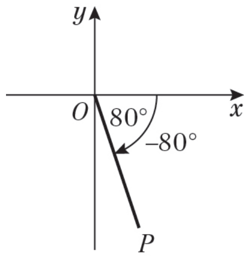
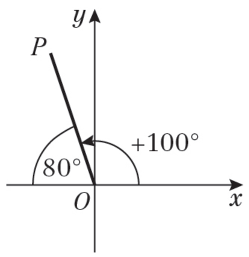
Exercise 6A

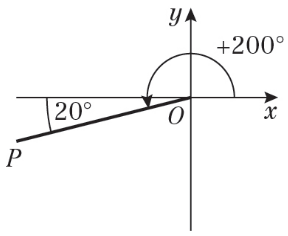
1 a



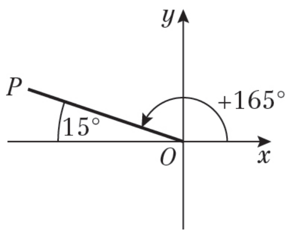
b



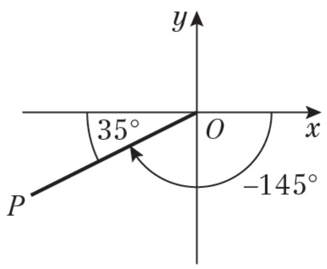
c



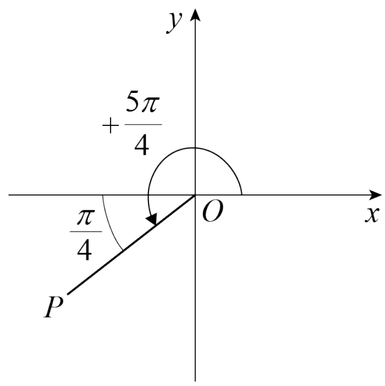
d



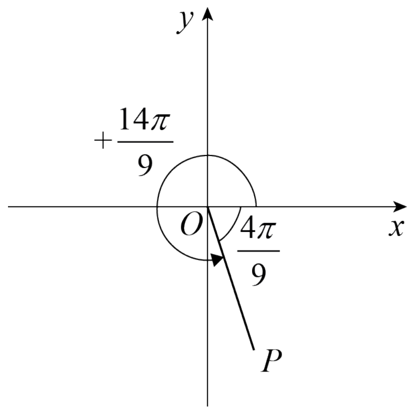
e



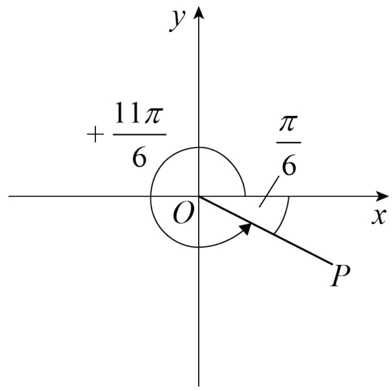
1 f



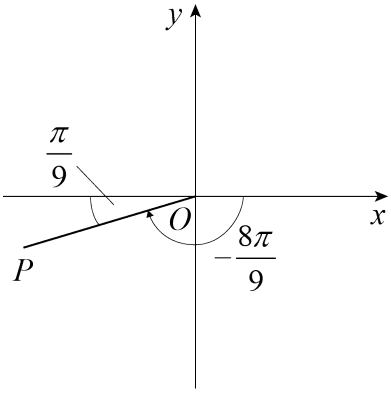
g



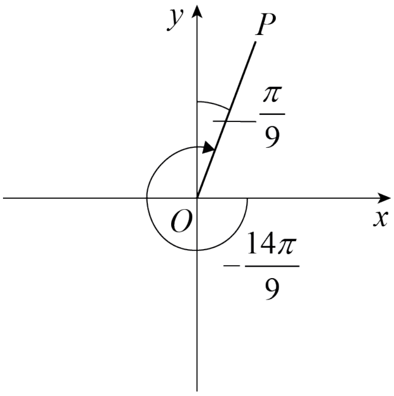
h



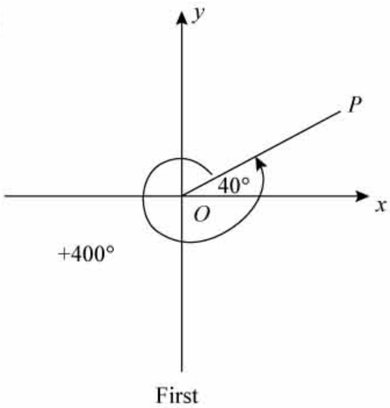
1 i


y
x
O
P
$\frac{\pi}{9}$
$-\frac{8\pi}{9}$

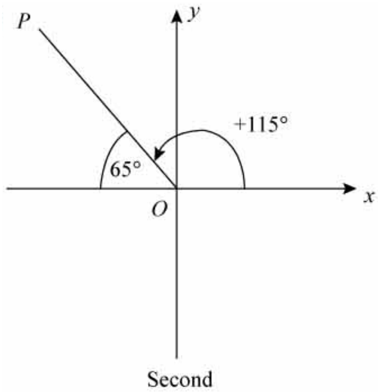
j


y
P
x
O
$\frac{\pi}{9}$
$-\frac{14\pi}{9}$

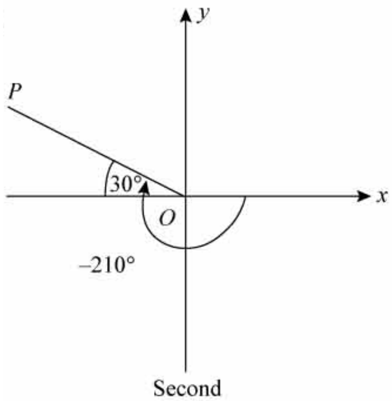
2 a


y
P
40°
O
x
+400°
First

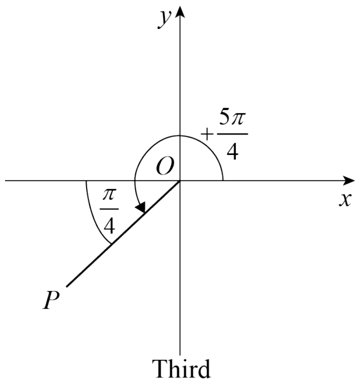
b


P
y
+115°
65°
O
x
Second

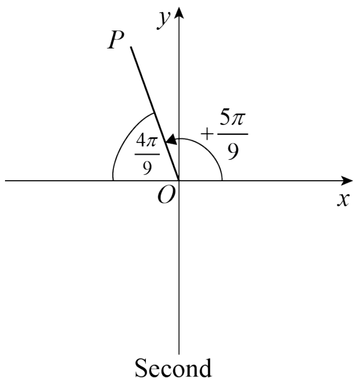
c


y
P
30°
O
x
–210°
Second

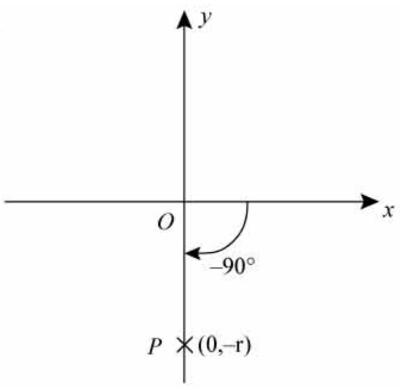
d


y
$+\frac{5\pi}{4}$
O
$\frac{\pi}{4}$
x
P
Third

e

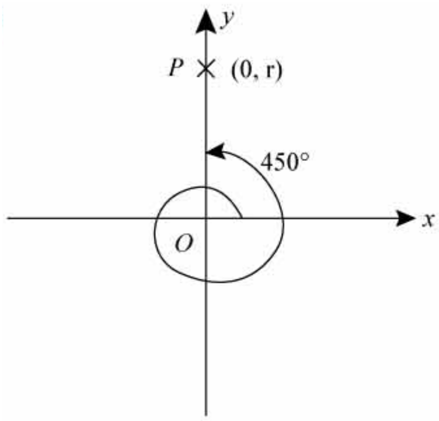

y
P
$\frac{4\pi}{9}$
$+\frac{5\pi}{9}$
O
x
Second

3 a



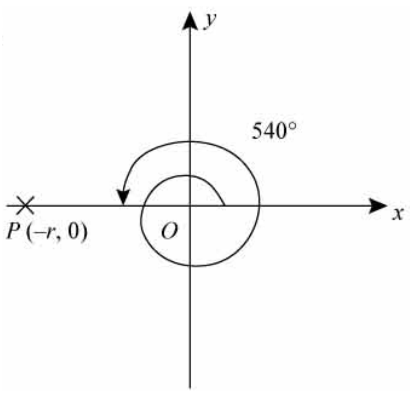
$\sin(-90)° = \frac{-r}{r} = -1$

b



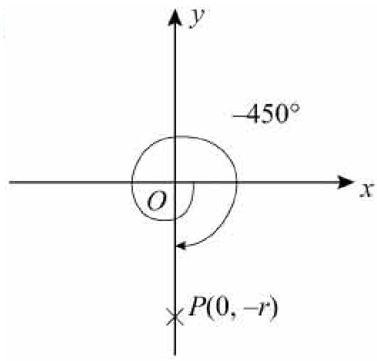
$\sin 450° = \frac{r}{r} = 1$

c



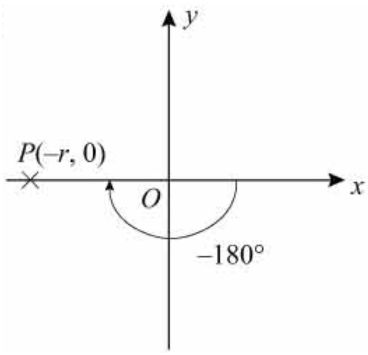
$\sin 540° = \frac{0}{r} = 0$

3 d



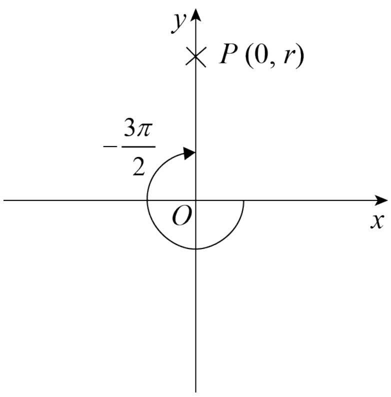
$\sin(-450)° = \frac{-r}{r} = -1$

e



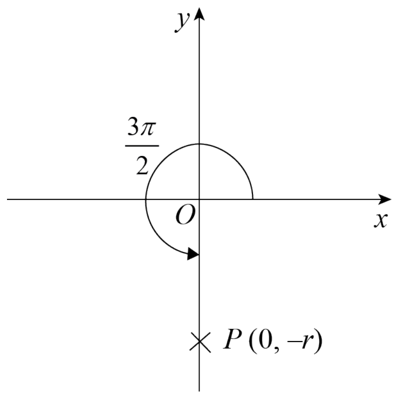
$\cos(-180)° = \frac{-r}{r} = -1$

f



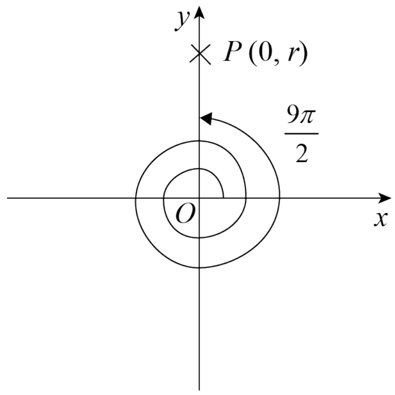
$\cos\left(-\frac{3\pi}{2}\right) = \frac{0}{r} = 0$

3 g



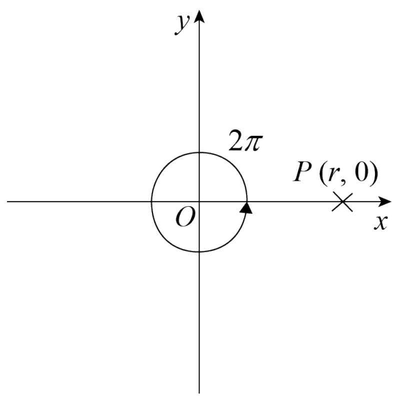
$$\cos\left(\frac{3\pi}{2}\right)=\frac{0}{r}=0$$

h



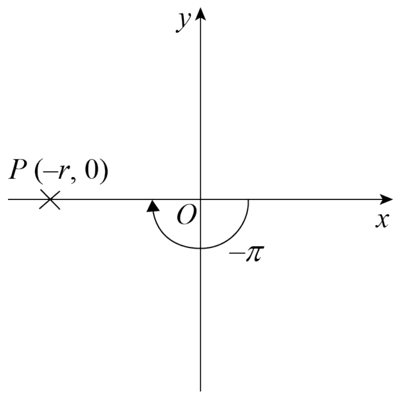
$$\cos\left(\frac{9\pi}{2}\right)=\frac{0}{r}=0$$

i



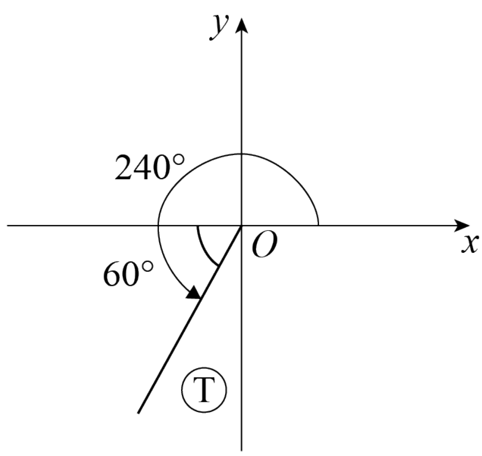
$$\tan 2\pi=\frac{0}{r}=0$$

3 j



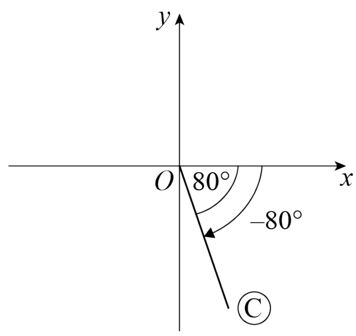
$$\tan(-\pi)=\frac{0}{-r}=0$$

4 a



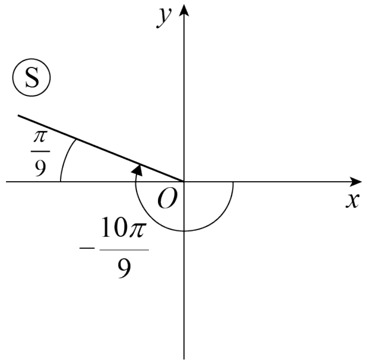
60° is the acute angle.
In the third quadrant sin is $-$ve.
So $\sin 240° = -\sin 60°$

b



80° is the acute angle.
In the fourth quadrant sin is $-$ve.
So $\sin(-80)° = -\sin 80°$

4 c

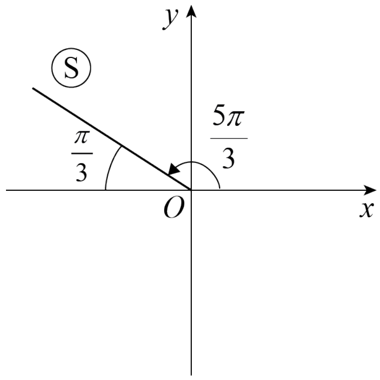


$\frac{\pi}{9}$ is the acute angle.

In the second quadrant only sin is positive.

so $\sin\left(-\frac{10\pi}{9}\right)=\sin\left(\frac{\pi}{9}\right)$.

d

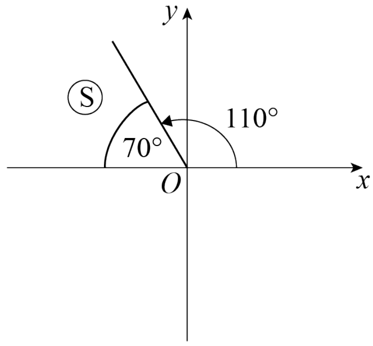


$\frac{\pi}{3}$ is the acute angle.

In the fourth quadrant only cos is positive.

So $\sin\left(\frac{5\pi}{3}\right)=-\sin\left(\frac{\pi}{3}\right)$.

4 e

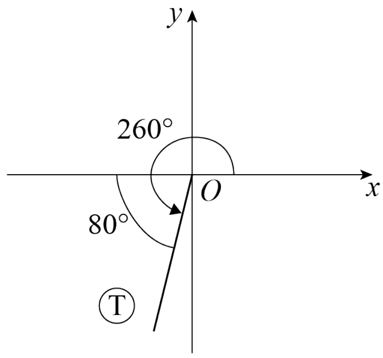


$70°$ is the acute angle.

In the second quadrant cos is $-$ve.

So $\cos 110° = -\cos 70°$

f

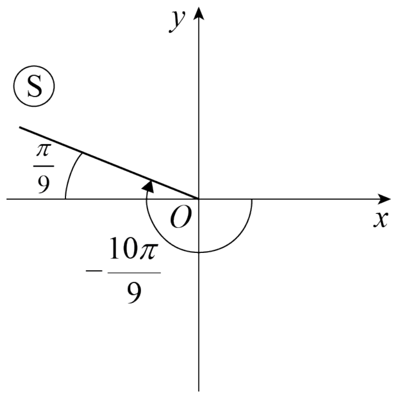


$80°$ is the acute angle.

In the third quadrant cos is $-$ve.

So $\cos 260° = -\cos 80°$

g

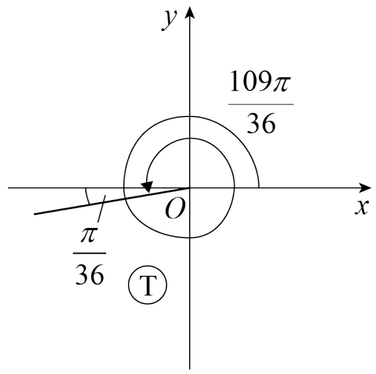


$\frac{\pi}{9}$ is the acute angle.

In the second quadrant only sin is positive.

So $\cos\left(-\frac{10\pi}{9}\right)=-\cos\left(\frac{\pi}{9}\right)$.

4 h

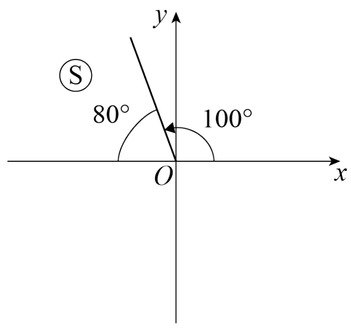


$\frac{\pi}{36}$ is the acute angle.

In the third quadrant only tan is positive.

So $\cos\left(\frac{109\pi}{36}\right) = -\cos\left(\frac{\pi}{36}\right)$.

i

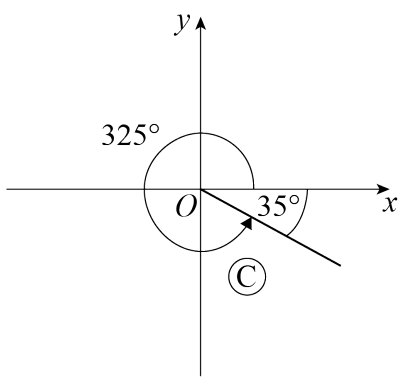


80° is the acute angle.

In the second quadrant tan is −ve.

So $\tan 100° = -\tan 80°$

j

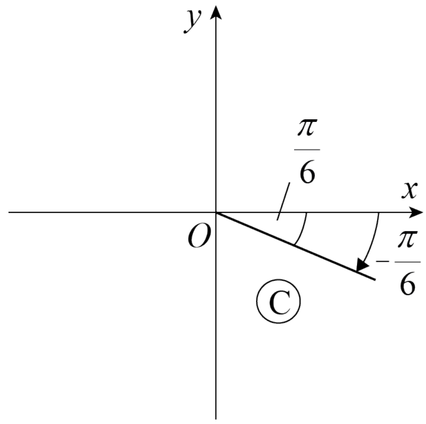


35° is the acute angle.

In the fourth quadrant tan is −ve.

So $\tan 325° = -\tan 35°$

4 k

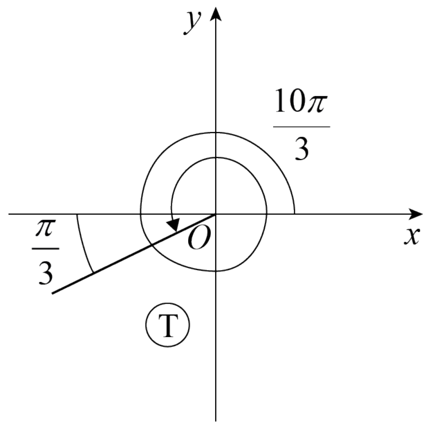


$\frac{\pi}{6}$ is the acute angle.

In the fourth quadrant only cos is positive.

So $\tan\left(-\frac{\pi}{6}\right) = -\tan\left(\frac{\pi}{6}\right)$

l

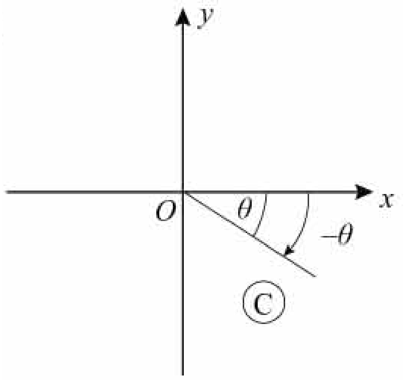


$\frac{\pi}{3}$ is the acute angle.

In the third quadrant only tan is positive.

So $\tan\left(\frac{10\pi}{3}\right) = \tan\left(\frac{\pi}{3}\right)$

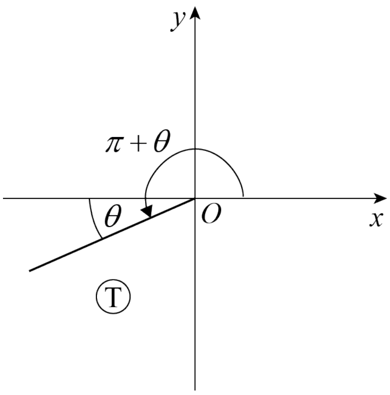
5 a



sin is – ve in this quadrant.

So $\sin(-\theta) = -\sin\theta$

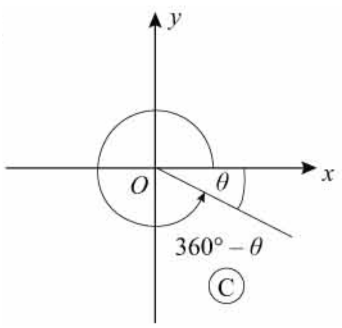
b



Only tan is + ve in this quadrant.

So $\sin(\pi + \theta) = -\sin\theta$

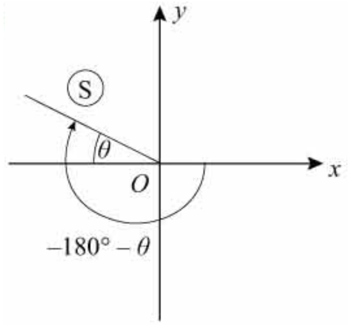
c



sin is – ve in this quadrant.

So $\sin(360° - \theta) = -\sin\theta$

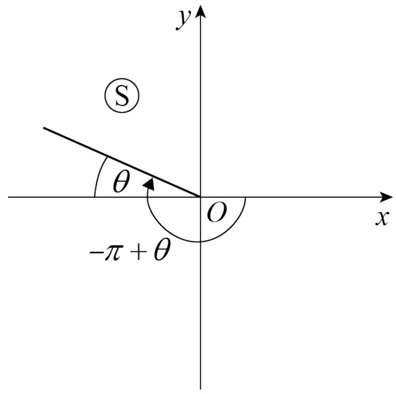
5 d



sin is + ve in this quadrant.

So $\sin-(180° + \theta) = +\sin\theta$

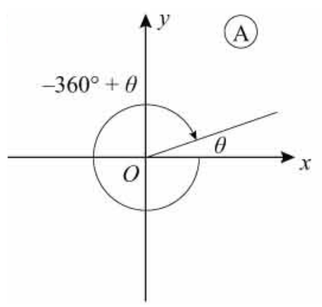
e



sin is +ve in this quadrant.

So $\sin(-\pi + \theta) = -\sin\theta$

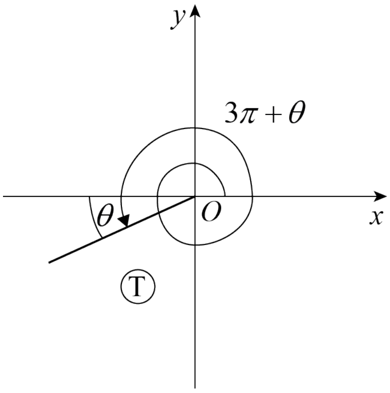
f



sin is + ve in this quadrant.

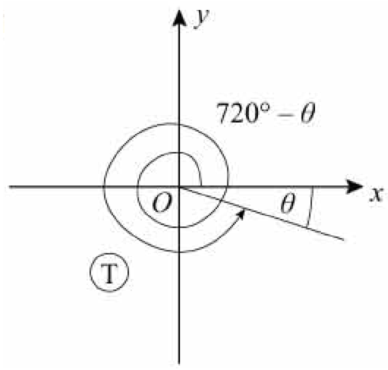
So $\sin(-360° + \theta) = +\sin\theta$

5 g



Only tan is + ve in this quadrant.
So $\sin(3\pi+\theta)=-\sin\theta$

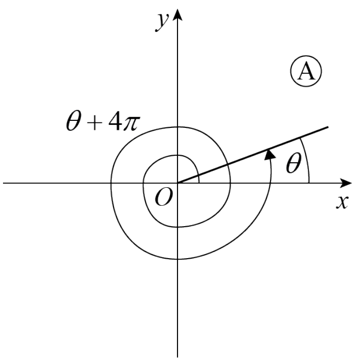
h



sin is + ve in this quadrant.

So $\sin(720°-\theta)=-\sin\theta$

i



sin, cos and tan are all + ve in this quadrant.
So $\sin(\theta+4\pi)=\sin\theta$

6 a $\pi-\theta$ is in the second quadrant, at θ to the horizontal.
So $\cos(\pi-\theta)=-\cos\theta$

b $180°+\theta$ is in the third quadrant, at θ to the horizontal.
So $\cos(180°+\theta)=-\cos\theta$

c $-\theta$ is in the fourth quadrant, at θ to the horizontal.
So $\cos(-\theta)=+\cos\theta$

d $-(180°-\theta)$ is in the third quadrant, at θ to the horizontal.
So cos $-(180°-\theta)=-\cos\theta$

e $\theta-2\pi$ is in the first quadrant, at θ to the horizontal.
So $\cos(\theta-2\pi)=\cos\theta$

f $\theta-540°$ is in the third quadrant, at θ to the horizontal.
So $\cos(\theta-540°)=-\cos\theta$

g $-\theta$ is in the fourth quadrant.
So $\tan(-\theta)=-\tan\theta$

h $\pi-\theta$ is in the second quadrant, at θ to the horizontal.
So $\tan(\pi-\theta)=-\tan\theta$

i $(180°+\theta)$ is in the third quadrant.
So $\tan(180°+\theta)=+\tan\theta$

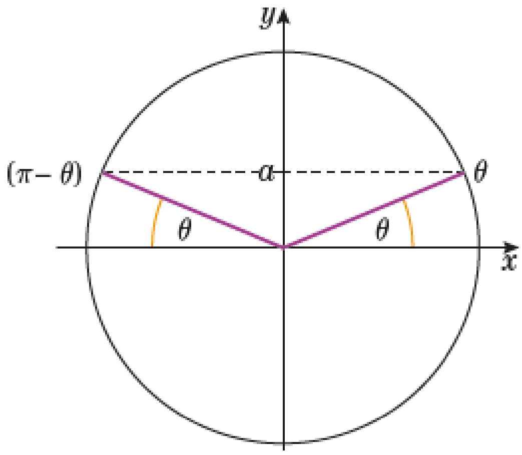
j $-\pi+\theta$ is in the third quadrant.
So $\tan(-\pi+\theta)=\tan\theta$

k $3\pi-\theta$ is in the second quadrant.
So $\tan(3\pi-\theta)=-\tan\theta$

l $\theta-2\pi$ is in the first quadrant.
So $\tan(\theta-2\pi)=\tan\theta$

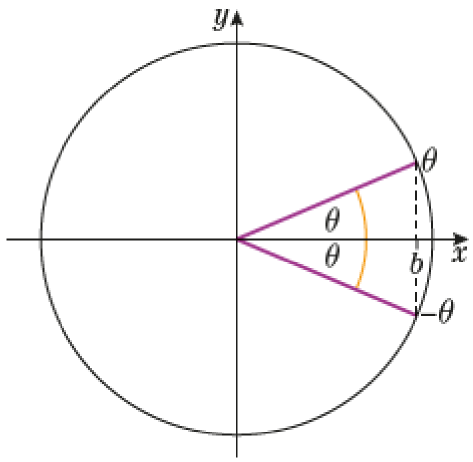
Challenge

a



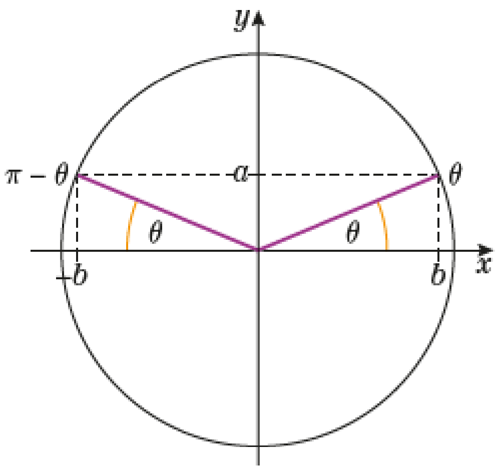
$\sin\theta = \sin(180 - \theta) = a$

b



$\cos\theta = \cos(-\theta) = b$

c



$\tan\theta = \dfrac{a}{b}$

$\tan(\pi - \theta) = \dfrac{a}{-b} = -\tan\theta$