Periodic Functions

Periodic Function: repeats a pattern of y-values (outputs) at regular intervals
Cycle: may begin at any point in a graph
Period: is the horizontal length of one cycle.

Special Right Angles

| 45-45-90 | h = sqrt(2) times l |
| 30-60-90 | h = 2 times s |

Properties Of Sine Functions

y = a sin b theta
period = 2pi/b
j = amplitude
b = number of cycles (0 to 2pi)

Quadratic Functions

Standard Form
f(x) = ax^2 + bx + c
ax^2 Quadratic term
bx Linear term
c constant term

Exponential Growth & Exponential Decay

b = 1 + r
y = ab^x

b = growth factor
r = increase in rate

Sine, Cosine, Tangent

Sine = opp./adj.
Cosine = Adj./Hypo.
Tangent = Opp./Adj.

Maximum & Minimum

y = ax^2 + bx + c
AOS: x = -b/2a
1. vertex
2. c
3. another point

Area = length times width

Unit Circle

radian 2pi, tangent 0
radian pi/6, tangent sqrt 3/3
radian pi/4, tangent 1
radian pi/3, tangent sqrt 3
radian pi/2, tangent undefined
radian 2pi/3, tangent -sqrt 3
radian 3pi/4, tangent -1
radian 5pi/6, tangent -sqrt3/3
radian 2pi, tangent 0
radian 3pi/2, tangent undefined
radian 5pi/3, tangent sqrt3
radian 7pi/4, tangent 1
radian 11pi/6, tangent -1

Reciprocal Identities

csc theta = 1/sin theta
Sec theta = 1/ cos theta
Cot theta = 1/ tan theta

Tangent & Cotangent Identities
Tan theta = sin theta/ cos theta
Cot theta = cos theta/ sin theta

Pythagorean Identities
Cos^2 theta + Sin^2 theta = 1
1 + Tan^2 theta = Sec^2 theta
1 + Cot^2 theta = Csc^2 theta

Angle Difference Identities
sin(A-B) = sinA cosB - cosA sinB
sin^2(A) = cosA cosB + sinA sinB
tan(A-B) = tanA - tan B/1+ tanA tanB

Angle Sum Identities
sin(A+B) = sinA cosB + cosA sinB
SinB

Tangent & Cotangent Identities
Tan theta = sin theta/ cos theta
Cot theta = cos theta/ sin theta

Pythagorean Identities
Cos^2 theta + Sin^2 theta = 1
1 + Tan^2 theta = Sec^2 theta
1 + Cot^2 theta = Csc^2 theta

Double-Angle Identities
cos2 x = cos^2 x - sin^2 x
cos2 x = 2cos^2 x - 1
cos2 x = 1 - 2sin^2 x
sin2 x = 2sin x cos x
tan2 x = 2tan x/1-tan^2 x

Half Angle Identities
sin A/2 = +/- sqrt(1-cosA)/2
cos A/2 = +/- sqrt(1+cosA)/2
tan A/2 = +/- sqrt(1-cosA)/1+cosA

Identities

Trigonometric Identities

Reciprocal Identities

csc theta = 1/sin theta
Sec theta = 1/ cos theta
Cot theta = 1/ tan theta

Identities

Double-Angle Identities
cos2 x = cos^2 x - sin^2 x
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Half Angle Identities
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Logarithms

- to base b of a positive number y is defined as...
  If y = ab^x, then log_b y = x

Log In Life
pH = -log[H^+]

Log

- b is not equal to 1
- b must be positive
- log of 0 or negative number = undefined
- log = log base 10

Log Are Inverses Of Exponentials
1. Graph exponential function
2. Graph y = x
3. Reflect exponential function over y = x (reverse coordinates)

Properties Of Log
log_b MN = log_b M + log_b N ---- product property
log_b M/N = log_b M - log_b N ---- Quotient property
log_b M^x = x log_b M ---- Power property

WATCH OUT FOR ERRORS
log_b a/log_b c does not equal log_b a/c
log_b a times c does not equal log_b a times log_b c

Natural Log
Write 3ln6 - ln8 as a single natural log
In 6^1/8 --> ln216/8 --> ln27

Solving Log Equations
Pt 1
solve log(3x+1) = 5
3x+1 = 10^5
3x+1 = 100000
3x = 99,999
x = 33,333
Pt 2
Solve 2log x - log 3 = 2
log(x^2/3)=2
x^2/3 = 10^2
x^2 = 2(100)
x = 10sqrt3 or 17.32

Pairs Of Relations are Inverse Of Each Other
y = x - 7/2
y = 2x + 7
y = 3x - 1
y = x + 1/3
y = -x + 4
y = -x + 4/1
y = x + 4/5
y = 5x - 4

Expanding Log
log_2 7b = log_2 7 + log_2 b
left to right = expand
right to left = simplify