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proportion equation

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Synonym	proportion
Related topic	Equation
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Defines	proportion
Defines	extreme members
Defines	middle members
Defines	fourth proportional
Defines	central proportional
Defines	third proportional

The *proportion equation*, or usually simply , is an equation whose both are <http://planetmath.org/Divisionratios> of (non-zero) numbers:

$$\frac{a}{b} = \frac{c}{d} \quad \text{or} \quad a : b = c : d \quad (1)$$

The numbers a , b , c , d are the *members* of the ; a and d are the *extreme members* and b and c are the *middle members*. The number d is called the *fourth proportional* of the numbers a , b and c .

- The product of the extreme members of the is equal to the product of the middle members.

- The

$$\frac{a}{c} = \frac{b}{d},$$

i.e., the middle members can be swapped.

- The

$$\frac{a+b}{a-b} = \frac{c+d}{c-d}$$

if the do not vanish.

- If any three members of a are known, then the fourth member may be determined (often by using the first property).
- If the number b satisfies the proportion

$$\frac{a}{b} = \frac{b}{c} \quad (2)$$

then b is called the *central proportional* of a and c . We have

$$b = \sqrt{ac},$$

i.e., the central proportional of two real numbers (of same sign) equals to their geometric mean.

- In (2), the number c is called the *third proportional* of a and b .