

## Example 1: watergutter

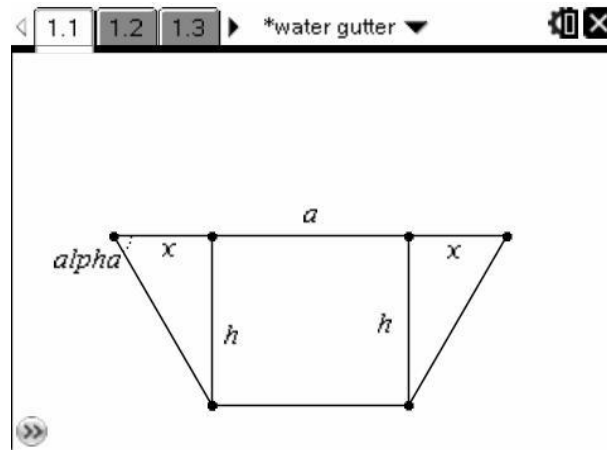


### Algebraic solution

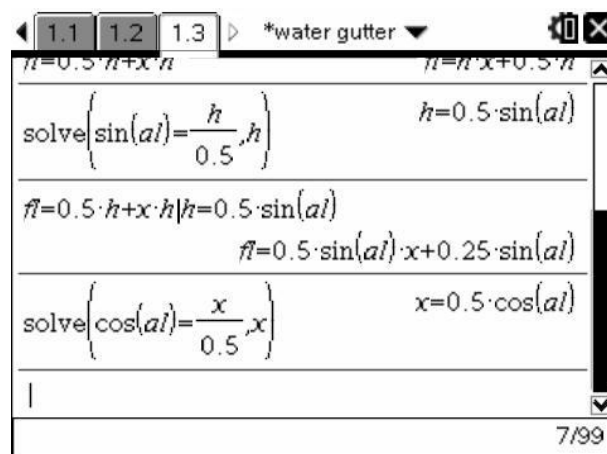
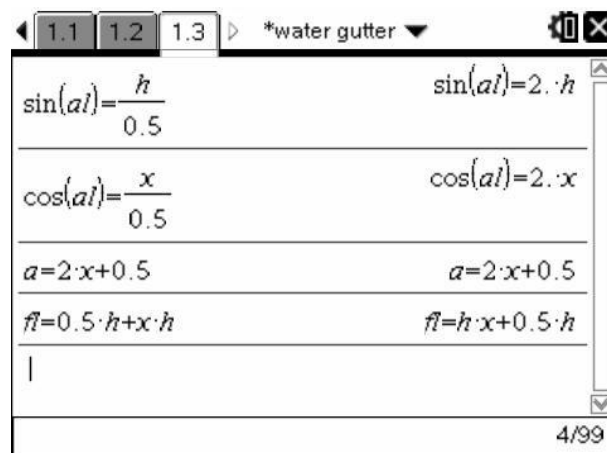
### Derivation of the function equation

For the derivation see the notation in the illustration.

The angle alpha in the following illustrations is designed with al.



All calculations and transformations are done with technology.



1.1 1.2 1.3 \*water gutter

solve( $\cos(aI) = \frac{x}{0.5}$ , x)

$fI = 0.5 \cdot \sin(aI) \cdot x + 0.25 \cdot \sin(aI) | x = 0.5 \cdot \cos(aI)$

$fI = 0.25 \cdot \sin(aI) \cdot \cos(aI) + 0.25 \cdot \sin(aI)$

factor( $fI = 0.25 \cdot \sin(aI) \cdot \cos(aI) + 0.25 \cdot \sin(aI)$ )

$fI = 0.25 \cdot \sin(aI) \cdot (\cos(aI) + 1.)$

$f(aI) := 0.25 \cdot \sin(aI) \cdot (\cos(aI) + 1.)$  Done

10/99

1.1 1.2 1.3 \*water gutter

$fI = 0.25 \cdot \sin(aI) \cdot \cos(aI) + 0.25 \cdot \sin(aI)$

factor( $fI = 0.25 \cdot \sin(aI) \cdot \cos(aI) + 0.25 \cdot \sin(aI)$ )

$fI = 0.25 \cdot \sin(aI) \cdot (\cos(aI) + 1.)$

$f(aI) := 0.25 \cdot \sin(aI) \cdot (\cos(aI) + 1.)$  Done

fMax( $f(aI), aI$ ) |  $0 < aI < 90$   $aI = 60$

$f(aI) | aI = 60$  0.32476

|

12/99

The maximum can be obtained with methods of calculus, as well.