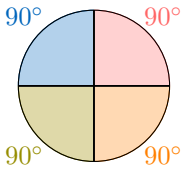
TRIGONOMETRY

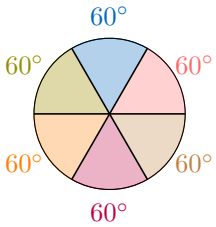
A RADIAN MEASURE

A.1 CONVERTING DEGREES TO RADIANS IN TERMS OF π



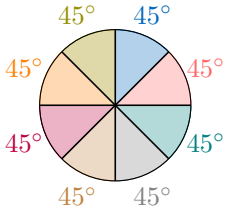
Ex 1: Convert to radians in terms of π:

$90° =$ ☐



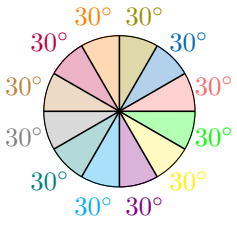
Ex 2: Convert to radians in terms of π:

$60° =$ ☐



Ex 3: Convert to radians in terms of π:

$45° =$ ☐



Ex 4: Convert to radians in terms of π:

$30° =$ ☐

A.2 CONVERTING DEGREES TO RADIANS

Ex 5: Convert to radians (round to 2 decimal places).

$46.5° =$ ☐

Ex 6: Convert to radians (round to 2 decimal places).

$110° =$ ☐

Ex 7: Convert to radians (round to 2 decimal places).

$43° =$ ☐

Ex 8: Convert to radians (round to 2 decimal places).

$300° =$ ☐

A.3 CONVERTING RADIANS TO DEGREES

Ex 9: Convert to degrees (round to the nearest integer).

$1.25 =$ ☐°

Ex 10: Convert to degrees (round to the nearest integer).

$0.7 =$ ☐°

Ex 11: Convert to degrees (round to the nearest integer).

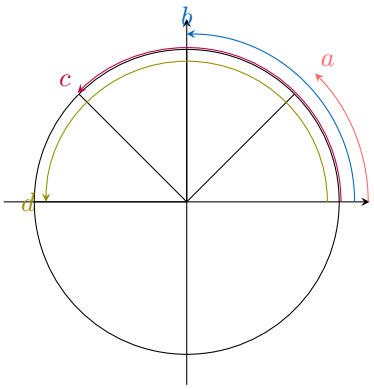
$4.5 =$ ☐°

Ex 12: Convert to degrees (round to the nearest integer).

$2 =$ ☐°

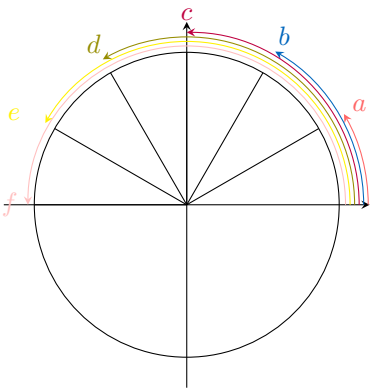
A.4 CONVERTING REFERENCE ANGLES TO RADIANS

Ex 13: Convert to radians in terms of π:



- $a =$ ☐
- $b =$ ☐
- $c =$ ☐
- $d =$ ☐

Ex 14: Convert to radians in terms of π:



- $a =$ ☐
- $b =$ ☐
- $c =$ ☐
- $d =$ ☐
- $e =$ ☐
- $f =$ ☐

A.5 CALCULATING TRIGONOMETRIC VALUES

Ex 15: Calculate (round to 2 decimal places)

$\cos\left(\frac{\pi}{4}\right) \approx$ ☐

Ex 16: Calculate (round to 2 decimal places)

$\cos\left(\frac{\pi}{6}\right) \approx$ ☐

Ex 17: Calculate (round to 2 decimal places)

$\sin\left(\frac{5\pi}{6}\right) \approx$ ☐

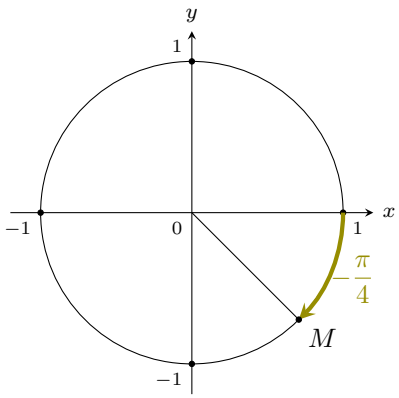
Ex 18: Calculate (round to 2 decimal places)

$\sin\left(-\frac{\pi}{5}\right) \approx$ ☐

B TRIGONOMETRIC RATIOS AND UNIT CIRCLE

B.1 EXPRESSING THE COORDINATES OF A POINT ON THE UNIT CIRCLE

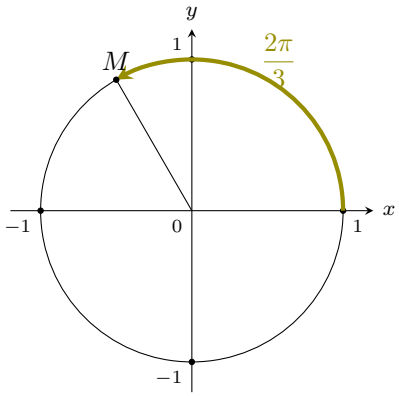
Ex 19:



Determine the coordinates of point M in terms of sine and cosine:

$M($ ☐ ; ☐ $)$.

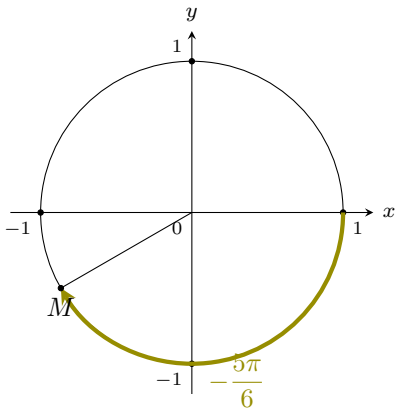
Ex 20:



Determine the coordinates of point M in terms of sine and cosine:

$M($ ☐ ; ☐ $)$.

Ex 21:



Determine the coordinates of point M in terms of sine and cosine:

$M($ ☐ ; ☐ $)$.

B.2 FINDING SINE AND COSINE VALUES ON THE UNIT CIRCLE

Ex 22: Find the values:

- $\cos\left(\frac{\pi}{2}\right) =$ ☐

- $\sin\left(\frac{\pi}{2}\right) =$ ☐

Ex 23: Find the values:

- $\cos(\pi) =$ ☐
- $\sin(\pi) =$ ☐

Ex 24: Find the values:

- $\cos\left(-\frac{\pi}{2}\right) =$ ☐
- $\sin\left(-\frac{\pi}{2}\right) =$ ☐

Ex 25: Find the values:

- $\cos(-\pi) =$ ☐
- $\sin(-\pi) =$ ☐

B.3 DETERMINING THE SIGN OF SINE AND COSINE

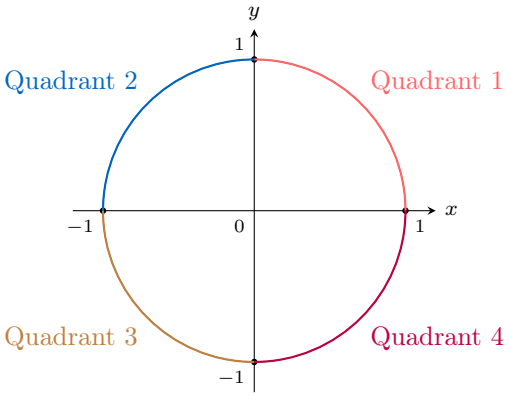
Ex 26: Determine the sign of $\cos\left(-\frac{\pi}{4}\right)$: ☐ + ☐ − .

Ex 27: Determine the sign of $\cos\left(\frac{2\pi}{3}\right)$: ☐ + ☐ − .

Ex 28: Determine the sign of $\sin\left(-\frac{\pi}{6}\right)$: ☐ + ☐ − .

Ex 29: Determine the sign of $\sin\left(\frac{5\pi}{6}\right)$: ☐ + ☐ − .

Ex 30:



- For the quadrant 1, $\cos\theta$ is ☐ + ☐ − and $\sin\theta$ is ☐ + ☐ − .
- For the quadrant 2, $\cos\theta$ is ☐ + ☐ − and $\sin\theta$ is ☐ + ☐ − .
- For the quadrant 3, $\cos\theta$ is ☐ + ☐ − and $\sin\theta$ is ☐ + ☐ − .
- For the quadrant 4, $\cos\theta$ is ☐ + ☐ − and $\sin\theta$ is ☐ + ☐ − .

C TRIGONOMETRIC PROPERTIES

C.1 EXPRESSING TRIGONOMETRIC VALUES IN TERMS OF REFERENCE ANGLES

Ex 31: Express $\cos\left(\frac{7\pi}{6}\right)$ in terms of sine or cosine of $\frac{\pi}{6}$ (use a unit circle):

$$\cos\left(\frac{7\pi}{6}\right) = \square$$

Ex 32: Express $\sin\left(\frac{5\pi}{6}\right)$ in terms of sine or cosine of $\frac{\pi}{6}$ (use a unit circle):

$$\sin\left(\frac{5\pi}{6}\right) = \square$$

Ex 33: Express $\sin\left(-\frac{\pi}{6}\right)$ in terms of sine or cosine of $\frac{\pi}{6}$ (use a unit circle):

$$\sin\left(-\frac{\pi}{6}\right) = \square$$

Ex 34: Express $\cos\left(\frac{13\pi}{6}\right)$ in terms of cosine or sine of $\frac{\pi}{6}$ (use a unit circle):

$$\cos\left(\frac{13\pi}{6}\right) = \square$$

Ex 35: Express $\cos\left(\frac{\pi}{3}\right)$ in terms of sine or cosine of $\frac{\pi}{6}$ (use a unit circle):

$$\cos\left(\frac{\pi}{3}\right) = \square$$

C.2 EXPLAINING TRIGONOMETRIC EQUALITIES

Ex 36: Explain why $\cos\left(\frac{13\pi}{6}\right) = \cos\left(\frac{\pi}{6}\right)$.

Ex 37: Explain why $\cos\left(\frac{7\pi}{6}\right) = -\cos\left(\frac{\pi}{6}\right)$.

Ex 38: Explain why $\sin\left(\frac{\pi}{4}\right) = -\sin\left(-\frac{\pi}{4}\right)$.

Ex 39: Explain why $\sin\left(\frac{5\pi}{4}\right) = -\sin\left(\frac{\pi}{4}\right)$.

Ex 40: Explain why $\sin\left(\frac{5\pi}{2}\right) = \sin\left(\frac{\pi}{2}\right)$.

C.3 FINDING EXACT TRIGONOMETRIC VALUES USING THE PYTHAGOREAN IDENTITY

Ex 41: Find the exact value of $\sin\theta$ if $\cos\theta = \frac{\sqrt{3}}{2}$ and $0 \leq \theta \leq \pi$.

$$\sin\theta = \square$$

Ex 42: Find the exact value of $\cos\theta$ if $\sin\theta = \frac{1}{\sqrt{2}}$ and $-\frac{\pi}{2} \leq \theta < \frac{\pi}{2}$.

$$\cos\theta = \square$$

Ex 43: Find the exact value of $\sin\theta$ if $\cos\theta = \frac{1}{2}$ and $-\pi \leq \theta < 0$.

$$\sin\theta = \square$$

Ex 44: Find the exact value of $\cos\theta$ if $\sin\theta = \dfrac{1}{\sqrt{2}}$ and $\dfrac{\pi}{2} < \theta < \dfrac{3\pi}{2}$.

$$\cos\theta = \square$$

D MULTIPLES OF $\frac{\pi}{4}$

D.1 READING TRIGONOMETRIC VALUES FOR MULTIPLES OF $\pi/4$

Ex 45: Use a unit circle to find:

$$\cos\left(\frac{3\pi}{4}\right) = \square$$

Ex 46: Use a unit circle to find:

$$\sin\left(\frac{7\pi}{4}\right) = \square$$

Ex 47: Use a unit circle to find:

$$\sin\left(\frac{5\pi}{4}\right) = \square$$

Ex 48: Use a unit circle to find:

$$\cos\left(-\frac{\pi}{4}\right) = \square$$

E MULTIPLES OF $\frac{\pi}{6}$

E.1 READING TRIGONOMETRIC VALUES FOR MULTIPLES OF $\pi/6$

Ex 49: Use a unit circle to find:

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

Ex 50: Use a unit circle to find:

$$\sin\left(\frac{5\pi}{6}\right) = \square$$

Ex 51: Use a unit circle to find:

$$\cos\left(\frac{7\pi}{6}\right) = \square$$

Ex 52: Use a unit circle to find:

$$\sin\left(-\frac{\pi}{3}\right) = \square$$