# What's Going On?

**Checking In**

**Minds on** Back to CAST

**Action!** Properties of sin and cos

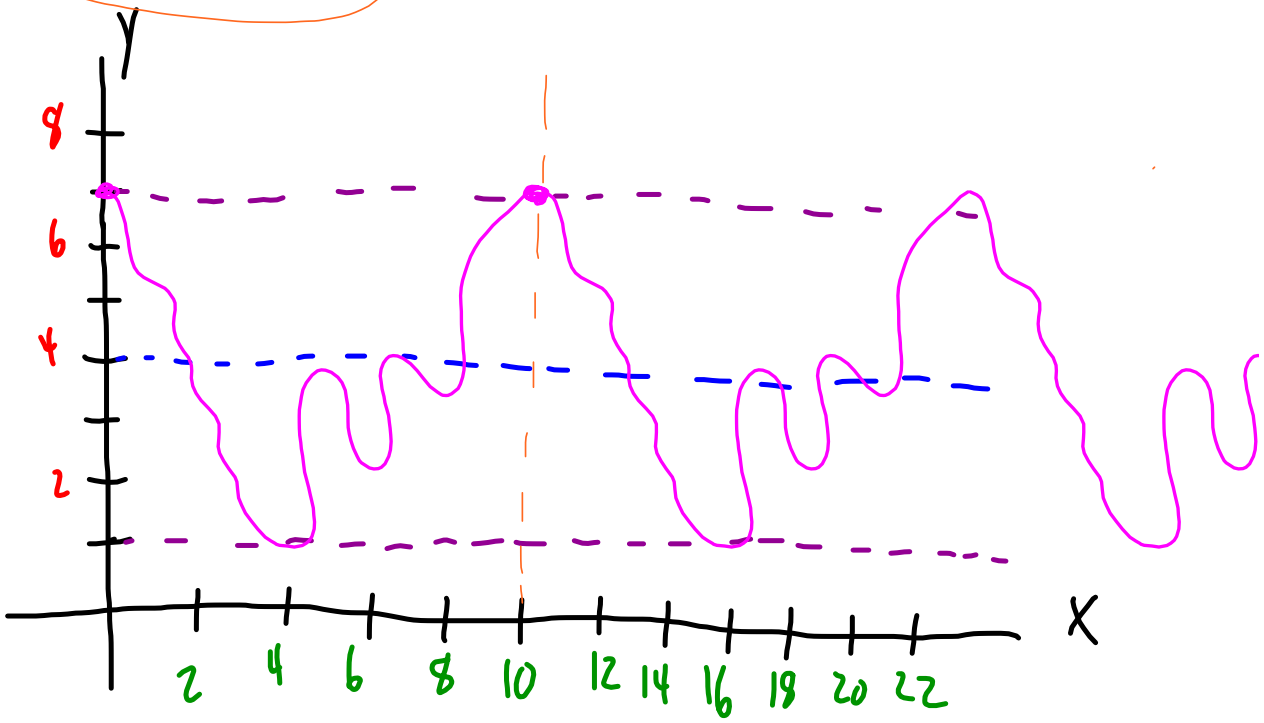
**Consolidation** Coordinates of a Point

**Learning Goal - I will be able to describe the characteristics of sinusoidal functions.**

# L.G.L.

Create a ROUGH sketch of a periodic function with the following properties

- Equation of Axis: y = 4
- Amplitude = 3
- Period = 10



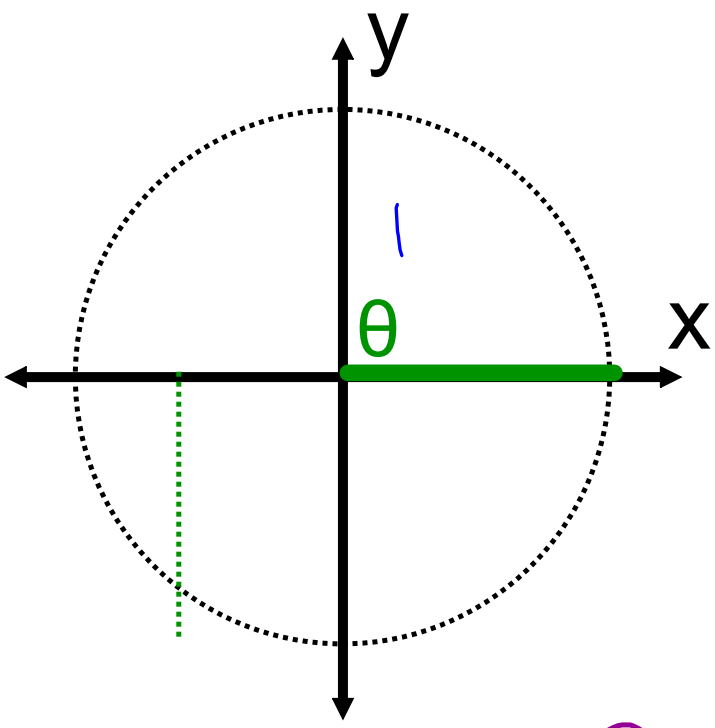
## Minds on

# Back to CAST

Assume the circle on the right has a radius of 1.

Complete the table below.

$\sin\theta = \frac{x}{r}$




| θ | 0° | 90° | 180° | 270° | 360° |
|---|---|---|---|---|---|
| **sin θ** | 0 | 1 | 0 | -1 | 0 |
| **cos θ** | 1 | 0 | -1 | 0 | 1 |

## Action!

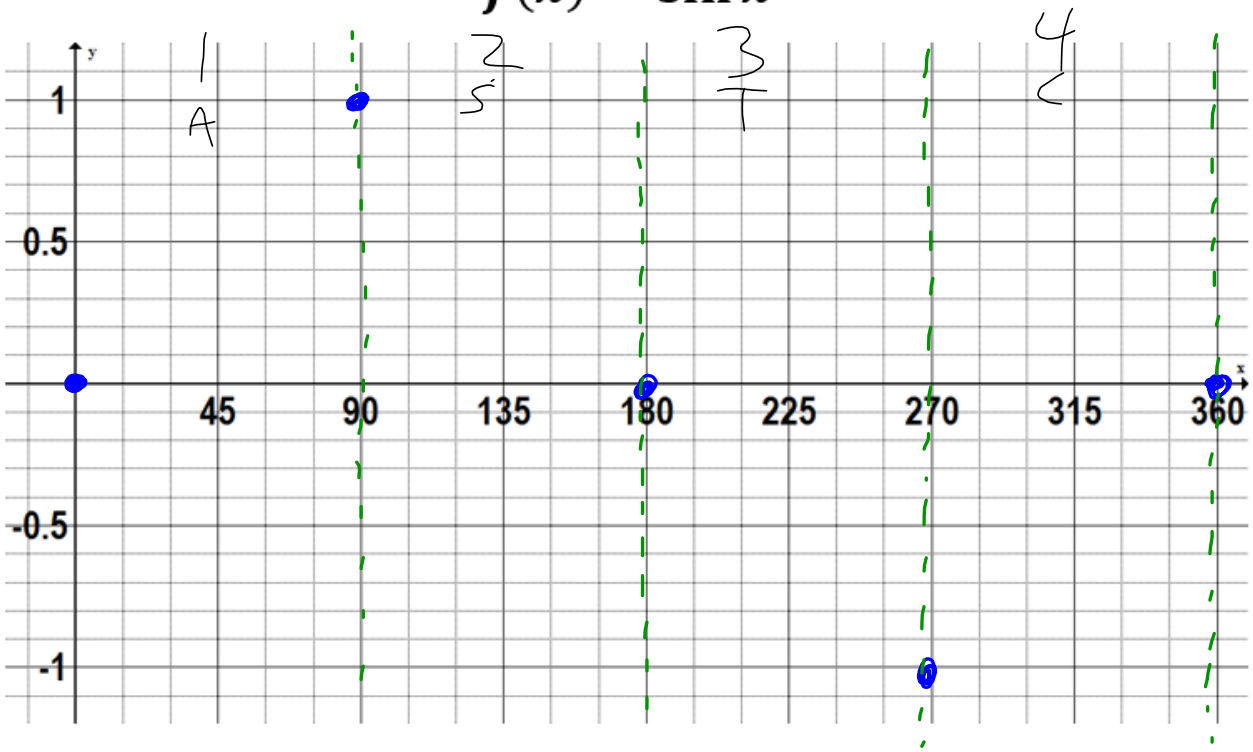
# Properties of sin(θ) and cos(θ)

Using your calculator for assistance, graph sin(θ) and cos(θ) between $0^o$ and $360^o$ on the axes provided (sin on front, cos on back).

Here are a few points to get you started.

| **θ** | $0^o$ | $90^o$ | $180^o$ | $270^o$ | $360^o$ |
|---|---|---|---|---|---|
| **sin θ** | 0 | 1 | 0 | -1 | 0 |
| **cos θ** | 1 | 0 | -1 | 0 | 1 |

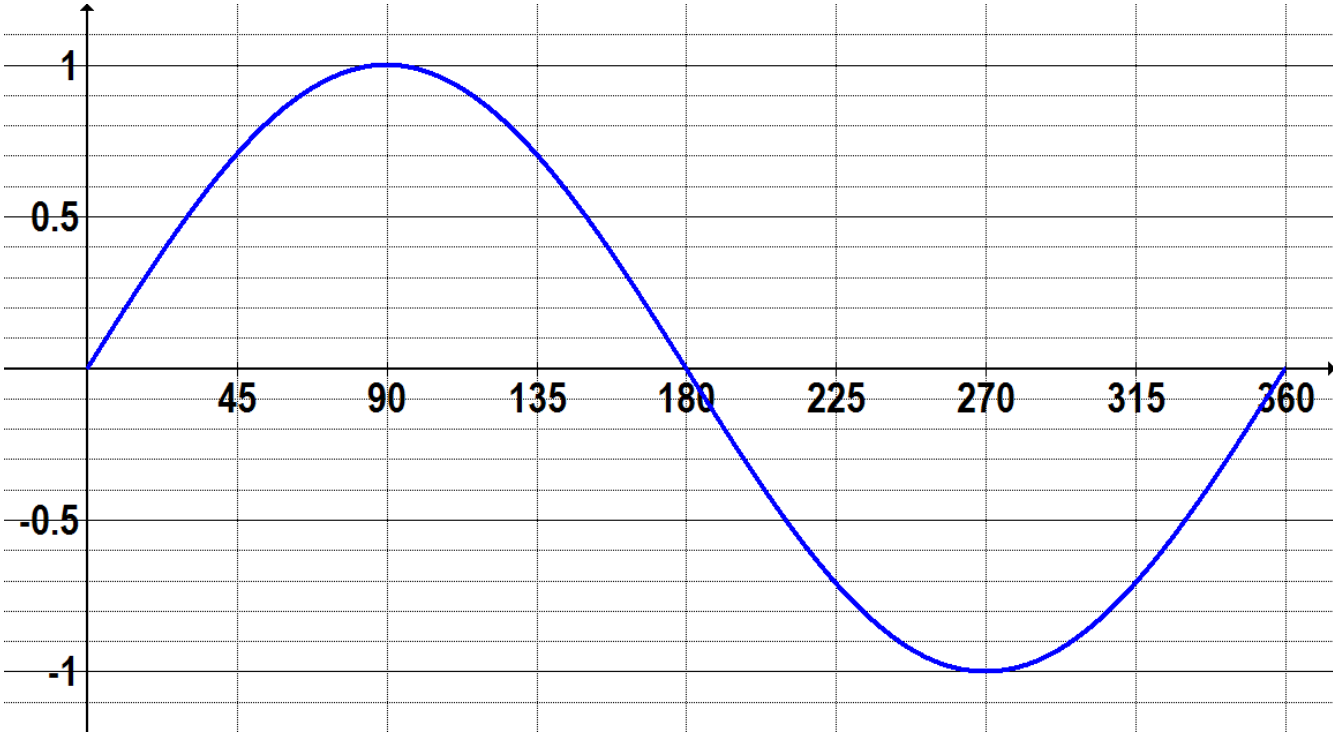
$$f(x) = \sin x$$



## Action!

# Properties of sin(θ) and cos(θ)

**f(θ) = sin θ**



## Action!

# Properties of sin(θ) and cos(θ)

**f(θ) = sin θ**

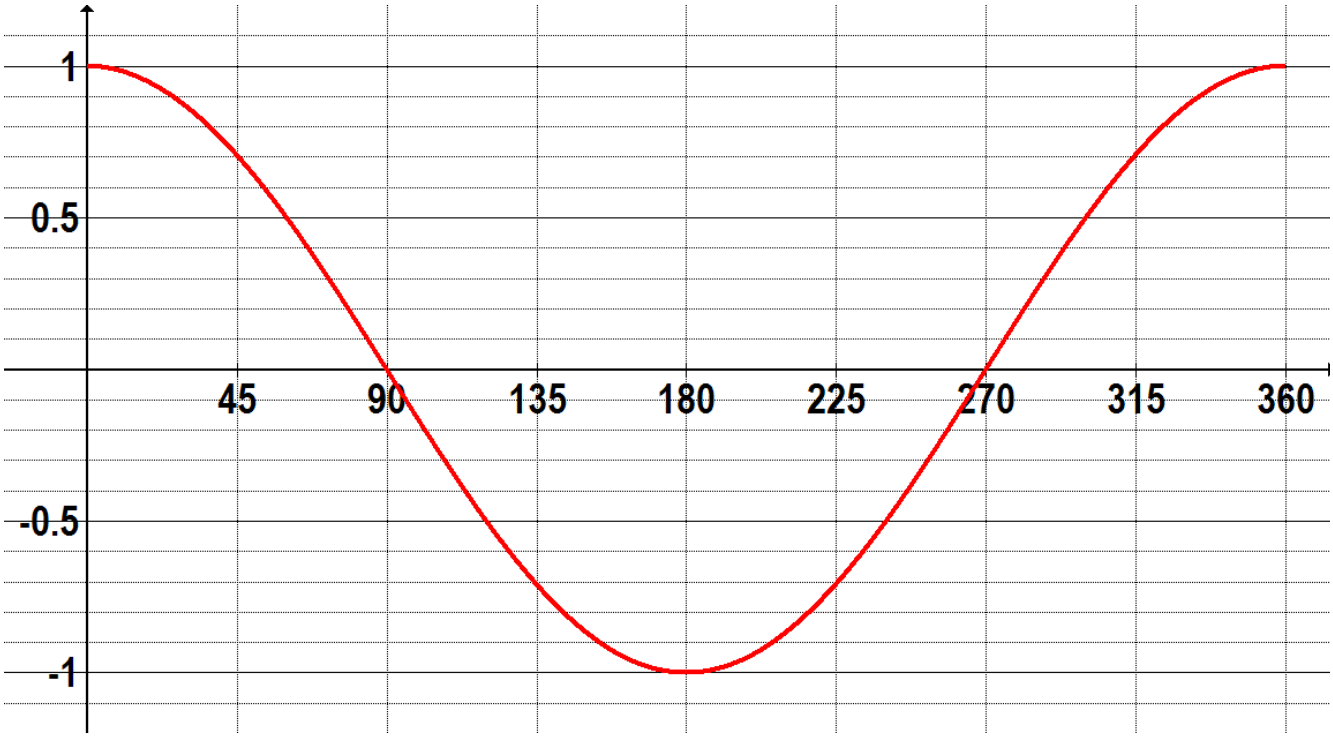
- The period is 360°
- The amplitude is 1
  The max value is 1
  The min value is −1
- The domain is { θ ∈ ℝ }
- The range is { −1 ≤ f(θ) ≤ 1 }
- The zeroes are located at 0, 180, 360, . . .

f(θ) = 0

## Action!

# Properties of sin(θ) and cos(θ)

**f(θ) = cos θ**



## Action!

# Properties of sin(θ) and cos(θ)

**f(θ) = cos θ**

- The period is 360°
- The amplitude is 1

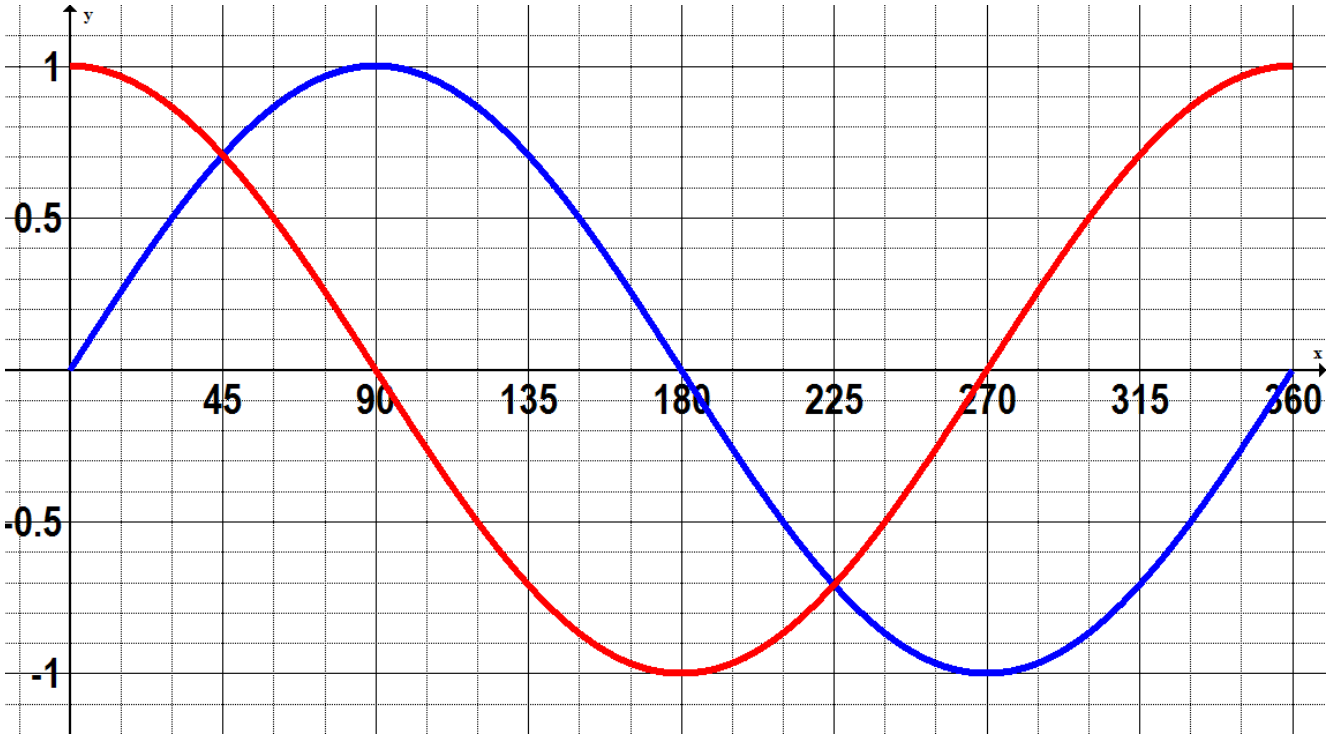
  The max value is 1

  The min value is −1
- The domain is { θ ∈ ℝ }
- The range is { −1 ≤ f(θ) ≤ 1 }
- The zeroes are located at 90°, 270°, ...

f(θ) = 0

## Action!

# Properties of sin(θ) and cos(θ)



**Action!**

# Sinusoidal Functions

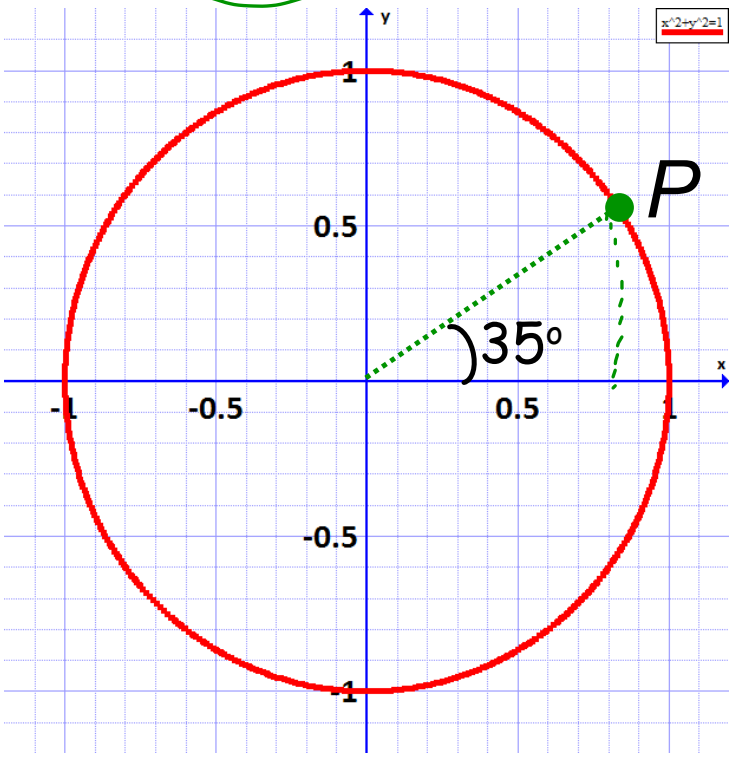
A sinusoidal function is a periodic function whose graph looks like smooth symmetrical waves, where any portion of the wave can be horizontally translated onto another portion of the curve

Graphs of sinusoidal functions can be created by transforming the graph of the function **y = sin x** or **y = cos x**.

## Consolidation

# Coordinates of a Point

Determine the **exact coordinates** of the given point *P*(x, y).




$\sin 35^\circ = \frac{y}{1}$

$\cos 35^\circ = \frac{x}{1}$

$x = 1 \times \cos 35^\circ$

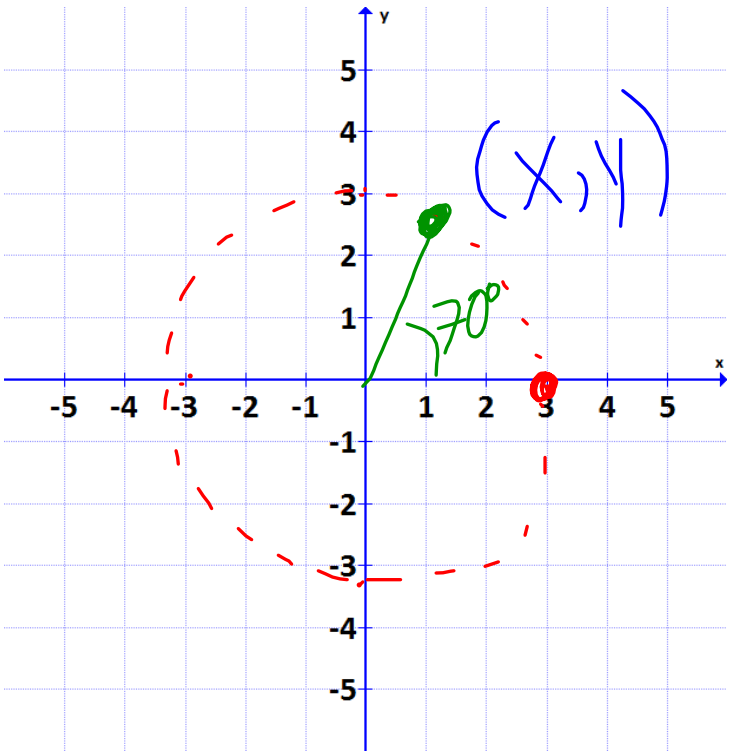
$y = 1 \times \sin 35^\circ$

$(\cos 35^\circ, \sin 35^\circ)$

## Consolidation

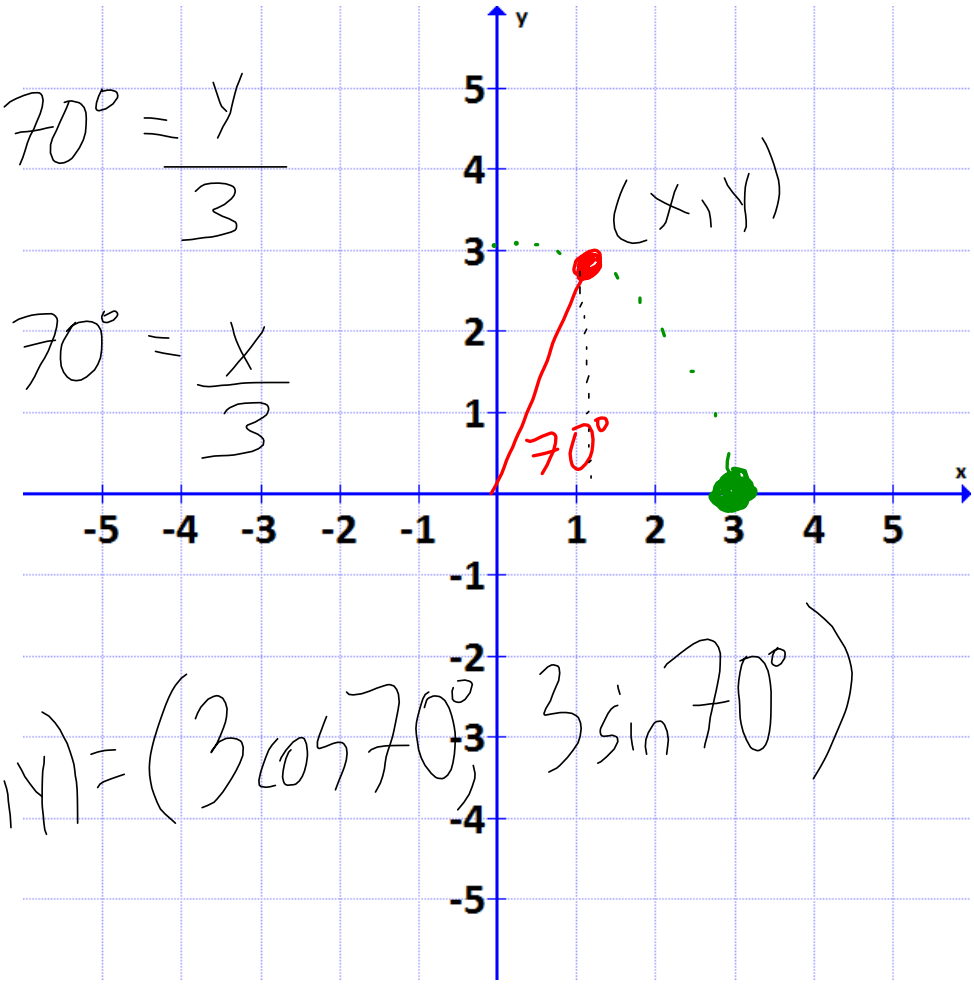
# Coordinates of a Point

Determine the coordinates of the point *P*(x, y) resulting from a rotation of 70 degrees centred at the origin and starting from the point (3, 0).



$\sin 70^\circ = \frac{y}{3}$

$\cos 70^\circ = \frac{x}{3}$

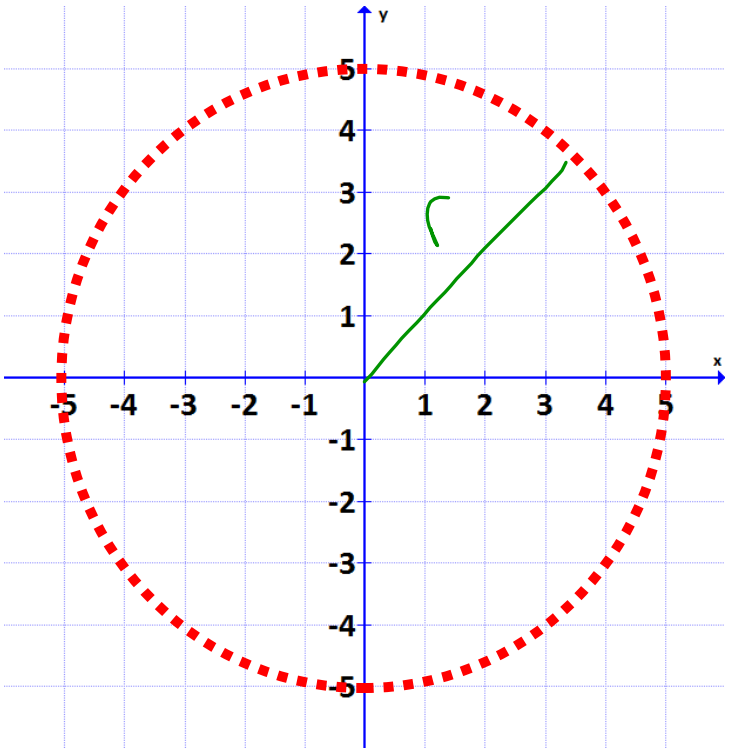



$(x, y) = (3\cos 70^\circ, 3\sin 70^\circ)$

## Consolidation

# Coordinates of a Point

Any point $P(x, y)$ on a circle centred at (0,0) with radius $r$ and rotated through an angle $\theta$ can be expressed as an ordered pair $(r\cos\theta, r\sin\theta)$.




**Find the coordinates of each point.**