5.2: (Trigonometry of Right Triangles)

A man stands 123 feet away from the base of a flagpole. He measures the angle of elevation to the top of the flagpole as 30°. If his eyes are 5 feet above the ground, then the height of the flagpole is

A) $5 + 41\sqrt{3}$ft.

B) $5 + 123\sqrt{3}$ft.

C) $46\sqrt{3}$ft.

D) $36\sqrt{3}$ft

E) $\frac{123}{2}$ ft

If a student stands at the top of a cliff and looks down at a 60° angle of depression at the base of a tree that is 123 m away from the bottom of the cliff, then the height of the cliff is

A) $123\sqrt{3}$

B) $41\sqrt{3}$

C) 123

D) 41

E) $123 + 41\sqrt{3}$

A 10 meters ladder is placed against a wall and forms an angle of $45°$ with the ground. If the foot of the ladder is moved away from the wall the angle changes to $30°$. The exact distance moved by the top of the ladder on the wall is

A) $5\sqrt{3}+1$

B) $5(\sqrt{2}-1)$

C) 5

D) $3\sqrt{5}-1$

E) $5\sqrt{2}$

If the angle of elevation from a point 18 feet from the base of a tree to the top of the tree is θ and if $\sin\ \theta = \frac{4}{5}$, then the height of the tree is

A) 24 feet

B) 20 feet

C) 13.5 feet

D) 21 feet

E) 27 feet

If the angle of depression from the top of a television tower to a point on the ground 36 meters from the bottom of the tower is 30°, then the height of the tower is

A) $12\sqrt{3}$ meters

B) $36\sqrt{3}$ meters

C) $36\sqrt{2}$ meters

D) $18\sqrt{2}$ meters

E) 18 meters

The angle of depression from the top of a building to a point on the ground is 60°. How far is the point from the bottom of the building if the building is 300 meters high?

A) $100\sqrt{3}$ m

B) $300\sqrt{3}$ m

C) $600\sqrt{3}$ m

D) $400\sqrt{3}$ m

E) 600 m

A 20ft ladder leans against a building so that the angle between the ground and the ladder is θ. If $\cot\ \theta = \frac{4}{3}$, then the height at which the ladder reaches on the building is

A) 12ft

B) 10ft

C) 5ft

D) 30ft

E) 8ft

From a point on the ground $100\sqrt{3}ft$ from the base of a building, an observer finds that the angle of elevation to the top of the building is $30°$ and that the angle of elevation to the top of a flagpole on top of the building is a, with $\tan\ a = \frac{21}{20\sqrt{3}}$. Find the length of the flagpole.

A) 5 feet

B) 4 feet

C) 6 feet

D) 3 feet

E) 7 feet

From a window 20 feet above the street, the angle of elevation to the top of the building across the street is $60°$, and the angle of depression to the base of the building is $20°$, the height of the building across the street is:

A) $20(1+\sqrt{3}\cot\ 20°)$

B) $20\sqrt{3}\tan\ 20°$

C) $20(1+\sqrt{3}\tan\ 20°)$

D) $20\sqrt{3}\cot\ 20°$

E) $20\sqrt{3}$

A 20ft ladder leans against a building so that the angle between the ground and the ladder is α. If $\tan\ \alpha = \frac{1}{2}$, how high does the top of the ladder reach on the building?

A) $4\sqrt{5}$

B) 10

C) 4

D) $8\sqrt{5}$

E) 8

The angle of depression from the top of a building to the bottom of a tower is $30°$ and the angle of elevation from the top of the building to the top of the tower is $60°$. If the distance between the building and the tower is 60 meters, then the height of the tower in meters is:

A) $80\sqrt{3}$

B) $60(\sqrt{3}+1)$

C) $30(\sqrt{3}-1)$

D) $45\sqrt{3}$

E) 100

A 10 meters ladder is placed against a wall and forms an angle of $30°$ with the ground. If the foot of the ladder is moved toward the wall, the angle changes to $60°$. The exact distance moved by the top of the ladder on the wall is

A) $5(\sqrt{3}-1)$

B) $5(\sqrt{3}-\sqrt{2})$

C) $5(\sqrt{2}-1)$

D) $5\sqrt{2}$

E) $5\sqrt{3}$

Mohammad wants to find the height of a tree. From a point on the ground he finds that the angle of elevation to the top of the tree is $60°$. He then moves back 50 meters from the second point, the angle of elevation to the top of the tree is $45°$, the height of the tree is

A) $75 + 25\sqrt{3}$

B) $25 + 25\sqrt{3}$

C) $50 + 25\sqrt{3}$

D) $50 - 25\sqrt{3}$

E) $75 - 25\sqrt{3}$

A helicopter is flying 450 feet above the ground level. If the angle of depression from the helicopter to the base of a flagpole is θ, where $\sin\ \theta = \frac{5}{13}$, then the horizontal distance the helicopter must fly to be directly over the flagpole is

A) 1080 feet

B) 187.5 feet

C) 1170 feet

D) 173.1 feet

E) 487.5 feet

If from the top of a 60 meters tower, an observer finds that the angle of depression to the bottom of a building opposite to the tower is α. where $\sec\alpha = 3$, then the distance in meters between the tower and the building is

A) $15\sqrt{2}$

B) $2\sqrt{2}$

C) $30\sqrt{2}$

D) $60\sqrt{2}$

E) $120\sqrt{2}$

The angle of depression from the top of a building to a point on the ground is $30°$. How far is the point from the bottom of the building if the building is 252 meters high?

A) $252\sqrt{3}$ m

B) 504 m

C) $\frac{504\sqrt{3}}{3}$ m

D) 126 m

E) $126\sqrt{3}$ m

If the angle of elevation from a point 12 feet from the base of a building to the top of the building is θ and if $\sec\ \theta = \frac{5}{4}$, then the height of the building is

A) 9 feet

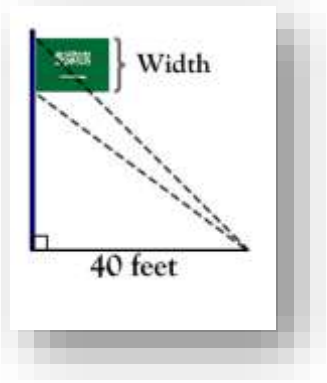
B) 16 feet

C) $\frac{36}{5}$ feet

D) 8 feet

E) $\frac{48}{5}$ feet

Measurements taken 40 feet from the base of a flagpole show the angle of elevation to the top of the flagpole to be $60°$ and the angle of elevation to the bottom of the flag to be $45°$. Determine the vertical width of the flag.



A) $40(\sqrt{3}-1)$ feet

B) $6\sqrt{3}$ feet

C) $\frac{20\sqrt{3}}{3}$ feet

D) 12 feet

E) $\frac{40\sqrt{3}}{3}$ feet

From the top of a tower, a man finds that the angle of depression to a car on the ground is $30°$. If the car is 60 meters away from the tower, then the height of the tower in meters is

A) 80

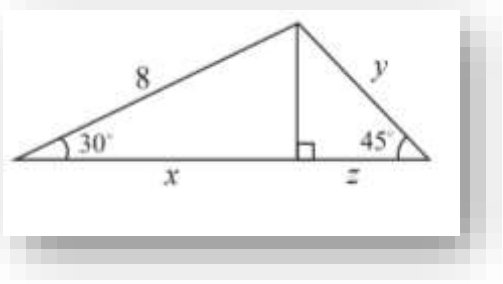
B) $80\sqrt{3}$

C) 20

D) $20\sqrt{2}$

E) $20\sqrt{3}$

In the adjacent figure, the value of $\frac{x \cdot y}{\sqrt{3}}$ is



A) $16\sqrt{2}$

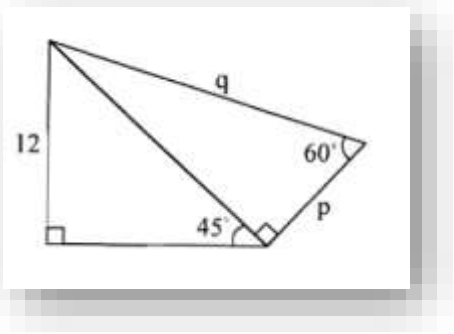
B) 32

C) 36

D) 24

E) $24\sqrt{3}$

In the adjacent figure, $p + q =$



A) $12\sqrt{6}$

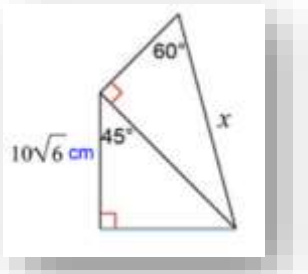
B) $4\sqrt{6} + 3\sqrt{2}$

C) $18\sqrt{6}$

D) $6\sqrt{2} + 4\sqrt{3}$

E) $15\sqrt{2}$

In the adjacent figure, $x =$



A) 40 cm

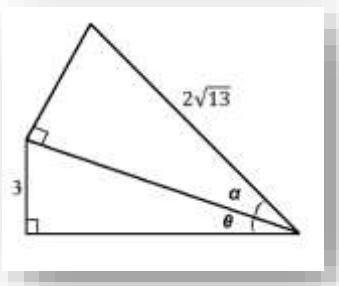
B) $40\sqrt{3}$ cm

C) $20\sqrt{3}$ cm

D) 20 cm

E) $20\sqrt{6}$ cm

In the following figure, if $\tan\ \alpha = \frac{2}{3}$, then $\theta =$



A) $30°$

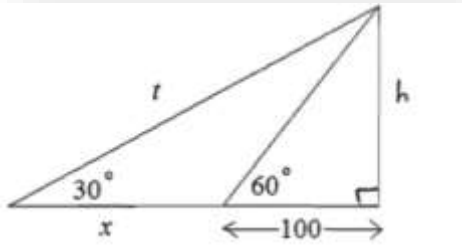
B) $45°$

C) $15°$

D) $75°$

E) $60°$

From the adjacent figure $x + t =$



A) $200(\sqrt{3}+1)$

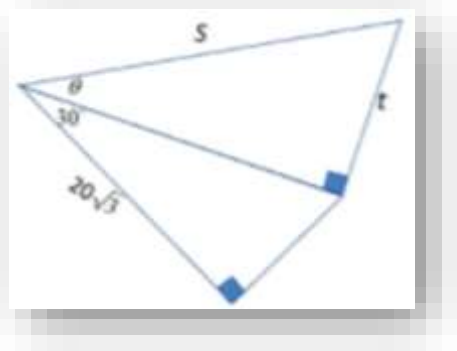
B) 200

C) $100\sqrt{3}$

D) $100(\sqrt{3}+1)$

E) $100(\sqrt{3}-1)$

In the figure below, if $\sin\ \theta = \frac{4}{5}$, then $S + t =$



A) 120

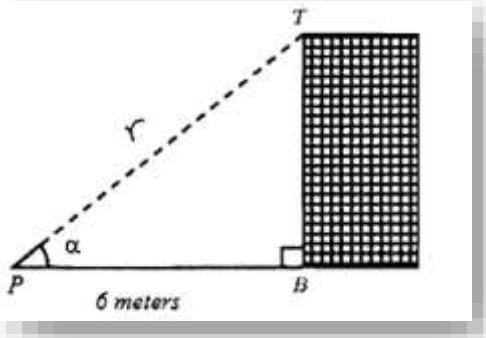
B) $\frac{100\sqrt{3}}{3}$

C) $80\sqrt{3}$

D) 100

E) $\frac{80\sqrt{3}}{3}$

The angle of elevation from a point P that is 6 meters from the base of a building to the top of the building is α. If $\sin\ \alpha = \frac{4}{5}$ then the height of the building is



A) 8 meters

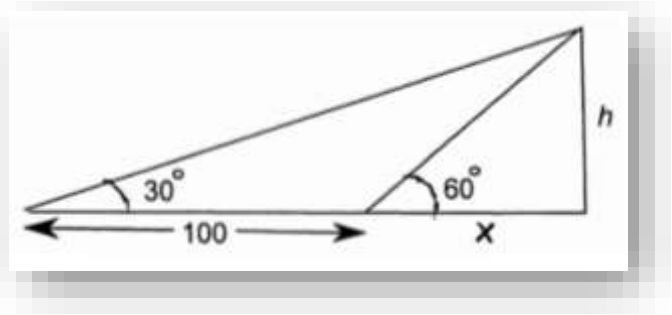
B) 3 meters

c) 16 meters

D) 9 meters

E) 64 meters

In the adjacent figure $h =$



(a) 50

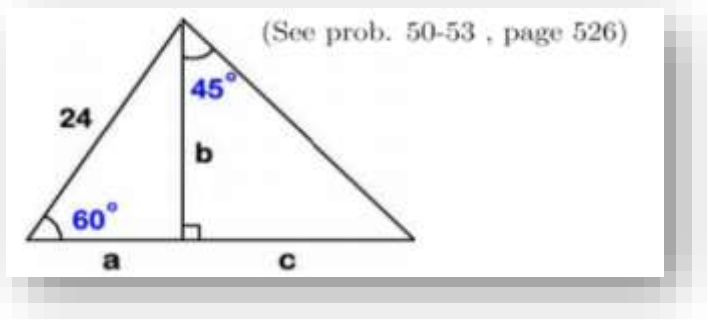
(b) $50\sqrt{3}$

(c) $100(\sqrt{3}-1)$

(d) $100\sqrt{3}$

(e) $\frac{50\sqrt{3}}{3}$

The value of $2a + \frac{b}{\sqrt{3}} - \sqrt{3}c$ in the adjacent figure is



A) 0

B) $12\sqrt{3}$

C) $24\sqrt{3}$

D) $-12\sqrt{3}$

E) 12

If $\tan\ \theta = -\frac{4}{5}$ and $\sin\ \theta < 0$, then $\sec\ \theta - \csc\ \theta =$

A) $\frac{9\sqrt{41}}{20}$

B) $-\frac{9\sqrt{41}}{20}$

C) $\frac{\sqrt{41}}{20}$

D) $-\frac{\sqrt{41}}{20}$

E) $\frac{9\sqrt{41}}{41}$

Let θ be an acute angle satisfying the equation $3\sin\ \theta = 4\cos\ \theta$, then $\csc\ \theta - \sec\ \theta =$

A) $\frac{5}{4}$

B) $-\frac{1}{5}$

c) $\frac{5}{12}$

D) $\frac{1}{5}$

E) $-\frac{5}{12}$

If from the top of a tower $120\sqrt{3}$ feet high, the angles of depression to the top and bottom of a building opposite to the tower are observed to be $30°$ and $60°$ respectively, then the height of the building is

(a) $80\sqrt{3}$ feet

(b) $60\sqrt{3}$ feet

(c) $120\sqrt{3}$ feet

(d) $240\sqrt{3}$ feet

(e) $40\sqrt{3}$ feet

If the angle of elevation from a point 60 meters from the base of a tower to the top of the tower is θ, where $\sec\ \theta = \frac{2\sqrt{3}}{3}$. How high must the tower be raised so the angle of elevation from the same point changes to $60°$?

A) $40\sqrt{3}$

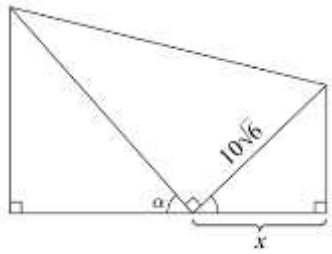
B) $20\sqrt{3}$

C) $60\sqrt{3}$

D) $80(\sqrt{3}-1)$

E) $20(\sqrt{3}-1)$

In the adjacent figure, if $\alpha = \frac{\pi}{3}$, then the value of x is



A) $15\sqrt{2}$

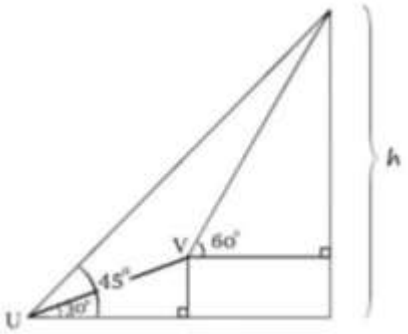
B) $5\sqrt{6}$

C) $10\sqrt{3}$

D) $5\sqrt{3}$

E) $10\sqrt{6}$

In the adjacent figure, if the length of line $\mathrm{UV} = 8$, then $h =$



A) $4(\sqrt{3}+1)$

B) $8(\sqrt{3}+1)$

C) $8(\sqrt{3}+2)$

D) $4(\sqrt{3}+2)$

E) $2(\sqrt{3}+2)$