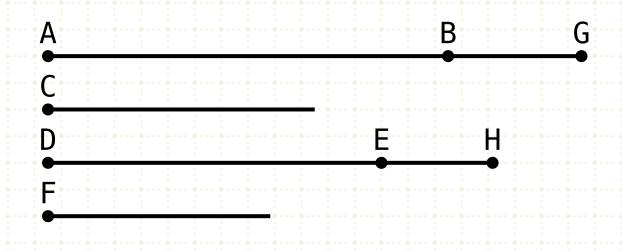
# Euclid's Elements

# Book V



AB:C = DE:F

BG:C = EH:F

AG:C = DH:F

Proportions are what makes the old Greek temples classic in their beauty. They are like huge blocks, from which the air has been literally hewn out between the columns.

Arne Jacobsen



# **Table of Contents, Chapter 5**

- $1 \quad n \cdot X + n \cdot Y = n \cdot (X + Y)$
- 2 if  $n \cdot C + m \cdot C = k \cdot C$  then  $n \cdot F + m \cdot F = k \cdot F$
- 3 if E=m·(n·B) and G=m·(n·D) then E=k·B and G=k·B
- 4 if A:B=C:D then (p·A):(q·B)=(p·C):(q·D)
- 5  $n \cdot X n \cdot Y = n \cdot (X Y)$
- 6 if  $n \cdot E m \cdot E = k \cdot E$  then  $n \cdot F - m \cdot F = k \cdot F$
- 7 if  $A = B \neq C$  then A:C = B:C and C:A = C:B
- 8 if A > B ≠ D then A:D > B:D and D:A < D:B
- 10 if A:C > B:C, or A:C < B:C then A > B, or A < C, respectively

- 11 if A:B = C:D and C:D = E:F then A:B = E:F
- 12 if A:B = C:D = E:F then (A+C+E):(B+D+F) = A:B
- 13 if A:B = C:D and C:D > E:F then A:B > E:F
- 14 if A:B = C:D and A > C then B > D
- 15 if  $A = n \cdot C$  and  $B = n \cdot D$  then A:B = C:D
- 16 if A:B = C:D then A:C = B:D
- 17 if (A+B):B = (C+D):D then A:B = C:D
- 18 if A:B = C:D then (A+B):B = (C+D):D
- 19 if (A+C):(B+D) = C:D then (A+C):(B+D) = A:B

- 20 if A:B = D:E, B:C = E:F and if A > C, then D > F
- 21 if A:B = E:F, B:C = D:E and if A > C, then D > F
- 22 if A:B = D:E, B:C = E:F then A:C = D:F
- 23 if A:B = E:F, B:C = D:E then A:C = D:F
- 24 if A:C = D:F, B:C = E:F then (A+B):C = (D+E):F
- 25 if A:B = C:D and A > B,C,D and D < A,B,C then (A+D) > (B+C)



Proposition 9 of Book V

Magnitudes which have the same ratio to the same are equal to one another; and magnitudes to which the same has the same ratio are equal



Magnitudes which have the same ratio to the same are equal to one another; and magnitudes to which the same has the same ratio are equal

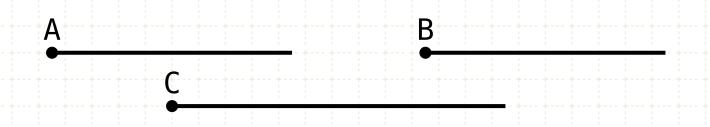


$$A:C = B:C \rightarrow A = B$$
  
 $C:A = C:B \rightarrow A = B$ 

### In other words

Let the ratios of A to C and B to C be equal Then A and B are equal

Magnitudes which have the same ratio to the same are equal to one another; and magnitudes to which the same has the same ratio are equal



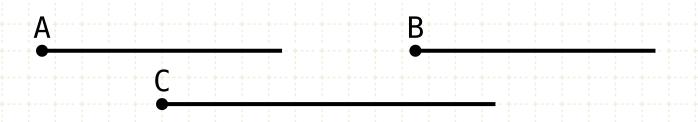
$$A:C = B:C$$

### In other words

Let the ratios of A to C and B to C be equal Then A and B are equal

#### **Proof**

Magnitudes which have the same ratio to the same are equal to one another; and magnitudes to which the same has the same ratio are equal



A:C = B:C  

$$A \neq B \rightarrow A:C \neq B:C$$
  
but A:C = B:C : A = B

#### In other words

Let the ratios of A to C and B to C be equal Then A and B are equal

#### **Proof**

If A and B are not equal, then their ratios will not be equal, thus they are equal (V·8)

Magnitudes which have the same ratio to the same are equal to one another; and magnitudes to which the same has the same ratio are equal



A:C = B:C  

$$A \neq B \rightarrow A:C \neq B:C$$
  
but A:C = B:C  $\therefore$  A = B

$$C:A = B:C$$

#### In other words

Let the ratios of A to C and B to C be equal Then A and B are equal

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but A:C = B:C : A = B

$$C:A = B:C$$
  
 $A \neq B \rightarrow C:A \neq C:B$   
but  $C:A = C:B \therefore A = B$ 

#### In other words

Let the ratios of A to C and B to C be equal Then A and B are equal

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