

MATHEMATICS 201-009-50

Precalculus

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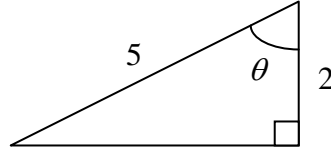
Fall 2007

XVI – Right Angle Trigonometry

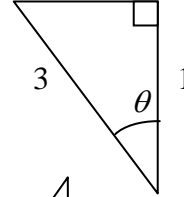
- Find the radian measure of the given degree measure.
a) 75° b) 210° c) -45° d) 420°
e) 135° f) 900° g) -315° h) 48°
- Find the degree measure of the given radian measure.
a) $\frac{2\pi}{3}$ b) $\frac{-3\pi}{4}$ c) $\frac{5\pi}{2}$ d) $\frac{5\pi}{6}$
e) $\frac{8\pi}{3}$ f) $\frac{-7\pi}{12}$ g) $\frac{5\pi}{18}$ h) 2
- Determine two coterminal angles (one positive and one negative) for each angle. Give your answer in radians.
a) $\frac{2\pi}{3}$ b) $\frac{-3\pi}{4}$ c) $\frac{5\pi}{2}$ d) $\frac{5\pi}{6}$
- Find the length of the arc that subtends a central angle of 60° in a circle of radius 15m.
- Find the length of the arc of a circle of radius 7m subtended by a central angle of 135° .
- Find the central angle θ in a circle of radius 10m that subtends an arc of length 8m. Give the answer in degrees and in radians.
- Find the central angle θ in a circle of radius 50m that subtends an arc of length 120m. Give the answer in degrees and in radians.
- A circular arc of length 4m subtends a central angle of 30° . Find the radius of the circle.
- A circular arc of length 9m subtends a central angle of 3 rad. Find the radius of the circle.
- Find the area of a sector with central angle 120° in a circle of radius 5m.
- Find the area of a sector with central angle 5 radians in a circle of radius 2m.
- The area of a circle is 48m^2 . Find the area of a sector of this circle that subtends a central angle of 45° .
- The area of a sector of a circle of radius 3m is 7m^2 . Find the central angle of the sector. Give your answer in degree and in radians.

14. Find the value of the six trigonometric functions for the angle in the triangle shown.

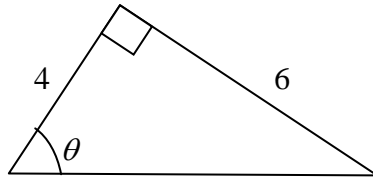
a)



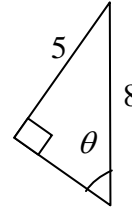
b)



c)



d)



15. Assuming that θ is an acute angle, find the other five trigonometric functions for θ .

a) $\cos \theta = \frac{3}{5}$

b) $\csc \theta = \frac{13}{5}$

c) $\cot \theta = 1$

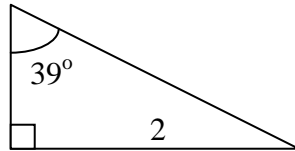
d) $\sec \theta = 4$

e) $\sin \theta = \frac{1}{2}$

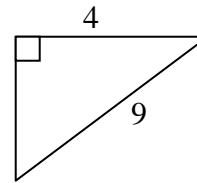
f) $\tan \theta = \sqrt{3}$

16. Solve the following right triangle.

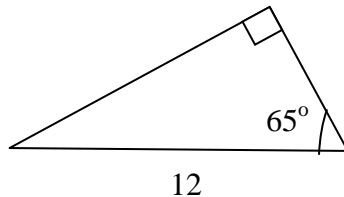
a)



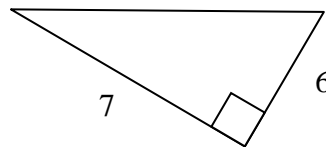
b)



c)



d)



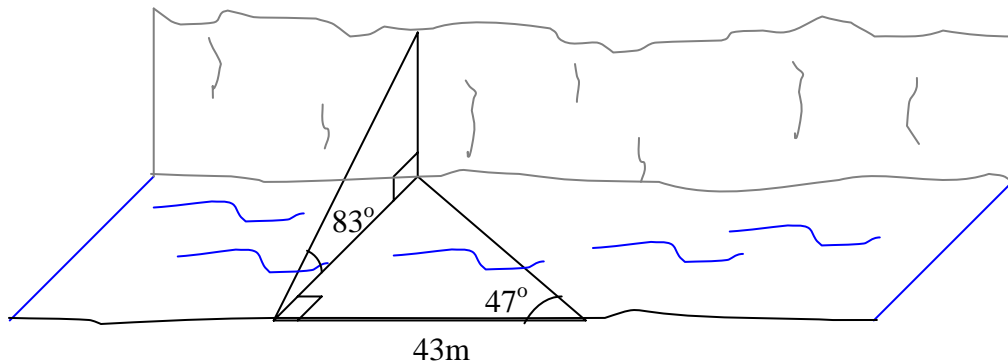
17. A pilot is flying within sight of the Chateau Frontenac, at an elevation of 2.1 km. The pilot would like to estimate his distance from the Chateau Frontenac. He finds that the angle of depression to a point on the ground is 24° .

a) What is the distance between the plane and the Chateau?

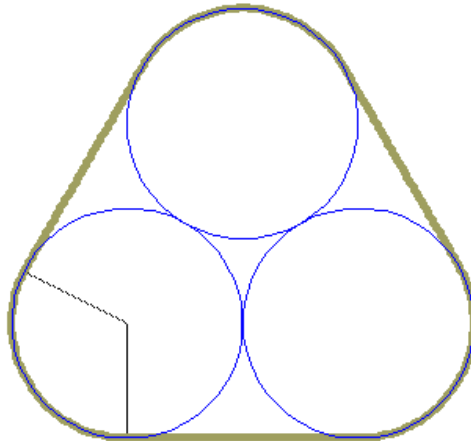
b) What is the distance between a point on the ground directly below the plane and the Chateau?

18. From a 15m observation tower on the coast, a Coast Guard sights a boat where the person on board seems to be calling for help. How far is the boat from the shoreline if the Coast Guard measures the angle of depression to be 6° ?

19. The height of a steep cliff is to be measured from a point on the opposite side of the river. Find the height of the cliff from the information given in the figure.



20. A laser beam is to be directed towards the center of the moon, but the beam strays 0.5° from its intended path.
- How far has the beam diverged from its assigned target when it reaches the moon?
(The distance between the moon and the earth is 384 400 km).
 - The radius of the moon is about 1738 km. Will the beam strike the moon?
21. Find the length of the belt around the three cylinders, each of whose diameter is 9 cm.

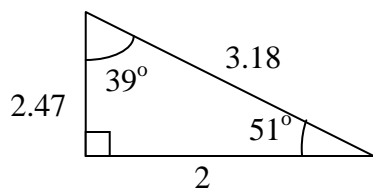


ANSWERS

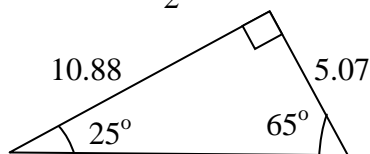
1. a) $\frac{5\pi}{12}$ b) $\frac{7\pi}{6}$ c) $\frac{-\pi}{4}$ d) $\frac{7\pi}{3}$ e) $\frac{3\pi}{4}$ f) 5π g) $\frac{-7\pi}{4}$ h) $\frac{4\pi}{15}$
 2. a) 120° b) -135° c) 450° d) 150° e) 480° f) -105°
 g) 50° h) $\frac{360^\circ}{\pi}$
 3. a) $\frac{-4\pi}{3}, \frac{8\pi}{3}$ b) $\frac{-11\pi}{4}, \frac{5\pi}{4}$ c) $\frac{-3\pi}{2}, \frac{\pi}{2}$ d) $\frac{-7\pi}{6}, \frac{17\pi}{6}$
 4. 5π m 5. $\frac{21\pi}{4}$ m 6. $\frac{4}{5}$ rad $\approx 45.8^\circ$ 7. $\frac{12}{5}$ rad $\approx 137.5^\circ$
 8. $\frac{24}{\pi}$ m 9. 3 m 10. $\frac{25\pi}{3}$ m² 11. 10 m² 12. 6 m² 13. $\frac{14}{9}$ rad $\approx 89.1^\circ$

14. a) $\sin \theta = \frac{\sqrt{21}}{5}$ $\csc \theta = \frac{5\sqrt{21}}{21}$ b) $\sin \theta = \frac{2\sqrt{2}}{3}$ $\csc \theta = \frac{3\sqrt{2}}{4}$
 $\cos \theta = \frac{2}{5}$ $\sec \theta = \frac{5}{2}$ $\cos \theta = \frac{1}{3}$ $\sec \theta = 3$
 $\tan \theta = \frac{\sqrt{21}}{2}$ $\cot \theta = \frac{2\sqrt{21}}{21}$ $\tan \theta = 2\sqrt{2}$ $\cot \theta = \frac{\sqrt{2}}{4}$
 c) $\sin \theta = \frac{3\sqrt{13}}{13}$ $\csc \theta = \frac{\sqrt{13}}{3}$ d) $\sin \theta = \frac{5}{8}$ $\csc \theta = \frac{8}{5}$
 $\cos \theta = \frac{2\sqrt{13}}{13}$ $\sec \theta = \frac{\sqrt{13}}{2}$ $\cos \theta = \frac{\sqrt{39}}{8}$ $\sec \theta = \frac{8\sqrt{39}}{39}$
 $\tan \theta = \frac{3}{2}$ $\cot \theta = \frac{2}{3}$ $\tan \theta = \frac{5\sqrt{39}}{39}$ $\cot \theta = \frac{\sqrt{39}}{5}$
 15. a) $\sin \theta = \frac{4}{5}$ $\csc \theta = \frac{5}{4}$ b) $\sin \theta = \frac{5}{13}$ $\sec \theta = \frac{13}{12}$
 $\tan \theta = \frac{4}{3}$ $\sec \theta = \frac{5}{3}$ $\cos \theta = \frac{12}{13}$ $\cot \theta = \frac{12}{5}$
 $\cot \theta = \frac{3}{4}$ $\tan \theta = \frac{5}{12}$
 c) $\sin \theta = \frac{\sqrt{2}}{2}$ $\csc \theta = \sqrt{2}$ d) $\sin \theta = \frac{\sqrt{15}}{4}$ $\csc \theta = \frac{4\sqrt{15}}{15}$
 $\cos \theta = \frac{\sqrt{2}}{2}$ $\sec \theta = \sqrt{2}$ $\cos \theta = \frac{1}{4}$ $\cot \theta = \frac{\sqrt{15}}{15}$
 $\tan \theta = 1$ $\tan \theta = \sqrt{15}$
 e) $\cos \theta = \frac{\sqrt{3}}{2}$ $\csc \theta = 2$ f) $\sin \theta = \frac{\sqrt{3}}{2}$ $\csc \theta = \frac{2\sqrt{3}}{3}$
 $\tan \theta = \frac{\sqrt{3}}{3}$ $\sec \theta = \frac{2\sqrt{3}}{3}$ $\cos \theta = \frac{1}{2}$ $\sec \theta = 2$
 $\cot \theta = \sqrt{3}$ $\cot \theta = \frac{\sqrt{3}}{3}$

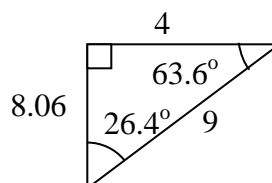
16. a)



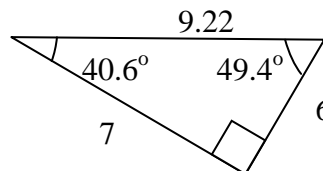
c)



b)



d)



17. a) 5.16 km

b) 4.72 km

18. 142.7 m

19. 375.6m

20. a) 3355 km

b) No

21. $27 + 9\pi \approx 55.3$ cm