

Proofs – Properties of Proportion

If $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$

(Cross Multiplying)

1. $\frac{a}{b} = \frac{c}{d}$

Given

2. $\frac{a}{b} bd = \frac{c}{d} bd$

Mult. Prop. of Equality

3. $ad = bc$

Mult. Inverse & Identity

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

(Sideways)

1. $\frac{a}{b} = \frac{c}{d}$

Given

2. $ad = bc$

Cross Multiply

3. $\frac{ad}{cd} = \frac{bc}{cd}$

Div. Prop. of Equality

4. $\frac{a}{c} = \frac{b}{d}$

Mult. Inverse & Identity

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

(Upside down)

1. $\frac{a}{b} = \frac{c}{d}$

Given

2. $ad = bc$

Cross Multiply

3. $\frac{ad}{ac} = \frac{bc}{ac}$

Div. Prop. of Equality

4. $\frac{d}{c} = \frac{b}{a}$

Mult. Inverse & Identity

5. $\frac{b}{a} = \frac{d}{c}$

Symmetric Property

If $\frac{a}{b} = \frac{c}{d}$, then $\frac{a+b}{b} = \frac{c+d}{d}$

(Add N and D/D)

1. $\frac{a}{b} = \frac{c}{d}$

Given

2. $\frac{a}{b} + \frac{b}{b} = \frac{c}{d} + \frac{d}{d}$

Add Prop. of Equality (+1)

3. $\frac{a+b}{b} = \frac{c+d}{d}$

Add Fractions

If $\frac{a}{b} = \frac{c}{d}$, then $\frac{a}{b} = \frac{a+c}{b+d}$

Add N, Add D

1. $\frac{a}{b} = \frac{c}{d}$

Given

2. $ad = bc$

Cross mult.

3. $\frac{a}{b} = \frac{a}{b} * \frac{b+d}{b+d}$

Mult. by 1

4. $\frac{a(b+d)}{b(b+d)}$

Simplify Fractions

5. $\frac{ab+ad}{b(b+d)}$

Distributive Prop.

6. $\frac{ab+bc}{b(b+d)}$

Substitution; #2

7. $\frac{b(a+c)}{b(b+d)}$

Factor – Distrib. Prop.

8. $\frac{a+c}{b+d}$

Mult. Inverse & Identify

9. $\frac{a}{b} = \frac{a+c}{b+d}$

Transitive Property