

For #20 and 21, it is easy to get the side relationship mixed.
For example, in the 30-60-90 triangle, x is the hypotenuse, and
it is twice the smallest side, y .

20. For the diagram at right, given $h = 12$, use 30-60-90 and 45-45-90 triangle relationships to find the value of p .

(a) find y :

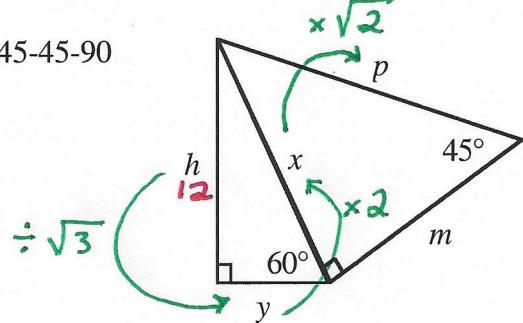
$$y = \frac{12}{\sqrt{3}} = \frac{12\sqrt{3}}{3} = 4\sqrt{3}$$

(b) find x :

$$x = 2 \cdot 4\sqrt{3} = 8\sqrt{3}$$

(c) find p :

$$\begin{aligned} p &= 8\sqrt{3} \cdot \sqrt{2} \\ p &= 8\sqrt{6} \end{aligned}$$



- a) $4\sqrt{6}$ b) $8\sqrt{6}$ c) $3\sqrt{6}$ d) $6\sqrt{6}$ e) None of these

21. For the diagram at right, given $p = 20\sqrt{3}$, use 30-60-90 and 45-45-90 triangle relationships to find the value of h .

(a) find x :

$$x = \frac{20\sqrt{3}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{20\sqrt{6}}{2} = 10\sqrt{6}$$

(b) find y :

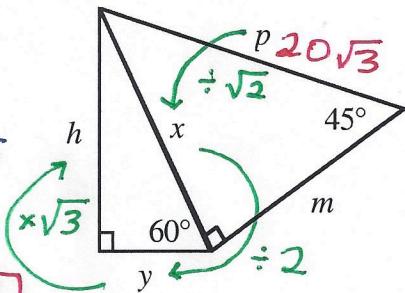
$$y = \frac{10\sqrt{6}}{2} = 5\sqrt{6}$$

(c) find h :

$$h = 5\sqrt{6} \times \sqrt{3}$$

$$\begin{aligned} h &= 5\sqrt{18} \\ h &= 5 \cdot \sqrt{9 \cdot 2} \\ h &= 5 \cdot 3 \cdot \sqrt{2} = 15\sqrt{2} \end{aligned}$$

- a) $5\sqrt{6}$ b) $15\sqrt{6}$ c) $5\sqrt{2}$ d) $15\sqrt{2}$ e) None of these



22. Evaluate $\sin(105^\circ)\cos(165^\circ) + \sin(165^\circ)\cos(105^\circ)$ using a sum, difference, or double angle formula.

this is the pattern for the sine of a sum.

$$= \sin(105^\circ + 165^\circ)$$

$$= \sin(270^\circ) = -1$$

- a) Undefined b) -1 c) $-\frac{1}{2}$ d) $-\frac{\sqrt{3}}{2}$ e) None of these

23. Evaluate $\cos(75^\circ)\cos(195^\circ) + \sin(195^\circ)\sin(75^\circ)$ using a sum, difference, or double angle formula.

this is the pattern for cosine of a difference.

$$= \cos(75^\circ - 195^\circ)$$

$$= \cos(-120^\circ) = -\frac{1}{2}$$

- a) -1 b) $-\frac{1}{2}$ c) $-\frac{\sqrt{3}}{2}$ d) Undefined e) None of these

24. Evaluate $\cos^2\left(\frac{3\pi}{8}\right) - \sin^2\left(\frac{3\pi}{8}\right)$ using a sum, difference, or double angle formula.

$= \cos\left(2 \cdot \frac{3\pi}{8}\right)$ this is one of the double angle formulas for cosine. Here, $A = \frac{3\pi}{8}$

$= \cos\left(\frac{3\pi}{4}\right) = \boxed{-\frac{\sqrt{2}}{2}}$

- a) 1 b) -1 c) $-\frac{\sqrt{2}}{2}$ d) $\frac{\sqrt{2}}{2}$ e) None of these

25. Evaluate $2\sin\left(\frac{7\pi}{12}\right)\cos\left(\frac{7\pi}{12}\right)$ using a sum, difference, or double angle formula.

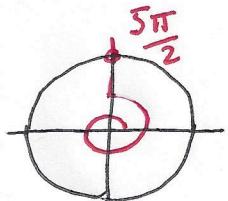
$= \sin\left(2 \cdot \frac{7\pi}{12}\right)$ this is the double angle formula for sine. Here, $A = \frac{7\pi}{12}$

$= \sin\left(\frac{7\pi}{6}\right) = \boxed{-\frac{1}{2}}$

- a) $\frac{1}{2}$ b) $-\frac{1}{2}$ c) $-\frac{\sqrt{3}}{2}$ d) $\frac{\sqrt{3}}{2}$ e) None of these

26. Given $f(t) = -4\sin(3t)$, find $f\left(\frac{5\pi}{6}\right)$.

$$\begin{aligned} f\left(\frac{5\pi}{6}\right) &= -4 \cdot \sin\left(3 \cdot \frac{5\pi}{6}\right) = -4 \cdot \sin\left(\frac{5\pi}{2}\right) \\ &= -4 \cdot 1 = \boxed{-4} \end{aligned}$$



- a) -1 b) 0 c) -4 d) 1 e) None of these

27. Given $f(t) = \sec\left(t + \frac{\pi}{3}\right)$ find $f\left(\frac{5\pi}{6}\right)$.

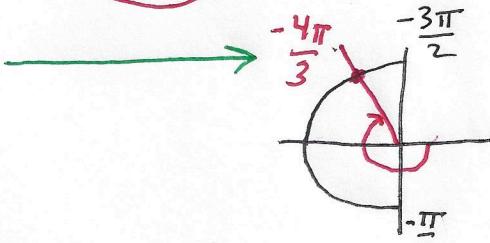
$$\begin{aligned} f\left(\frac{5\pi}{6}\right) &= \sec\left(\frac{5\pi}{6} + \frac{\pi}{3}\right) \\ &= \sec\left(\frac{7\pi}{6}\right) = \boxed{-\frac{2\sqrt{3}}{3}} \end{aligned}$$

$$\begin{aligned} \frac{5\pi}{6} + \frac{\pi}{3} &= \frac{5\pi}{6} + \frac{2\pi}{6} = \frac{7\pi}{6} \end{aligned}$$

- a) -1 b) Undefined c) -2 d) $-\frac{2\sqrt{3}}{3}$ e) None of these

28. Find x given $\sin(x) = \frac{\sqrt{3}}{2}$ and $-\frac{3\pi}{2} \leq x \leq -\frac{\pi}{2}$.

$$x = -\frac{4\pi}{3}$$



- a) $x = -\frac{2\pi}{3}$ b) $x = -\frac{5\pi}{6}$ c) $x = -\frac{4\pi}{3}$ d) $x = -\frac{7\pi}{6}$ e) None of these