

Activity 22

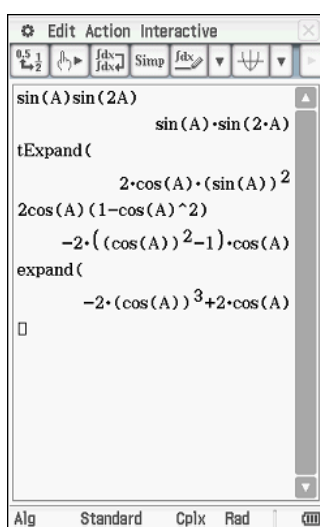
Trigonometric identities

Aim: Prove trigonometric identities using the ClassPad and record results as a formal proof.

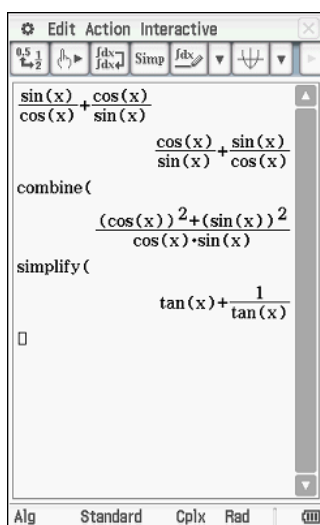
For each of the ClassPad screen-captures:

- duplicate the work on your ClassPad
- state the identity
- write a pencil and paper proof (using work from the screenshot).

1.



2.



3.

The screenshot shows a ClassPad calculator window titled "Edit Action Interactive". The main display area contains the following text and mathematical expressions:

$$(\cos(\theta) + \sin(\theta))(\cos(\theta) - \sin(\theta))$$

$$(\cos(\theta) + \sin(\theta)) \cdot (\cos(\theta) - \sin(\theta))$$

expand(

$$(\cos(\theta))^2 - (\sin(\theta))^2$$

ans | $(\sin(\theta))^2 = 1 - \cos(\theta)^2$

$$2 \cdot (\cos(\theta))^2 - 1$$

□

At the bottom of the window, there are tabs for "Alg", "Standard", "Cplx", and "Rad", along with a small icon.

4.

The screenshot shows a ClassPad calculator window titled "Edit Action Interactive". The main display area contains the following text and mathematical expressions:

$$2\sin\left(\frac{P+Q}{2}\right)\cos\left(\frac{P-Q}{2}\right)$$

$$2 \cdot \sin\left(\frac{P+Q}{2}\right) \cdot \cos\left(\frac{P-Q}{2}\right)$$

tExpand(

$$2 \cdot \left(\cos\left(\frac{P}{2}\right) \cdot \cos\left(\frac{Q}{2}\right) + \sin\left(\frac{P}{2}\right) \cdot \sin\left(\frac{Q}{2}\right) \right) \cdot \left(\cos\left(\frac{P}{2}\right) \cdot \sin\left(\frac{Q}{2}\right) + \sin\left(\frac{P}{2}\right) \cdot \cos\left(\frac{Q}{2}\right) \right)$$

expand(

$$2 \cdot \left(\cos\left(\frac{P}{2}\right) \right)^2 \cdot \cos\left(\frac{Q}{2}\right) \cdot \sin\left(\frac{Q}{2}\right) + 2 \cdot \left(\sin\left(\frac{P}{2}\right) \right)^2 \cdot \cos\left(\frac{Q}{2}\right) \cdot \sin\left(\frac{Q}{2}\right) + 2 \cdot \cos\left(\frac{P}{2}\right) \cdot \sin\left(\frac{Q}{2}\right) \cdot \left(\cos\left(\frac{P}{2}\right) \cdot \sin\left(\frac{Q}{2}\right) + \sin\left(\frac{P}{2}\right) \cdot \cos\left(\frac{Q}{2}\right) \right)$$

simplify(

$$\sin(P) + \sin(Q)$$

□

Learning notes

Generally you will be expected to prove trig identities using the formulae written on your formula sheet using a series of steps. A good understanding of when using your ClassPad is likely to assist can save you time.

Often it is best to start with the more complex side and attempt to simplify.

In writing a formal proof for a trigonometric identity, you begin with one side of the equation and with appropriate algebraic steps derive the other. The CAS engine will perform the operation you request and where these are simple steps it is likely that you will be quicker doing them directly on paper. Where complex manipulation is required, the CAS engine may be able to help as you can try things so much more easily.

It is also a valuable skill to be able to articulate the steps as you are doing when using CAS.