Theorem 64 (Area of trapezoid). The area of a trapezoid with parallel sides a and b and h the altitude from b to a is

$$h\cdot\frac{a+b}{2}$$

Hide Segment

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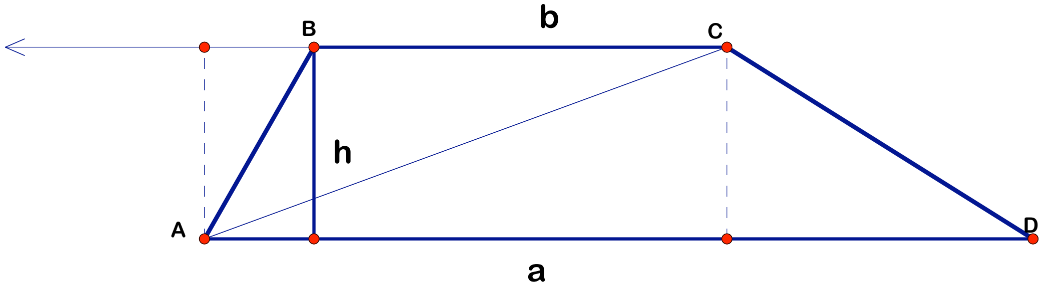


Proof: Draw the diagonal AC.

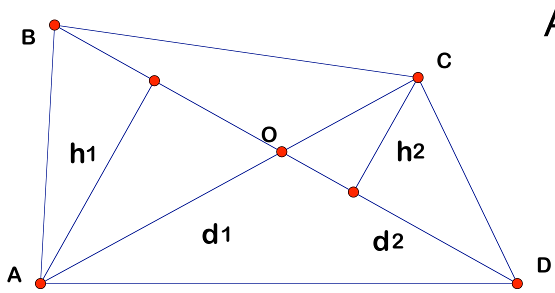
Area(ABCD)=Area($\triangle$ABC)+Area($\triangle$ACD)=

$$=\frac{1}{2}h\cdot a+\frac{1}{2}h\cdot b=h\cdot\frac{a+b}{2}.$$

Theorem 65. (Area of a quadrilateral). If ABCD is a convex quadrilateral, then

$$\text{Area(ABCD)}=d_1\cdot d_2\cdot\sin\alpha,$$

where d_1 and d_2 are diagonals and α is the angle between them.



Area(ABCD)=Area($\triangle$BAD)+Area($\triangle$BCD)=

$$\frac{1}{2}h_1\cdot|BD|+\frac{1}{2}h_2\cdot|BD|=$$

$$\frac{1}{2}|AO|\cdot\sin\alpha\cdot|BD|+\frac{1}{2}|OC|\cdot\sin\alpha\cdot|BD|=$$

$$\frac{1}{2}(|AO|+|OC|)\cdot\sin\alpha\cdot|BD|=\frac{1}{2}|AC|\cdot\sin\alpha\cdot|BD|=$$

$$d_1\cdot d_2\cdot\sin\alpha$$