

Identify and sketch the graphs of $y = a \sin b(x-c) + d$ and $y = a \cos b(x-c) + d$

Characteristics of sine and cosines graphs:

- Maximum/Minimum values
- Amplitude $\left(\text{Amp} = \frac{\text{max} - \text{min}}{2} = |a| \right)$
- Period $\left(\text{Period} = \frac{2\pi}{b} \text{ or } \frac{360^\circ}{b} \right)$
- y-intercept
- x-intercepts
- domain
- range

Phase shift = horizontal shift

Vertical displacement = vertical shift $\left(d = \frac{\text{max} + \text{min}}{2} \right)$

Transformations:

- Vertical stretch by a factor of $|a|$. Reflected in the x-axis is $x < 0$
- Horizontal stretch by a factor of $\frac{1}{|b|}$. Reflected in the y-axis if $y < 0$
- Horizontal phase shift of c (right if $c > 0$, left if $c < 0$)
- Vertical displacement of d (up if $d > 0$, down if $d < 0$)

Write equations of sine and cosine graphs

Solving real world word problems

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