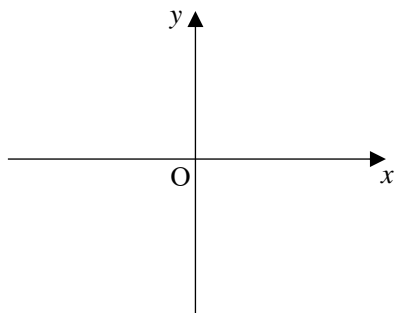


Trigonometric function

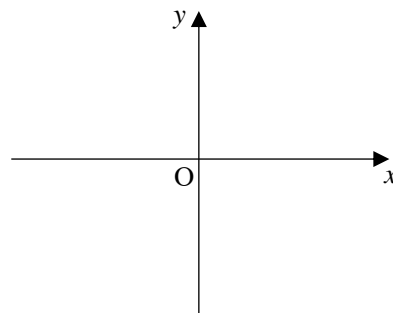
1

In the coordinate plane with point O as the origin, take the positive part of the x -axis as the starting line and illustrate the radius of motion OP rotated by the following angle. Also, express the general angle θ represented by the radius of motion OP in the form $\theta = \alpha + 360^\circ \times n$ ($0^\circ \leq \alpha < 360^\circ$, n is an integer), and answer in what quadrant the angle is.

(1) 800°



(2) -200°



2 Rewrite the following angles in degrees to arc degrees and arc degrees to degrees, respectively.

(1) 135°

(2) -108°

(3) $\frac{\pi}{2}$

(4) $-\frac{13}{10}\pi$

3

Find the arc length l and area S of a fan shape whose radius is 9 and whose central angle is $\frac{2}{3}\pi$.

4 Find the values of $\sin\theta$, $\cos\theta$, and $\tan\theta$, respectively, when θ has the following values.

(1) $\frac{5}{3}\pi$

(2) $-\frac{3}{4}\pi$

5

If θ is an angle in the fourth quadrant and $\cos \theta = \frac{1}{3}$, find the values of $\sin \theta$ and $\tan \theta$, respectively.

6

When $\sin \theta + \cos \theta = \frac{1}{2}$, find the value of the following expression.

(1) $\sin \theta \cos \theta$

(2) $\sin^3 \theta + \cos^3 \theta$

7 Find the following values.

(1) $\sin \frac{100}{3} \pi$

(2) $\tan \left(-\frac{3}{4} \pi \right)$

(3) $\sin \frac{3}{10} \pi + \cos \frac{4}{5} \pi$

8

(1) Graph the following functions. Find its period.

① $y = -\frac{1}{2} \cos \theta$

② $y = \tan 2\theta$

③ $y = \sin\left(\theta + \frac{\pi}{2}\right) + 1$

(2) For the functions ① through ③ in (1), answer which are even functions and which are odd functions, respectively.

9 Solve the following equations and inequalities for $0 \leq \theta < 2\pi$.

(1) $\sin \theta = -\frac{1}{\sqrt{2}}$

(2) $\cos \theta > \frac{1}{2}$

10

(1) Solve the equation $2 \sin\left(\theta - \frac{\pi}{6}\right) = -\sqrt{3}$ for $0 \leq \theta < 2\pi$.

(2) Solve the following equations and inequalities for $0 \leq \theta < 2\pi$.

① $2\sin^2\theta + 3\cos\theta - 3 = 0$

② $2\sin^2\theta + 3\cos\theta - 3 \geq 0$

1 1

Find the maximum and minimum values of the function $y = \sin^2\theta + \cos\theta$ when $0 \leq \theta < 2\pi$.

Also, find the value of θ at that time.

1 2 Find the following values.

(1) $\sin 15^\circ$

(2) $\cos 195^\circ$

(3) $\tan \frac{5}{12}\pi$

13

$0 < \alpha < \frac{\pi}{2}$, $\pi < \beta < \frac{3}{2}\pi$ and $\cos \alpha = \frac{12}{13}$, $\sin \beta = -\frac{3}{5}$, find the following values.

(1) $\sin(\alpha - \beta)$

(2) $\cos(\alpha - \beta)$

1 4 Find the acute angle θ formed by the two lines $y=5x$ and $2x=3y$.

15

Find the values of $\sin 2\alpha$, $\cos 2\alpha$, and $\tan 2\alpha$ when $\frac{\pi}{2} < \alpha < \pi$ and $\sin \alpha = \frac{1}{4}$.

16

Find the values of $\sin \frac{\alpha}{2}$, $\cos \frac{\alpha}{2}$, and $\tan \frac{\alpha}{2}$ when $\frac{3}{2}\pi < \alpha < 2\pi$ and $\sin \alpha = -\frac{4}{5}$.

1 7 Solve the following equations and inequalities for $0 \leq \theta < 2\pi$.

(1) $\sin 2\theta = -\sqrt{2} \cos \theta$

(2) $\cos 2\theta < 3 \cos \theta + 1$

1 8 Transform the following equation into the form $r\sin(\theta + \alpha)$. However, $r > 0$ and $-\pi < \alpha \leq \pi$.

(1) $-\sin \theta + \cos \theta$

(2) $\sqrt{3} \sin \theta - 3 \cos \theta$

19 Solve the following equations and inequalities for $0 \leq \theta < 2\pi$.

(1) $\sin \theta - \sqrt{3} \cos \theta - 1 = 0$

(2) $\sqrt{2} \sin \theta + \sqrt{2} \cos \theta \leq -\sqrt{3}$

20

Find the maximum and minimum values of the function $y = \sqrt{3} \sin \theta + \cos \theta - 1$ when $0 \leq \theta < 2\pi$.
Also, find the value of θ at that time.

Study 1

If the equation $\sin^2\theta + \cos\theta - a = 0$ has three solutions with $0 \leq \theta < 2\pi$, find the value of the constant a .

Study 2

Find the following values.

(1) $\sin 105^\circ \cos 15^\circ$

(2) $\cos 15^\circ \cos 75^\circ$

(3) $\sin 15^\circ + \sin 75^\circ$

(4) $\cos 15^\circ - \cos 105^\circ$

Study 3

When $0 \leq \theta < 2\pi$, answer the following questions.

- (1) Find the maximum and minimum values of the function $y = \sin\theta\cos\theta - \sqrt{3}\sin^2\theta$.

Also, find the value of θ at that time.

- (2) Find the maximum and minimum values of the function $y = \sin 2\theta - 2\sin\theta + 2\cos\theta$.

Also, find the value of θ at that time.