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2025/dms- trigonometry

Compound angle formulae

A displacement of a body from a fixed point can be expressed as 10 sin 2t + 0.67 meters or 10 sin wt = 0.33 amperes.

The angle 2t+0.67 and wt -0.33 are called compound angles because they are a sum or a difference of two angles.

The compound angle formula of sine and cosine are sines of A and B are

Sine(A+b)=SinAcosB+CosASinB

Sine(A-b)=SinAcosB-CosASinB

Cos (A+b)= CosASinB - SinAcosB

Cos (A-b)= CosASinB +SinAcosB

The above can be used to derive the compound angle formulae below

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

The compound angle formulae are true for all valuea of A and B into the formula they may be shown to be true

Examples :-

1. Expand and supply the following expressions
    a) Sin(π+α)
    b) –Cos(90°+B)
    c) Sin(A-B)- Sin(A+B)

Answers:

a) Sin(π+α)= SinπCosα) +CosπSinα from Sin(A+B)
b) –Cos(90°+B)= –Cos90°CosB - Sin90°SinB
c) Sin(A-B)- Sin(A+B)= SinACosB-CosASinB-SinAcosB+CosASinB
   =-2CosASinB

Assignment:

1. Prove that

$$Cos(y-\pi)+Sin\left(y+\frac{\pi}{2}\right)=0$$

2. Show that
   $Tan\left(x+\frac{\pi}{4}\right)Tan\left(x-\frac{\pi}{4}\right)=-1$
3. If Sin P= 0.8142 and Cos Q = 0.4432 evaluate correct to 3 decimal places
   a) Sin(P-Q)
   b) Cos(P+Q)
   c) Tan(P+Q)
4. solve the equation 4Sinx-20°)=5 Cos x for values of x between 0° and 90°
5. If Sin P= 0.8142 and Cos Q = 0.4432 evaluate correct to 3 decimal places
   a)Sin(P-Q) b)Cos(P+Q) c)Tan(P+Q) using compound angle formulae.
6. Solve the equation

   4Sin(x-20°) =5Cosx

   For values between 0° and 90°