Sum and Difference of Two Angles

There are formulae that allow us to determine the sine, cosine and tangent of the sum or difference of two angles.

	Sum	Difference
Sine	$\sin(a+b)=\sin a\cos b+\sin b\cos a$	$\sin(a-b)=\sin a\cos b-\sin b\cos a$
Cosine	$\cos(a+b)=\cos a\cos b-\sin a\sin b$	$\cos(a-b)=\cos a\cos b+\sin a\sin b$
Tangent	$\tan(a+b)=\dfrac{\tan a+\tan b}{1-\tan a\tan b}$	$\tan(a-b)=\dfrac{\tan a-\tan b}{1+\tan a\tan b}$

We can use these rules to determine the exact values of some angles not found on the trig circle.

Examples: Determine the exact values of ...

1. $\sin\frac{23\pi}{12}$

2. $\cos 15°$

3. $\tan\left(-\frac{\pi}{12}\right)$

4. $\sec 165°$

We can also use these rules to prove some statements.

Examples: Show that ...

1. $\sin(9\pi - x) = \sin x$

2. $\tan(x - 4\pi) = \tan x$

Can you find an expression that corresponds to ...

1. $\sin(2\theta)$

2. $\cos 2\theta$

These expressions are also rules and are known as the double angle formulas.

Given $P(\theta)=\left(\frac{8}{17},-\frac{15}{17}\right)$, find the coordinates of $P(2\theta)$.

Knowing that $\sin a = -\frac{15}{17}$ and $\sin b = \frac{12}{13}$, and that $\frac{3\pi}{2} \leq a \leq 2\pi$ and $\frac{\pi}{2} \leq b \leq \pi$ calculate...

$\sin(a+b)$

$\cos(a-b)$

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Questions 1,4 & 6