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Important Pentagon Formulas

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List of 21 Important Pentagon Formulas

Important Pentagon Formulas

Area of Pentagon

1) Area of Pentagon

$$\text{fx } A = \frac{l_e^2}{4} \cdot \sqrt{25 + (10 \cdot \sqrt{5})}$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2_img.jpg\)](#)

$$\text{ex } 172.0477\text{m}^2 = \frac{(10\text{m})^2}{4} \cdot \sqrt{25 + (10 \cdot \sqrt{5})}$$

2) Area of Pentagon given Edge Length and Inradius

$$\text{fx } A = \frac{5}{2} \cdot l_e \cdot r_i$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa_img.jpg\)](#)

$$\text{ex } 175\text{m}^2 = \frac{5}{2} \cdot 10\text{m} \cdot 7\text{m}$$

3) Area of Pentagon given Edge Length using Central Angle

$$\text{fx } A = \frac{5 \cdot l_e^2}{4 \cdot \tan\left(\frac{\pi}{5}\right)}$$

[Open Calculator !\[\]\(f1c5da15572e3e09d343161be98f508d_img.jpg\)](#)

$$\text{ex } 172.0477\text{m}^2 = \frac{5 \cdot (10\text{m})^2}{4 \cdot \tan\left(\frac{\pi}{5}\right)}$$



4) Area of Pentagon given Edge Length using Interior Angle

$$\text{fx } A = \frac{5 \cdot l_e^2 \cdot \left(\frac{1}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right)^2}{2 \cdot \sin\left(\frac{3}{5} \cdot \pi\right)}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 172.0477\text{m}^2 = \frac{5 \cdot (10\text{m})^2 \cdot \left(\frac{1}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right)^2}{2 \cdot \sin\left(\frac{3}{5} \cdot \pi\right)}$$

Height of Pentagon

5) Height of Pentagon

$$\text{fx } h = \frac{l_e}{2} \cdot \sqrt{5 + (2 \cdot \sqrt{5})}$$

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

$$\text{ex } 15.38842\text{m} = \frac{10\text{m}}{2} \cdot \sqrt{5 + (2 \cdot \sqrt{5})}$$

6) Height of Pentagon given Circumradius and Inradius

$$\text{fx } h = r_c + r_i$$

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

$$\text{ex } 16\text{m} = 9\text{m} + 7\text{m}$$



7) Height of Pentagon given Edge Length using Central Angle

$$\text{fx } h = \frac{l_e}{2} \cdot \frac{1 + \cos\left(\frac{\pi}{5}\right)}{\sin\left(\frac{\pi}{5}\right)}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$\text{ex } 15.38842\text{m} = \frac{10\text{m}}{2} \cdot \frac{1 + \cos\left(\frac{\pi}{5}\right)}{\sin\left(\frac{\pi}{5}\right)}$$

8) Height of Pentagon given Edge Length using Interior Angle

$$\text{fx } h = l_e \cdot \frac{\left(\frac{3}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right) \cdot \left(\frac{1}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right)}{\sin\left(\frac{3}{5} \cdot \pi\right)}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)

$$\text{ex } 15.38842\text{m} = 10\text{m} \cdot \frac{\left(\frac{3}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right) \cdot \left(\frac{1}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right)}{\sin\left(\frac{3}{5} \cdot \pi\right)}$$

Other Formulas of Pentagon

9) Diagonal of Pentagon

$$\text{fx } d = \left(1 + \sqrt{5}\right) \cdot \frac{l_e}{2}$$

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

$$\text{ex } 16.18034\text{m} = \left(1 + \sqrt{5}\right) \cdot \frac{10\text{m}}{2}$$



10) Edge Length of Pentagon given Area and Inradius

$$\text{fx } l_e = \frac{2 \cdot A}{5 \cdot r_i}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$\text{ex } 9.714286\text{m} = \frac{2 \cdot 170\text{m}^2}{5 \cdot 7\text{m}}$$

11) Perimeter of Pentagon

$$\text{fx } P = 5 \cdot l_e$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$\text{ex } 50\text{m} = 5 \cdot 10\text{m}$$

12) Width of Pentagon

$$\text{fx } w = \frac{1 + \sqrt{5}}{2} \cdot l_e$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

$$\text{ex } 16.18034\text{m} = \frac{1 + \sqrt{5}}{2} \cdot 10\text{m}$$

Radius of Pentagon

13) Circumradius of Pentagon

$$\text{fx } r_c = \frac{l_e}{10} \cdot \sqrt{50 + (10 \cdot \sqrt{5})}$$

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

$$\text{ex } 8.506508\text{m} = \frac{10\text{m}}{10} \cdot \sqrt{50 + (10 \cdot \sqrt{5})}$$



14) Circumradius of Pentagon given Edge Length using Central Angle

$$\text{fx } r_c = \frac{l_e}{2 \cdot \sin\left(\frac{\pi}{5}\right)}$$

Open Calculator 

$$\text{ex } 8.506508\text{m} = \frac{10\text{m}}{2 \cdot \sin\left(\frac{\pi}{5}\right)}$$

15) Circumradius of Pentagon given Edge Length using Interior Angle

$$\text{fx } r_c = \frac{l_e \cdot \left(\frac{1}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right)}{\sin\left(\frac{3}{5} \cdot \pi\right)}$$

Open Calculator 

$$\text{ex } 8.506508\text{m} = \frac{10\text{m} \cdot \left(\frac{1}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right)}{\sin\left(\frac{3}{5} \cdot \pi\right)}$$

16) Circumradius of Pentagon given Height and Inradius

$$\text{fx } r_c = h - r_i$$

Open Calculator 

$$\text{ex } 8\text{m} = 15\text{m} - 7\text{m}$$

17) Inradius of Pentagon

$$\text{fx } r_i = \frac{l_e}{10} \cdot \sqrt{25 + \left(10 \cdot \sqrt{5}\right)}$$

Open Calculator 

$$\text{ex } 6.88191\text{m} = \frac{10\text{m}}{10} \cdot \sqrt{25 + \left(10 \cdot \sqrt{5}\right)}$$



18) Inradius of Pentagon given Area and Edge Length

$$\text{fx } r_i = \frac{2 \cdot A}{5 \cdot l_e}$$

[Open Calculator !\[\]\(9dfdaff1d86ba3c1f8353b4d1b61b8c5_img.jpg\)](#)

$$\text{ex } 6.8\text{m} = \frac{2 \cdot 170\text{m}^2}{5 \cdot 10\text{m}}$$

19) Inradius of Pentagon given Circumradius and Height

$$\text{fx } r_i = h - r_c$$

[Open Calculator !\[\]\(2b376d1a92330ab09dad2665d2f89bf5_img.jpg\)](#)

$$\text{ex } 6\text{m} = 15\text{m} - 9\text{m}$$

20) Inradius of Pentagon given Edge Length using Central Angle

$$\text{fx } r_i = \frac{l_e}{2 \cdot \tan\left(\frac{\pi}{5}\right)}$$

[Open Calculator !\[\]\(c444627dab9fee9a1550c053ffaaaae2_img.jpg\)](#)

$$\text{ex } 6.88191\text{m} = \frac{10\text{m}}{2 \cdot \tan\left(\frac{\pi}{5}\right)}$$

21) Inradius of Pentagon given Edge Length using Interior Angle

$$\text{fx } r_i = \frac{\left(\frac{1}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right)^2 \cdot l_e}{\sin\left(\frac{3}{5} \cdot \pi\right)}$$

[Open Calculator !\[\]\(06a315363e7801bba8c7489a6694af19_img.jpg\)](#)

$$\text{ex } 6.88191\text{m} = \frac{\left(\frac{1}{2} - \cos\left(\frac{3}{5} \cdot \pi\right)\right)^2 \cdot 10\text{m}}{\sin\left(\frac{3}{5} \cdot \pi\right)}$$



Variables Used

- **A** Area of Pentagon (Square Meter)
- **d** Diagonal of Pentagon (Meter)
- **h** Height of Pentagon (Meter)
- **l_e** Edge Length of Pentagon (Meter)
- **P** Perimeter of Pentagon (Meter)
- **r_c** Circumradius of Pentagon (Meter)
- **r_i** Inradius of Pentagon (Meter)
- **w** Width of Pentagon (Meter)



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 



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