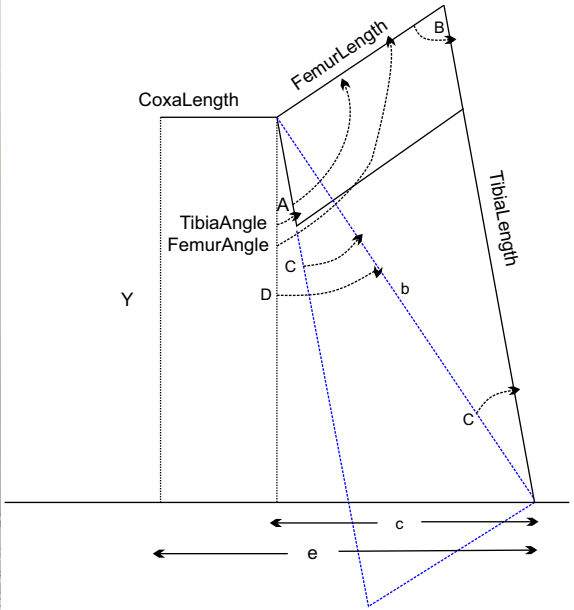
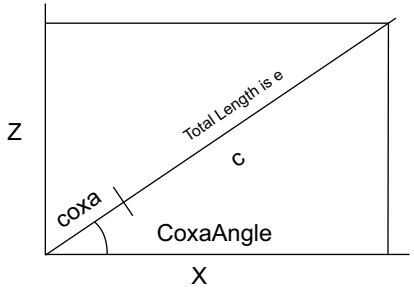
## Side View




## Overhead view




FemurLength: 6.0”
TibiaLength: 24.7”
CoxaLength: 2.5”

# Hexapod Forward Kinematics

Given the encoder based angles, determine the X, Y, and Z coordinates

Find parallelogram interior angle A by subtracting femur and tibia angles

A = FemurAngle - TibiaAngle

Find parallelogram interior angle B - assume regular paralellogram

B => 360 = 2(A) + 2(B) => B = 180 - A

Find Length b - line bisecting parallogram - use law of cosines

$b^2 = FemurLength^2 + TibiaLength^2 - 2(FemurLength)(TibiaLength)(\cos(B))$

Find C - Law of cosines

$C => \cos C = (b^2 + TibiaLength^2 - FemurLength^2)/ 2(b)(TibiaLength)$

Find D - Right triangle with height Y, hypotenuse b and base c

D = A + C

Find Y - right triangle

Y = cos(D) * b

Find c - base of right triangle

c = sin(D) * Y

Find e - add in CoxaLength

e = c + CoxaLength

Find X using right triangle

X = cos(CoxaAngle) * e

Find Z using right Triangle

Z = sin(CoxaAngle) * e