Important Formulas of Nonagon PDF

Formulas
Examples
with Units

List of 21
Important Formulas of Nonagon

1) Area of Nonagon Formulas

1.1) Area of Nonagon Formula

Evaluate Formula

Formula

$$A = \frac{9}{4} \cdot S^2 \cdot \cot\left(\frac{\pi}{9}\right)$$

Example with Units

$$395.6367\,\text{m}^2 = \frac{9}{4} \cdot 8\,\text{m}^2 \cdot \cot\left(\frac{3.1416}{9}\right)$$

1.2) Area of Nonagon given Height Formula

Evaluate Formula

Formula

$$A = \frac{\left(\frac{3 \cdot \sin\left(\frac{\pi}{9}\right) \cdot h}{1 + \cos\left(\frac{\pi}{9}\right)}\right)^2}{\tan\left(\frac{\pi}{9}\right)}$$

Example with Units

$$372.0999\,\text{m}^2 = \frac{\left(\frac{3 \cdot \sin\left(\frac{3.1416}{9}\right) \cdot 22\,\text{m}}{1 + \cos\left(\frac{3.1416}{9}\right)}\right)^2}{\tan\left(\frac{3.1416}{9}\right)}$$

1.3) Area of Nonagon given Inradius Formula

Evaluate Formula

Formula

$$A = 9 \cdot r_i^2 \cdot \tan\left(\frac{\pi}{9}\right)$$

Example with Units

$$396.3636\,\text{m}^2 = 9 \cdot 11\,\text{m}^2 \cdot \tan\left(\frac{3.1416}{9}\right)$$

1.4) Area of Nonagon given Perimeter Formula

Evaluate Formula

Formula

$$A = \frac{P^2 \cdot \cot\left(\frac{\pi}{9}\right)}{36}$$

Example with Units

$$373.9622\,\text{m}^2 = \frac{70\,\text{m}^2 \cdot \cot\left(\frac{3.1416}{9}\right)}{36}$$

2) Diagonal of Nonagon Formulas

2.1) Diagonal of Nonagon across Four Sides Formula

Evaluate Formula

Formula

$$d_4 = S \cdot \left(\frac{\sin\left(4 \cdot \frac{\pi}{9}\right)}{\sin\left(\frac{\pi}{9}\right)}\right)$$

Example with Units

$$23.0351\,\text{m} = 8\,\text{m} \cdot \left(\frac{\sin\left(4 \cdot \frac{3.1416}{9}\right)}{\sin\left(\frac{3.1416}{9}\right)}\right)$$

2.2) Diagonal of Nonagon across Three Sides Formula

Evaluate Formula

Formula

$$d_3 = S \cdot \left(\frac{\sin\left(3 \cdot \frac{\pi}{9}\right)}{\sin\left(\frac{\pi}{9}\right)} \right)$$

Example with Units

$$20.2567\,\text{m} = 8\,\text{m} \cdot \left(\frac{\sin\left(3 \cdot \frac{3.1416}{9}\right)}{\sin\left(\frac{3.1416}{9}\right)} \right)$$

2.3) Diagonal of Nonagon across Two Sides Formula

Evaluate Formula

Formula

$$d_2 = S \cdot \left(\frac{\sin\left(2 \cdot \frac{\pi}{9}\right)}{\sin\left(\frac{\pi}{9}\right)} \right)$$

Example with Units

$$15.0351\,\text{m} = 8\,\text{m} \cdot \left(\frac{\sin\left(2 \cdot \frac{3.1416}{9}\right)}{\sin\left(\frac{3.1416}{9}\right)} \right)$$

3) Height of Nonagon Formulas

3.1) Height of Nonagon Formula

Evaluate Formula

Formula

$$h = r_c + r_i$$

Example with Units

$$23\,\text{m} = 12\,\text{m} + 11\,\text{m}$$

3.2) Height of Nonagon given Area Formula

Evaluate Formula

Formula

$$h = \left(\frac{1 + \cos\left(\frac{\pi}{9}\right)}{3 \cdot \sin\left(\frac{\pi}{9}\right)} \right) \cdot \sqrt{A \cdot \left(\tan\left(\frac{\pi}{9}\right) \right)}$$

Example with Units

$$22.6669\,\text{m} = \left(\frac{1 + \cos\left(\frac{3.1416}{9}\right)}{3 \cdot \sin\left(\frac{3.1416}{9}\right)} \right) \cdot \sqrt{395\,\text{m}^2 \cdot \left(\tan\left(\frac{3.1416}{9}\right) \right)}$$

3.3) Height of Nonagon given Side Formula

Evaluate Formula

Formula

$$h = \left(\frac{1 + \cos\left(\frac{\pi}{9}\right)}{2 \cdot \sin\left(\frac{\pi}{9}\right)} \right) \cdot S$$

Example with Units

$$22.6851\,\text{m} = \left(\frac{1 + \cos\left(\frac{3.1416}{9}\right)}{2 \cdot \sin\left(\frac{3.1416}{9}\right)} \right) \cdot 8\,\text{m}$$

4) Perimeter of Nonagon Formulas

4.1) Perimeter of Nonagon Formula

Evaluate Formula

Formula

$$P = 9 \cdot S$$

Example with Units

$$72\,\text{m} = 9 \cdot 8\,\text{m}$$

4.2) Perimeter of Nonagon given Area Formula

Evaluate Formula

Formula

$$P = 9 \cdot \sqrt{\frac{4 \cdot A}{9 \cdot \cot\left(\frac{\pi}{9}\right)}}$$

Example with Units

$$71.942\,\text{m} = 9 \cdot \sqrt{\frac{4 \cdot 395\,\text{m}^2}{9 \cdot \cot\left(\frac{3.1416}{9}\right)}}$$

4.3) Perimeter of Nonagon given Inradius Formula

Evaluate Formula

Formula

$$P = 18 \cdot r_i \cdot \tan\left(\frac{\pi}{9}\right)$$

Example with Units

$$72.0661\,\text{m} = 18 \cdot 11\,\text{m} \cdot \tan\left(\frac{3.1416}{9}\right)$$

5) Radius of Nonagon Formulas

5.1) Circumradius of Nonagon Formula

Evaluate Formula

Formula

$$r_c = \frac{S}{2 \cdot \sin\left(\frac{\pi}{9}\right)}$$

Example with Units

$$11.6952\,\text{m} = \frac{8\,\text{m}}{2 \cdot \sin\left(\frac{3.1416}{9}\right)}$$

5.2) Circumradius of Nonagon given Height Formula

Evaluate Formula

Formula

$$r_c = \frac{h}{1 + \cos\left(\frac{\pi}{9}\right)}$$

Example with Units

$$11.342\,\text{m} = \frac{22\,\text{m}}{1 + \cos\left(\frac{3.1416}{9}\right)}$$

5.3) Inradius of Nonagon Formula

Evaluate Formula

Formula

$$r_i = \frac{S}{2 \cdot \tan\left(\frac{\pi}{9}\right)}$$

Example with Units

$$10.9899\,\text{m} = \frac{8\,\text{m}}{2 \cdot \tan\left(\frac{3.1416}{9}\right)}$$

5.4) Inradius of Nonagon given Diagonal across Two Sides Formula

Evaluate Formula

Formula

$$r_i = \frac{\left(\frac{d_2}{2 \cdot \left(\sin\left(2 \cdot \frac{\pi}{9}\right)\right)}\right) \cdot \sin\left(\frac{\pi}{9}\right)}{\tan\left(\frac{\pi}{9}\right)}$$

Example with Units

$$10.9643\,\text{m} = \frac{\left(\frac{15\,\text{m}}{2 \cdot \left(\sin\left(2 \cdot \frac{3.1416}{9}\right)\right)}\right) \cdot \sin\left(\frac{3.1416}{9}\right)}{\tan\left(\frac{3.1416}{9}\right)}$$

5.5) Inradius of Nonagon given Height Formula

Evaluate Formula

Formula

$$r_i = \frac{h}{1 + \sec\left(\frac{\pi}{9}\right)}$$

Example with Units

$$10.658\,\text{m} = \frac{22\,\text{m}}{1 + \sec\left(\frac{3.1416}{9}\right)}$$

6) Side of Nonagon Formulas

6.1) Side of Nonagon given Area Formula

Evaluate Formula

Formula

$$S = \sqrt{\frac{4}{9} \cdot \left(\frac{A}{\cot\left(\frac{\pi}{9}\right)}\right)}$$

Example with Units

$$7.9936\,\text{m} = \sqrt{\frac{4}{9} \cdot \left(\frac{395\,\text{m}^2}{\cot\left(\frac{3.1416}{9}\right)}\right)}$$

6.2) Side of Nonagon given Circumradius Formula

Evaluate Formula

Formula

$$S = 2 \cdot r_c \cdot \sin\left(\frac{\pi}{9}\right)$$

Example with Units

$$8.2085\,\text{m} = 2 \cdot 12\,\text{m} \cdot \sin\left(\frac{3.1416}{9}\right)$$

6.3) Side of Nonagon given Height Formula

Evaluate Formula

Formula

$$S = \left(\frac{2 \cdot \sin\left(\frac{\pi}{9}\right)}{1 + \cos\left(\frac{\pi}{9}\right)}\right) \cdot h$$

Example with Units

$$7.7584\,\text{m} = \left(\frac{2 \cdot \sin\left(\frac{3.1416}{9}\right)}{1 + \cos\left(\frac{3.1416}{9}\right)}\right) \cdot 22\,\text{m}$$

Variables used in list of Important Formulas of Nonagon above

- **A** Area of Nonagon *(Square Meter)*
- d_2 Diagonal across Two Sides of Nonagon *(Meter)*
- d_3 Diagonal across Three Sides of Nonagon *(Meter)*
- d_4 Diagonal across Four Sides of Nonagon *(Meter)*
- **h** Height of Nonagon *(Meter)*
- **P** Perimeter of Nonagon *(Meter)*
- r_c Circumradius of Nonagon *(Meter)*
- r_i Inradius of Nonagon *(Meter)*
- **S** Side of Nonagon *(Meter)*

Constants, Functions, Measurements used in list of Important Formulas of Nonagon above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- Functions: **cos**, cos(Angle) *Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.*
- Functions: **cot**, cot(Angle) *Cotangent is a trigonometric function that is defined as the ratio of the adjacent side to the opposite side in a right triangle.*
- Functions: **sec**, sec(Angle) *Secant is a trigonometric function that is defined ratio of the hypotenuse to the shorter side adjacent to an acute angle (in a right-angled triangle); the reciprocal of a cosine.*
- Functions: **sin**, sin(Angle) *Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.*
- Functions: **sqrt**, sqrt(Number) *A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- Functions: **tan**, tan(Angle) *The tangent of an angle is a trigonometric ratio of the length of the side opposite an angle to the length of the side adjacent to an angle in a right triangle.*
- Measurement: **Length** in Meter (m) *Length Unit Conversion*
- Measurement: **Area** in Square Meter (m²) *Area Unit Conversion*

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