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Important Formulas of Cyclic Quadrilateral

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List of 23 Important Formulas of Cyclic Quadrilateral

Important Formulas of Cyclic Quadrilateral

Angles of Cyclic Quadrilateral

1) Angle A of Cyclic Quadrilateral

$$\text{fx } \angle A = \arccos \left(\frac{S_a^2 + S_d^2 - S_b^2 - S_c^2}{2 \cdot ((S_a \cdot S_d) + (S_b \cdot S_c))} \right)$$

[Open Calculator](#)

$$\text{ex } 94.70165^\circ = \arccos \left(\frac{(10\text{m})^2 + (5\text{m})^2 - (9\text{m})^2 - (8\text{m})^2}{2 \cdot ((10\text{m} \cdot 5\text{m}) + (9\text{m} \cdot 8\text{m}))} \right)$$

2) Angle B of Cyclic Quadrilateral

$$\text{fx } \angle B = \pi - \angle D$$

[Open Calculator](#)

$$\text{ex } 70^\circ = \pi - 110^\circ$$

3) Angle between Diagonals of Cyclic Quadrilateral

$$\text{fx } \angle_{\text{Diagonals}} = 2 \cdot \arctan \left(\sqrt{\frac{(s - S_b) \cdot (s - S_d)}{(s - S_a) \cdot (s - S_c)}} \right)$$

[Open Calculator](#)

$$\text{ex } 103.4148^\circ = 2 \cdot \arctan \left(\sqrt{\frac{(16\text{m} - 9\text{m}) \cdot (16\text{m} - 5\text{m})}{(16\text{m} - 10\text{m}) \cdot (16\text{m} - 8\text{m})}} \right)$$

4) Angle C of Cyclic Quadrilateral

$$\text{fx } \angle C = \pi - \angle A$$

[Open Calculator](#)

$$\text{ex } 85^\circ = \pi - 95^\circ$$

5) Angle D of Cyclic Quadrilateral

$$\text{fx } \angle D = \arccos \left(\frac{S_d^2 + S_c^2 - S_a^2 - S_b^2}{2 \cdot ((S_d \cdot S_c) + (S_b \cdot S_a))} \right)$$

[Open Calculator](#)

$$\text{ex } 110.7227^\circ = \arccos \left(\frac{(5\text{m})^2 + (8\text{m})^2 - (10\text{m})^2 - (9\text{m})^2}{2 \cdot ((5\text{m} \cdot 8\text{m}) + (9\text{m} \cdot 10\text{m}))} \right)$$



Area of Cyclic Quadrilateral

6) Area of Cyclic Quadrilateral given Angle A

fx $A = \frac{1}{2} \cdot ((S_a \cdot S_d) + (S_b \cdot S_c)) \cdot \sin(\angle A)$

[Open Calculator !\[\]\(a03a7eb2f4046e1d3c76772003e549ea_img.jpg\)](#)

ex $60.76788\text{m}^2 = \frac{1}{2} \cdot ((10\text{m} \cdot 5\text{m}) + (9\text{m} \cdot 8\text{m})) \cdot \sin(95^\circ)$

7) Area of Cyclic Quadrilateral given Angle B

fx $A = \frac{1}{2} \cdot ((S_a \cdot S_b) + (S_c \cdot S_d)) \cdot \sin(\angle B)$

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc_img.jpg\)](#)

ex $61.08002\text{m}^2 = \frac{1}{2} \cdot ((10\text{m} \cdot 9\text{m}) + (8\text{m} \cdot 5\text{m})) \cdot \sin(70^\circ)$

8) Area of Cyclic Quadrilateral given Angle between Diagonals

fx $A = \frac{1}{2} \cdot ((S_a \cdot S_c) + (S_b \cdot S_d)) \cdot \sin(\angle_{\text{Diagonals}})$

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e_img.jpg\)](#)

ex $60.37036\text{m}^2 = \frac{1}{2} \cdot ((10\text{m} \cdot 8\text{m}) + (9\text{m} \cdot 5\text{m})) \cdot \sin(105^\circ)$

9) Area of Cyclic Quadrilateral given Circumradius

fx $A = \frac{\sqrt{((S_a \cdot S_b) + (S_c \cdot S_d)) \cdot ((S_a \cdot S_c) + (S_b \cdot S_d)) \cdot ((S_a \cdot S_d) + (S_c \cdot S_b))}}{4 \cdot r_c}$

[Open Calculator !\[\]\(84f47badaad7772cd95667a7c387a639_img.jpg\)](#)

ex $58.6672\text{m}^2 = \frac{\sqrt{((10\text{m} \cdot 9\text{m}) + (8\text{m} \cdot 5\text{m})) \cdot ((10\text{m} \cdot 8\text{m}) + (9\text{m} \cdot 5\text{m})) \cdot ((10\text{m} \cdot 5\text{m}) + (8\text{m} \cdot 9\text{m}))}}{4 \cdot 6\text{m}}$

10) Area of Cyclic Quadrilateral given Semiperimeter

fx $A = \sqrt{(s - S_a) \cdot (s - S_b) \cdot (s - S_c) \cdot (s - S_d)}$

[Open Calculator !\[\]\(c15650232aa6660c9deb34f3b82dcb72_img.jpg\)](#)

ex $60.79474\text{m}^2 = \sqrt{(16\text{m} - 10\text{m}) \cdot (16\text{m} - 9\text{m}) \cdot (16\text{m} - 8\text{m}) \cdot (16\text{m} - 5\text{m})}$



Diagonals of Cyclic Quadrilateral

11) Diagonal 1 of Cyclic Quadrilateral

$$\text{fx } d_1 = \sqrt{\frac{((S_a \cdot S_c) + (S_b \cdot S_d)) \cdot ((S_a \cdot S_d) + (S_b \cdot S_c))}{(S_a \cdot S_b) + (S_c \cdot S_d)}}$$

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5_img.jpg\)](#)

$$\text{ex } 10.83087\text{m} = \sqrt{\frac{((10\text{m} \cdot 8\text{m}) + (9\text{m} \cdot 5\text{m})) \cdot ((10\text{m} \cdot 5\text{m}) + (9\text{m} \cdot 8\text{m}))}{(10\text{m} \cdot 9\text{m}) + (8\text{m} \cdot 5\text{m})}}$$

12) Diagonal 1 of Cyclic Quadrilateral using Ptolemy's Second Theorem

$$\text{fx } d_1 = \left(\frac{(S_a \cdot S_d) + (S_b \cdot S_c)}{(S_a \cdot S_b) + (S_c \cdot S_d)} \right) \cdot d_2$$

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a_img.jpg\)](#)

$$\text{ex } 11.26154\text{m} = \left(\frac{(10\text{m} \cdot 5\text{m}) + (9\text{m} \cdot 8\text{m})}{(10\text{m} \cdot 9\text{m}) + (8\text{m} \cdot 5\text{m})} \right) \cdot 12\text{m}$$

13) Diagonal 1 of Cyclic Quadrilateral using Ptolemy's Theorem

$$\text{fx } d_1 = \frac{(S_a \cdot S_c) + (S_b \cdot S_d)}{d_2}$$

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a_img.jpg\)](#)

$$\text{ex } 10.41667\text{m} = \frac{(10\text{m} \cdot 8\text{m}) + (9\text{m} \cdot 5\text{m})}{12\text{m}}$$

14) Diagonal 2 of Cyclic Quadrilateral

$$\text{fx } d_2 = \sqrt{\frac{((S_a \cdot S_b) + (S_c \cdot S_d)) \cdot ((S_a \cdot S_c) + (S_b \cdot S_d))}{(S_a \cdot S_d) + (S_c \cdot S_b)}}$$

[Open Calculator !\[\]\(c1168d6a8b365d11e842ece304635fa7_img.jpg\)](#)

$$\text{ex } 11.54109\text{m} = \sqrt{\frac{((10\text{m} \cdot 9\text{m}) + (8\text{m} \cdot 5\text{m})) \cdot ((10\text{m} \cdot 8\text{m}) + (9\text{m} \cdot 5\text{m}))}{(10\text{m} \cdot 5\text{m}) + (8\text{m} \cdot 9\text{m})}}$$



Other Formulas of Cyclic Quadrilateral

15) Circumradius of Cyclic Quadrilateral

fx

[Open Calculator !\[\]\(74d4806277d7e73349d8e8c0897931e9_img.jpg\)](#)

$$r_c = \frac{1}{4} \cdot \left(\sqrt{\frac{((S_a \cdot S_b) + (S_c \cdot S_d)) \cdot ((S_a \cdot S_c) + (S_b \cdot S_d)) \cdot ((S_a \cdot S_d) + (S_b \cdot S_c))}{(s - S_a) \cdot (s - S_b) \cdot (s - S_c) \cdot (s - S_d)}} \right)$$

ex

$$5.790027m = \frac{1}{4} \cdot \left(\sqrt{\frac{((10m \cdot 9m) + (8m \cdot 5m)) \cdot ((10m \cdot 8m) + (9m \cdot 5m)) \cdot ((10m \cdot 5m) + (9m \cdot 8m))}{(16m - 10m) \cdot (16m - 9m) \cdot (16m - 8m) \cdot (16m - 5m)}} \right)$$

16) Circumradius of Cyclic Quadrilateral given Area

fx

[Open Calculator !\[\]\(47734e4656765d20df4fdbd5b7aff048_img.jpg\)](#)

$$r_c = \frac{\sqrt{((S_a \cdot S_b) + (S_c \cdot S_d)) \cdot ((S_a \cdot S_c) + (S_b \cdot S_d)) \cdot ((S_a \cdot S_d) + (S_c \cdot S_b))}}{4 \cdot A}$$

ex

$$5.86672m = \frac{\sqrt{((10m \cdot 9m) + (8m \cdot 5m)) \cdot ((10m \cdot 8m) + (9m \cdot 5m)) \cdot ((10m \cdot 5m) + (8m \cdot 9m))}}{4 \cdot 60m^2}$$

17) Perimeter of Cyclic Quadrilateral

fx

[Open Calculator !\[\]\(e50091943b385fe16d3277389202856f_img.jpg\)](#)

$$P = S_a + S_b + S_c + S_d$$

ex

$$32m = 10m + 9m + 8m + 5m$$

18) Semiperimeter of Cyclic Quadrilateral

fx

[Open Calculator !\[\]\(5ddb2a112276baa148775929432349f9_img.jpg\)](#)

$$s = \frac{P}{2}$$

ex

$$16m = \frac{32m}{2}$$

Sides of Cyclic Quadrilateral

19) Side A of Cyclic Quadrilateral given both Diagonals

fx

[Open Calculator !\[\]\(141489a9a09a5a55d166fd7134726d50_img.jpg\)](#)

$$S_a = \frac{(d_1 \cdot d_2) - (S_b \cdot S_d)}{S_c}$$

ex

$$10.875m = \frac{(11m \cdot 12m) - (9m \cdot 5m)}{8m}$$



20) Side A of Cyclic Quadrilateral given other Sides and Perimeter

$$\text{fx } S_a = P - (S_b + S_d + S_c)$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$\text{ex } 10\text{m} = 32\text{m} - (9\text{m} + 5\text{m} + 8\text{m})$$

21) Side B of Cyclic Quadrilateral given both Diagonals

$$\text{fx } S_b = \frac{(d_1 \cdot d_2) - (S_a \cdot S_c)}{S_d}$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$\text{ex } 10.4\text{m} = \frac{(11\text{m} \cdot 12\text{m}) - (10\text{m} \cdot 8\text{m})}{5\text{m}}$$

22) Side C of Cyclic Quadrilateral given both Diagonals

$$\text{fx } S_c = \frac{(d_1 \cdot d_2) - (S_b \cdot S_d)}{S_a}$$

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

$$\text{ex } 8.7\text{m} = \frac{(11\text{m} \cdot 12\text{m}) - (9\text{m} \cdot 5\text{m})}{10\text{m}}$$

23) Side D of Cyclic Quadrilateral given both Diagonals

$$\text{fx } S_d = \frac{(d_1 \cdot d_2) - (S_a \cdot S_c)}{S_b}$$

[Open Calculator !\[\]\(5abce1a84a655b073239ab33e1199487_img.jpg\)](#)

$$\text{ex } 5.777778\text{m} = \frac{(11\text{m} \cdot 12\text{m}) - (10\text{m} \cdot 8\text{m})}{9\text{m}}$$






Variables Used

- $\angle \text{Diagonals}$ Angle Between Diagonals of Cyclic Quadrilateral (Degree)
- $\angle A$ Angle A of Cyclic Quadrilateral (Degree)
- $\angle B$ Angle B of Cyclic Quadrilateral (Degree)
- $\angle C$ Angle C of Cyclic Quadrilateral (Degree)
- $\angle D$ Angle D of Cyclic Quadrilateral (Degree)
- A Area of Cyclic Quadrilateral (Square Meter)
- d_1 Diagonal 1 of Cyclic Quadrilateral (Meter)
- d_2 Diagonal 2 of Cyclic Quadrilateral (Meter)
- P Perimeter of Cyclic Quadrilateral (Meter)
- r_c Circumradius of Cyclic Quadrilateral (Meter)
- s Semiperimeter of Cyclic Quadrilateral (Meter)
- S_a Side A of Cyclic Quadrilateral (Meter)
- S_b Side B of Cyclic Quadrilateral (Meter)
- S_c Side C of Cyclic Quadrilateral (Meter)
- S_d Side D of Cyclic Quadrilateral (Meter)



Constants, Functions, Measurements used

- **Constant:** **pi**, 3.14159265358979323846264338327950288
Archimedes' constant
- **Function:** **arccos**, arccos(Number)
Inverse trigonometric cosine function
- **Function:** **arctan**, arctan(Number)
Inverse trigonometric tangent function
- **Function:** **cos**, cos(Angle)
Trigonometric cosine function
- **Function:** **ctan**, ctan(Angle)
Trigonometric cotangent function
- **Function:** **sin**, sin(Angle)
Trigonometric sine function
- **Function:** **sqrt**, sqrt(Number)
Square root function
- **Function:** **tan**, tan(Angle)
Trigonometric tangent function
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Area** in Square Meter (m²)
Area Unit Conversion 
- **Measurement:** **Angle** in Degree (°)
Angle Unit Conversion 



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