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Regular Polygon Formulas

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List of 28 Regular Polygon Formulas

Regular Polygon

Angles of Regular Polygon

1) Exterior Angle of Regular Polygon

Open Calculator

fx $$\angle_{\text{Exterior}} = \frac{2 \cdot \pi}{N_S}$$

ex $$45^\circ = \frac{2 \cdot \pi}{8}$$

2) Interior Angle of Regular Polygon

Open Calculator

fx $$\angle_{\text{Interior}} = \frac{(N_S - 2) \cdot \pi}{N_S}$$

ex $$135^\circ = \frac{(8 - 2) \cdot \pi}{8}$$

3) Interior Angle of Regular Polygon given Sum of Interior Angles

Open Calculator

fx $$\angle_{\text{Interior}} = \frac{\text{Sum}\angle_{\text{Interior}}}{N_S}$$

ex $$135^\circ = \frac{1080^\circ}{8}$$

4) Sum of Interior Angles of Regular Polygon

Open Calculator

fx $\text{Sum}\angle_{\text{Interior}} = (N_S - 2) \cdot \pi$

ex $1080^\circ = (8 - 2) \cdot \pi$

Area of Regular Polygon

5) Area of Regular Polygon

Open Calculator

fx $A = \frac{l_e^2 \cdot N_S}{4 \cdot \tan\left(\frac{\pi}{N_S}\right)}$

ex $482.8427\text{m}^2 = \frac{(10\text{m})^2 \cdot 8}{4 \cdot \tan\left(\frac{\pi}{8}\right)}$

6) Area of Regular Polygon given Circumradius

Open Calculator

fx $A = \frac{r_c^2 \cdot N_S \cdot \sin\left(\frac{2 \cdot \pi}{N_S}\right)}{2}$

ex $478.0042\text{m}^2 = \frac{(13\text{m})^2 \cdot 8 \cdot \sin\left(\frac{2 \cdot \pi}{8}\right)}{2}$

7) Area of Regular Polygon given Inradius

Open Calculator

fx $$A = r_i^2 \cdot N_S \cdot \tan\left(\frac{\pi}{N_S}\right)$$

ex $$477.174\text{m}^2 = (12\text{m})^2 \cdot 8 \cdot \tan\left(\frac{\pi}{8}\right)$$

8) Area of Regular Polygon given Perimeter and Circumradius

Open Calculator

fx $$A = \frac{P \cdot \sqrt{r_c^2 - \frac{l_e^2}{4}}}{2}$$

ex $$480\text{m}^2 = \frac{80\text{m} \cdot \sqrt{(13\text{m})^2 - \frac{(10\text{m})^2}{4}}}{2}$$

9) Area of Regular Polygon given Perimeter and Inradius

Open Calculator

fx $$A = \frac{P \cdot r_i}{2}$$

ex $$480\text{m}^2 = \frac{80\text{m} \cdot 12\text{m}}{2}$$

Edge Length of Regular Polygon

10) Edge Length of Regular Polygon given Area

Open Calculator

fx $$l_e = \frac{\sqrt{4 \cdot A \cdot \tan\left(\frac{\pi}{N_S}\right)}}{\sqrt{N_S}}$$

ex $$9.970519\text{m} = \frac{\sqrt{4 \cdot 480\text{m}^2 \cdot \tan\left(\frac{\pi}{8}\right)}}{\sqrt{8}}$$

11) Edge Length of Regular Polygon given Circumradius

Open Calculator

fx $$l_e = 2 \cdot r_c \cdot \sin\left(\frac{\pi}{N_S}\right)$$

ex $$9.949769\text{m} = 2 \cdot 13\text{m} \cdot \sin\left(\frac{\pi}{8}\right)$$

12) Edge Length of Regular Polygon given Inradius

Open Calculator

fx $$l_e = r_i \cdot 2 \cdot \tan\left(\frac{\pi}{N_S}\right)$$

ex $$9.941125\text{m} = 12\text{m} \cdot 2 \cdot \tan\left(\frac{\pi}{8}\right)$$

13) Edge Length of Regular Polygon given Perimeter

Open Calculator

fx $$l_e = \frac{P}{N_S}$$

ex $$10\text{m} = \frac{80\text{m}}{8}$$

Other Formulas of Regular Polygon

14) Number of Diagonals of Regular Polygon

Open Calculator

fx $$N_{\text{Diagonals}} = \frac{N_S \cdot (N_S - 3)}{2}$$

ex $$20 = \frac{8 \cdot (8 - 3)}{2}$$

15) Number of Sides of Regular Polygon given Sum of Interior Angles

Open Calculator

fx $$N_S = \left(\frac{\text{Sum}\angle_{\text{Interior}}}{\pi}\right) + 2$$

ex $$8 = \left(\frac{1080^\circ}{\pi}\right) + 2$$

Perimeter of Regular Polygon

16) Perimeter of Regular Polygon

Open Calculator

fx $$P = N_S \cdot l_e$$

ex $$80\text{m} = 8 \cdot 10\text{m}$$

17) Perimeter of Regular Polygon given Circumradius and Area

Open Calculator

fx $$P = \frac{2 \cdot A}{\sqrt{r_c^2 - \frac{l_e^2}{4}}}$$

ex $$80\text{m} = \frac{2 \cdot 480\text{m}^2}{\sqrt{(13\text{m})^2 - \frac{(10\text{m})^2}{4}}}$$

18) Perimeter of Regular Polygon given Inradius and Area

Open Calculator

fx $$P = \frac{2 \cdot A}{r_i}$$

ex $$80\text{m} = \frac{2 \cdot 480\text{m}^2}{12\text{m}}$$

19) Perimeter of Regular Polygon given Number of Sides and Circumradius

Open Calculator

fx $$P = 2 \cdot r_c \cdot N_S \cdot \sin\left(\frac{\pi}{N_S}\right)$$

ex $$79.59815\text{m} = 2 \cdot 13\text{m} \cdot 8 \cdot \sin\left(\frac{\pi}{8}\right)$$

20) Perimeter of Regular Polygon given Number of Sides and Inradius

Open Calculator

fx $$P = 2 \cdot N_S \cdot r_i \cdot \tan\left(\frac{\pi}{N_S}\right)$$

ex $$79.529\text{m} = 2 \cdot 8 \cdot 12\text{m} \cdot \tan\left(\frac{\pi}{8}\right)$$

Radius of Regular Polygon

Circumradius of Regular Polygon

21) Circumradius of Regular Polygon

Open Calculator

fx $$r_c = \frac{l_e}{2 \cdot \sin\left(\frac{\pi}{N_S}\right)}$$

ex $$13.06563\text{m} = \frac{10\text{m}}{2 \cdot \sin\left(\frac{\pi}{8}\right)}$$

22) Circumradius of Regular Polygon given Area

Open Calculator

fx $$r_c = \sqrt{\frac{2 \cdot A}{N_S \cdot \sin\left(\frac{2 \cdot \pi}{N_S}\right)}}$$

ex $$13.02711\text{m} = \sqrt{\frac{2 \cdot 480\text{m}^2}{8 \cdot \sin\left(\frac{2 \cdot \pi}{8}\right)}}$$

23) Circumradius of Regular Polygon given Inradius

Open Calculator

fx $$r_c = \frac{r_i}{\cos\left(\frac{\pi}{N_S}\right)}$$

ex $$12.98871\text{m} = \frac{12\text{m}}{\cos\left(\frac{\pi}{8}\right)}$$

24) Circumradius of Regular Polygon given Perimeter

Open Calculator

fx $$r_c = \frac{P}{2 \cdot N_S \cdot \sin\left(\frac{\pi}{N_S}\right)}$$

ex $$13.06563\text{m} = \frac{80\text{m}}{2 \cdot 8 \cdot \sin\left(\frac{\pi}{8}\right)}$$

Inradius of Regular Polygon

25) Inradius of Regular Polygon

Open Calculator

fx $$r_i = \frac{l_e}{2 \cdot \tan\left(\frac{\pi}{N_S}\right)}$$

ex $$12.07107\text{m} = \frac{10\text{m}}{2 \cdot \tan\left(\frac{\pi}{8}\right)}$$

26) Inradius of Regular Polygon given Area

Open Calculator

fx $$r_i = \sqrt{\frac{A}{N_S \cdot \tan\left(\frac{\pi}{N_S}\right)}}$$

ex $$12.03548\text{m} = \sqrt{\frac{480\text{m}^2}{8 \cdot \tan\left(\frac{\pi}{8}\right)}}$$

27) Inradius of Regular Polygon given Circumradius

Open Calculator

fx $$r_i = r_c \cdot \cos\left(\frac{\pi}{N_S}\right)$$

ex $$12.01043\text{m} = 13\text{m} \cdot \cos\left(\frac{\pi}{8}\right)$$

28) Inradius of Regular Polygon given Perimeter

Open Calculator

fx $$r_i = \frac{P}{2 \cdot N_S \cdot \tan\left(\frac{\pi}{N_S}\right)}$$

ex $$12.07107\text{m} = \frac{80\text{m}}{2 \cdot 8 \cdot \tan\left(\frac{\pi}{8}\right)}$$

Variables Used

- $\angle_{Exterior}$ Exterior Angle of Regular Polygon *(Degree)*
- $\angle_{Interior}$ Interior Angle of Regular Polygon *(Degree)*
- **A** Area of Regular Polygon *(Square Meter)*
- l_e Edge Length of Regular Polygon *(Meter)*
- $N_{Diagonals}$ Number of Diagonals of Regular Polygon
- N_S Number of Sides of Regular Polygon
- **P** Perimeter of Regular Polygon *(Meter)*
- r_c Circumradius of Regular Polygon *(Meter)*
- r_i Inradius of Regular Polygon *(Meter)*
- $Sum\angle_{Interior}$ Sum of Interior Angles of Regular Polygon *(Degree)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **cos**, cos(Angle)
  Trigonometric cosine 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

Check other formula lists

- Annulus Formulas
- Antiparallelogram Formulas
- Arrow Hexagon Formulas
- Astroid Formulas
- Bulge Formulas
- Cardioid Formulas
- Circular Arc Quadrangle Formulas
- Concave Pentagon Formulas
- Concave Quadrilateral Formulas
- Concave Regular Hexagon Formulas
- Concave Regular Pentagon Formulas
- Crossed Rectangle Formulas
- Cut Rectangle Formulas
- Cyclic Quadrilateral Formulas
- Cycloid Formulas
- Decagon Formulas
- Dodecagon Formulas
- Double Cycloid Formulas
- Fourstar Formulas
- Frame Formulas
- Golden Rectangle Formulas
- Grid Formulas
- H Shape Formulas
- Half Yin-Yang Formulas
- Heart Shape Formulas
- Hendecagon Formulas
- Heptagon Formulas
- Hexadecagon Formulas
- Hexagon Formulas
- Hexagram Formulas
- House Shape Formulas
- Hyperbola Formulas
- Hypocycloid Formulas
- Isosceles Trapezoid Formulas
- Koch Curve Formulas
- L Shape Formulas
- Line Formulas
- Lune Formulas
- N-gon Formulas
- Nonagon Formulas
- Octagon Formulas
- Octagram Formulas
- Open Frame Formulas
- Parallelogram Formulas
- Pentagon Formulas
- Pentagram Formulas
- Polygram Formulas
- Quadrilateral Formulas
- Quarter Circle Formulas
- Rectangle Formulas

- Rectangular Hexagon Formulas
- Regular Polygon Formulas
- Reuleaux Triangle Formulas
- Rhombus Formulas
- Right Trapezoid Formulas
- Round Corner Formulas
- Salinon Formulas
- Semicircle Formulas
- Sharp Kink Formulas
- Square Formulas
- Star of Lakshmi Formulas
- Stretched Hexagon Formulas
- T Shape Formulas
- Tangential Quadrilateral Formulas
- Trapezoid Formulas
- Tricorn Formulas
- Tri-equilateral Trapezoid Formulas
- Truncated Square Formulas
- Unicursal Hexagram Formulas
- X Shape Formulas

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