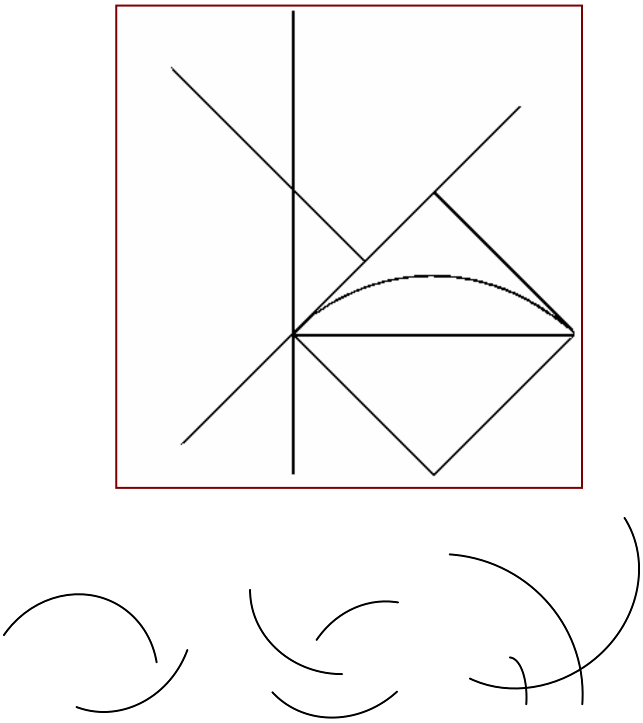
The correct values for a circle

CHORDS



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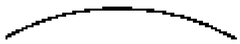
Chord



Presentation of squaring formula:

$M = (\ln\sqrt{S^2 * 2} / \ln S)^2 / 2$

$M = (\ln\sqrt{4^2 * 2} / \ln 4)^2 / 2 = 0.78125$

$4M = (\ln\sqrt{4^2 * 2} / \ln 4)^2 * 2 = 3.125$

Presentation of formulae:

$Q = (\ln\sqrt{s^2 * 2} / \ln s)^2 / 2 =$ every value

$4Q = (\ln\sqrt{s^2 * 2} / \ln s)^2 * 2 =$ every value

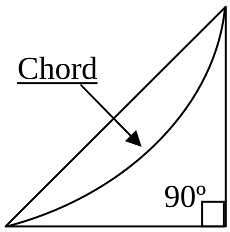
 $= M = 0.78125$

Chord

The formula can be applied to calculate many values.

One of its uses is to calculate the length of a chord as a straight line.

A chord is inserted into a right-angled triangle, see diagram opposite.

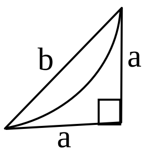


The chord is calculated using the following method:

Chord rule

$\text{Chord} = \sqrt{\text{perpendicular}^2 * 2^2} \; * \; (\ln\sqrt{S^2 * 2} / \ln S)^2 \; / \; 2$

$\text{Chord} = \sqrt{\text{hypoteneuse}^2 * 2} \; * \; (\ln\sqrt{S^2 * 2} / \ln S)^2 \; / \; 2$



Note: The chord functions as a circle. This means that formula will calculate the chord as a circle, irrespective of the size of the chord.

The base of the chord is the hypotenuse of the two short sides.

For a chord larger than 90° or smaller than 180°, the two right-angled triangles must be drawn and calculated separately.

The length of the chord can now be calculated using the perpendicular or the hypotenuse.

a = perpendicular

b = hypotenuse

Note: the formula gives the length of the chord as the circumference of the new circle.

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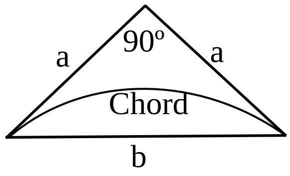
The correct values for a circle



Chord rules

$$\sqrt{a^2*2^2}*(\ln\sqrt{S^2*2}/\ln S)^2/2 \rightarrow \sqrt{a^2*2^2}*M$$

Or

$$\sqrt{b^2*2}*(\ln\sqrt{S^2*2}/\ln S)^2/2 \rightarrow \sqrt{b^2*2}*M$$

Chord rules

$$\sqrt{a^2*2^2}*(\ln\sqrt{S^2*2}/\ln S)^2/2 \rightarrow \sqrt{a^2*2^2}*0.78125$$

Or

$$\sqrt{b^2*2}*(\ln\sqrt{S^2*2}/\ln S)^2/2 \rightarrow \sqrt{b^2*2}*0.78125$$

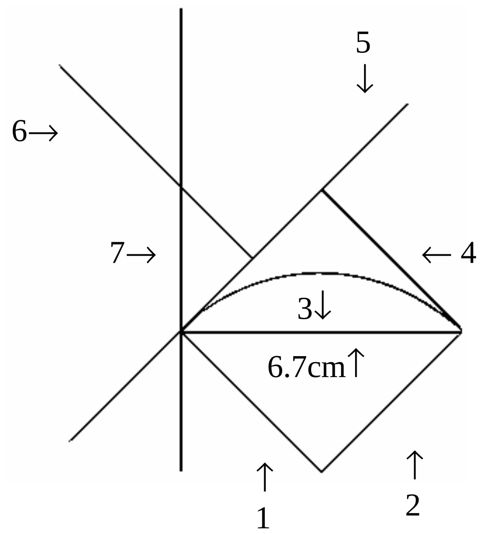
Practical approach:

A chord of 7.4 cm is drawn using a compass, protractor and ruler, producing a hypotenuse that is 6.7 cm.

The formula for the chord gives the following result:

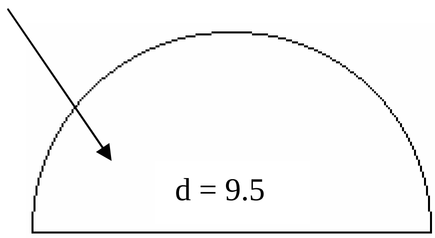
$$\text{Chord} = \sqrt{6.7^2*2}*(\ln\sqrt{S^2*2}\ /\ \ln S)^2\ /\ 2 = 7.40252...$$

It transpires that the formula produces an exact value.



The example below provides a better illustration of the method.

A circle with a diameter of 9.5 cm has a circumference of 29.6875 cm.



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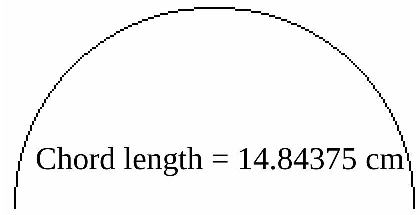
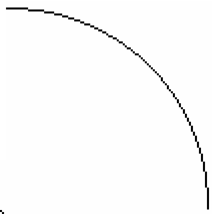
The correct values for a circle

$$\text{Circumference of circle} = 9.5 * 4 * (\ln\sqrt{S^2 * 2} / \ln S)^2 / 2 = 29.6875\text{cm}$$

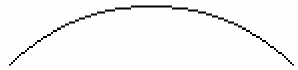
Circumference = 9.5 * 4 * *M* = 29.6875 cm
Length of chord = 9.5 * 2*M* = 14.84375 cm



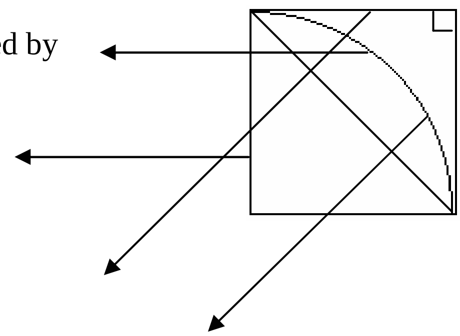
$^1/_2$ chord length = 9.5 * *M* = 7.421875 cm



Length of chord = 7.421875 cm
or $^1/_4$ of a circle.



The chord is bisected:
The chord is $^1/_4$ of a circle of diameter 9.5 cm.



$^1/_4$ of the circumference is obtained by multiplying 9.5 by *M*.

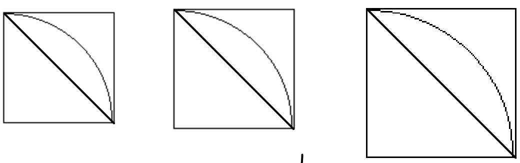
The perpendicular is 4.75 cm.

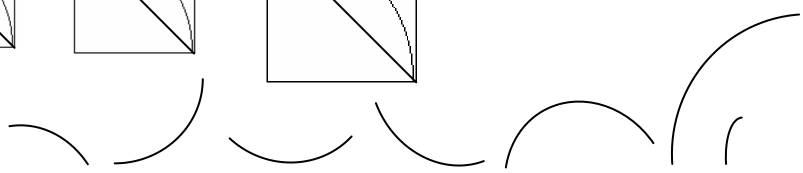
9.5 * *M* = 7.421875 cm.

The same result is obtained by using the formula:

$$\sqrt{4.75^2 * 4} * (\ln\sqrt{S^2 * 2} / \ln S)^2 / 2 = 7.421875\text{cm}$$
$$\sqrt{4.75^2 * 4} * M = 7.421875\text{cm}$$

Note: the formulae calculate a chord as a circle.





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