{6} \\ &= 14\sqrt{6} \end{aligned}$$

22. m = $21\sqrt{2}$

22. b = $14\sqrt{6}$

22.



$$\begin{aligned} \frac{9\sqrt{5}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} \\ \frac{9\sqrt{10}}{2} \end{aligned}$$

22. r = $\frac{9\sqrt{10}}{2}$

22. f = $\frac{9\sqrt{10}}{2}$

Find the **midpoint** to each of the following:

23. $(-3, 8), (4, 12)$
 $(-3, 8)$
 $(4, 12)$
 $(\frac{1}{2}, 10)$

23. $(\frac{1}{2}, 10)$

24. $(-4, -2), (9, -17)$
 $(-4, -2)$
 $(9, -17)$
 $(\frac{5}{2}, -\frac{19}{2})$

24. $(2\frac{1}{2}, -9\frac{1}{2})$

Find the **endpoint** to each of the following:

25. A $(-5, 7)$, midpoint $(3, 2)$
 $+8 \left\langle \begin{array}{l} (-5, 7) \\ (3, 2) \end{array} \right\rangle -5$
 $+8 \left\langle \begin{array}{l} (3, 2) \\ (11, -3) \end{array} \right\rangle -5$

25. $(11, -3)$

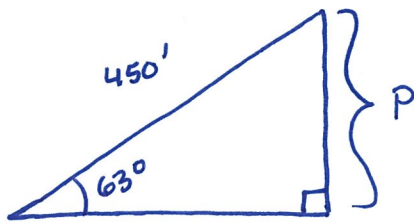
26. A $(3, -6)$, midpoint $(4, -1)$

$$+1 \left\langle \begin{array}{l} (3, -6) \\ (4, -1) \end{array} \right\rangle +5$$
$$+1 \left\langle \begin{array}{l} (4, -1) \\ (5, 4) \end{array} \right\rangle +5$$

26. $(5, 4)$

Solve the following application problems. You MUST draw a picture and write an equation for each problem. Round your answers to the nearest tenth.

27. A man is lying on the beach, flying a kite. He holds the end of the kite string at ground level and estimates the angle of elevation of the kite to be 63° . If the string is 450 feet long, how high is the kite above the ground?



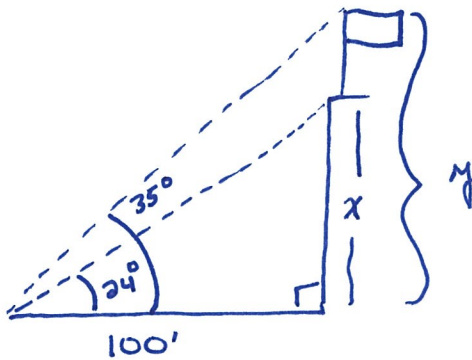
$$\sin 63^\circ = \frac{P}{450}$$

$$450 \sin 63^\circ = P$$

$$401.0' = P$$

27. 401.0'

28. From a point 100 feet in front of a public library, the angles of elevation to the base of the flagpole and to the top of the flagpole are 24° and 35° , respectively. The flagpole is mounted on the roof of the library. Find the height of the flagpole.



$$\tan 24 = \frac{x}{100}$$

$$100 \tan 24 = x$$

$$44.5 \approx x$$

$$\tan 35 = \frac{y}{100}$$

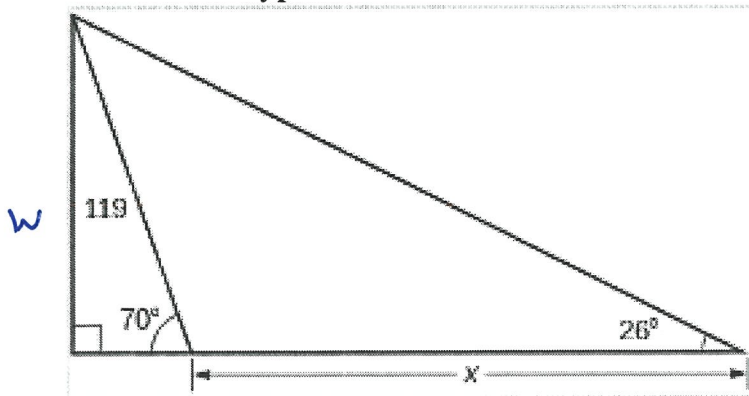
$$100 \tan 35 = y$$

$$70.0 \approx y$$

$$y - x = 25.5'$$

28. 25.5'

29. 119 is a hypotenuse



$$\cos 70^\circ = \frac{y}{119}$$

$$119 \cos 70^\circ = y$$

$$y = 40.7$$

$$x = 188.6$$

--- y ---

$$\sin 70 = \frac{W}{119}$$

$$119 \sin 70 = W$$

$$111.8234 = W$$

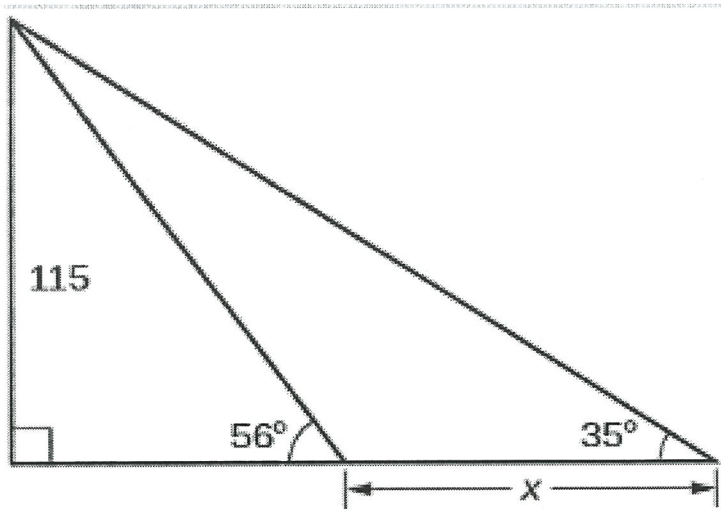
$$\tan 26^\circ = \frac{111.8234}{x+y}$$

$$x+y = \frac{111.8234}{\tan 26}$$

$$x+y = 229.27199$$

29. 188.6

30.



|----- y -----|

$$\tan 56^\circ = \frac{115}{y}$$

$$y = \frac{115}{\tan 56}$$

$$y \approx 77.5685$$

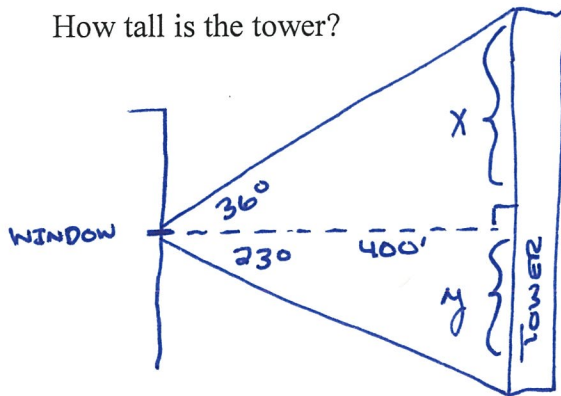
$$\tan 35^\circ = \frac{115}{x+y}$$

$$x+y = \frac{115}{\tan 35^\circ}$$

30. $\underline{y = 77.6}$
 $\underline{x = 86.7}$

31. A radio tower is located 400 feet from a building. From a window in the building, a person determines that the angle of elevation to the top of the tower is 36° , and that the angle of depression to the bottom of the tower is 23° .

How tall is the tower?



$$\tan 23^\circ = \frac{y}{400}$$

$$400 \tan 23 = y$$

$$\tan 36^\circ = \frac{x}{400}$$

$$400 \tan 36 = x$$

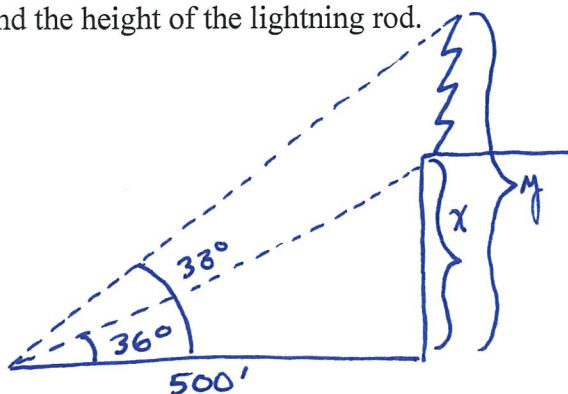
$$x+y =$$

31. $\underline{460.4'}$

32. There is a lightning rod that sits on the top of a building. From a location 500 feet from the base of the building, the angle of elevation to the top of the building is measured to be 36° .

From the same location, the angle of elevation to the top of the lightning rod is measured to be 38° .

Find the height of the lightning rod.



$$\tan 36^\circ = \frac{x}{500}$$

$$500 \tan 36 = x$$

$$\tan 38^\circ = \frac{y}{500}$$

$$500 \tan 38 = y$$

$$y - x =$$

32. $\underline{27.4'}$