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# Important Formulas of Decagon

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# List of 25 Important Formulas of Decagon

## Important Formulas of Decagon

### Area of Decagon

#### 1) Area of Decagon

$$\text{fx } A = \frac{5}{2} \cdot \sqrt{5 + (2 \cdot \sqrt{5})} \cdot S^2$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2\_img.jpg\)](#)

$$\text{ex } 769.4209\text{m}^2 = \frac{5}{2} \cdot \sqrt{5 + (2 \cdot \sqrt{5})} \cdot (10\text{m})^2$$

#### 2) Area of Decagon given Circumradius

$$\text{fx } A = \frac{5}{2} \cdot \sqrt{5 + (2 \cdot \sqrt{5})} \cdot \left( \frac{2 \cdot r_c}{1 + \sqrt{5}} \right)^2$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa\_img.jpg\)](#)

$$\text{ex } 752.3651\text{m}^2 = \frac{5}{2} \cdot \sqrt{5 + (2 \cdot \sqrt{5})} \cdot \left( \frac{2 \cdot 16\text{m}}{1 + \sqrt{5}} \right)^2$$



### 3) Area of Decagon given Perimeter

$$\text{fx } A = \frac{5}{2} \cdot \sqrt{5 + (2 \cdot \sqrt{5})} \cdot \left(\frac{P}{10}\right)^2$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235\_img.jpg\)](#)

$$\text{ex } 769.4209\text{m}^2 = \frac{5}{2} \cdot \sqrt{5 + (2 \cdot \sqrt{5})} \cdot \left(\frac{100\text{m}}{10}\right)^2$$

### Diagonal of Decagon

#### 4) Diagonal of Decagon across Five Sides

$$\text{fx } d_5 = (1 + \sqrt{5}) \cdot S$$

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc\_img.jpg\)](#)

$$\text{ex } 32.36068\text{m} = (1 + \sqrt{5}) \cdot 10\text{m}$$

#### 5) Diagonal of Decagon across Five Sides given Circumradius

$$\text{fx } d_5 = 2 \cdot r_c$$

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e\_img.jpg\)](#)

$$\text{ex } 32\text{m} = 2 \cdot 16\text{m}$$

#### 6) Diagonal of Decagon across Four Sides

$$\text{fx } d_4 = \sqrt{5 + (2 \cdot \sqrt{5})} \cdot S$$

[Open Calculator !\[\]\(84f47badaad7772cd95667a7c387a639\_img.jpg\)](#)

$$\text{ex } 30.77684\text{m} = \sqrt{5 + (2 \cdot \sqrt{5})} \cdot 10\text{m}$$




7) Diagonal of Decagon across Four Sides given Inradius 

$$fx \quad d_4 = (2 \cdot r_i)$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95\_img.jpg\)](#)

$$ex \quad 30m = (2 \cdot 15m)$$

8) Diagonal of Decagon across Three Sides 

$$fx \quad d_3 = \frac{\sqrt{14 + (6 \cdot \sqrt{5})}}{2} \cdot S$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2\_img.jpg\)](#)

$$ex \quad 26.18034m = \frac{\sqrt{14 + (6 \cdot \sqrt{5})}}{2} \cdot 10m$$

9) Diagonal of Decagon across Two Sides 

$$fx \quad d_2 = \frac{\sqrt{10 + (2 \cdot \sqrt{5})}}{2} \cdot S$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7\_img.jpg\)](#)

$$ex \quad 19.02113m = \frac{\sqrt{10 + (2 \cdot \sqrt{5})}}{2} \cdot 10m$$



## Height of Decagon

### 10) Height of Decagon

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

[Open Calculator !\[\]\(74d4806277d7e73349d8e8c0897931e9\_img.jpg\)](#)

$$\text{ex } 30.77684\text{m} = \sqrt{5 + (2 \cdot \sqrt{5})} \cdot 10\text{m}$$

### 11) Height of Decagon given Diagonal across Four Sides

$$\text{fx } h = d_4 \cdot 1$$

[Open Calculator !\[\]\(8bba887393ca45b761e5cb49e755e762\_img.jpg\)](#)

$$\text{ex } 31\text{m} = 31\text{m} \cdot 1$$

### 12) Height of Decagon given Width

$$\text{fx } h = \frac{\sqrt{5 + (2 \cdot \sqrt{5})} \cdot w}{1 + \sqrt{5}}$$

[Open Calculator !\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3\_img.jpg\)](#)

$$\text{ex } 30.43381\text{m} = \frac{\sqrt{5 + (2 \cdot \sqrt{5})} \cdot 32\text{m}}{1 + \sqrt{5}}$$



## Perimeter of Decagon

### 13) Perimeter of Decagon

$$\text{fx } P = 10 \cdot S$$

[Open Calculator !\[\]\(950a62bbddad88d64435fd35607dfc42\_img.jpg\)](#)

$$\text{ex } 100\text{m} = 10 \cdot 10\text{m}$$

### 14) Perimeter of Decagon given Circumradius

$$\text{fx } P = 10 \cdot \frac{2 \cdot r_c}{1 + \sqrt{5}}$$

[Open Calculator !\[\]\(73002692dd5e7a64e60946be3158e719\_img.jpg\)](#)

$$\text{ex } 98.88544\text{m} = 10 \cdot \frac{2 \cdot 16\text{m}}{1 + \sqrt{5}}$$

### 15) Perimeter of Decagon given Height

$$\text{fx } P = 10 \cdot \frac{h}{\sqrt{5 + (2 \cdot \sqrt{5})}}$$

[Open Calculator !\[\]\(104fbf564e2e5a8fbd84f31656d114c7\_img.jpg\)](#)

$$\text{ex } 100.7251\text{m} = 10 \cdot \frac{31\text{m}}{\sqrt{5 + (2 \cdot \sqrt{5})}}$$



## Radius of Decagon

### 16) Circumradius of Decagon

$$\text{fx } r_c = \frac{1 + \sqrt{5}}{2} \cdot S$$

[Open Calculator !\[\]\(83f22ed94ec5517769dd76d702c6bfd8\_img.jpg\)](#)

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

### 17) Circumradius of Decagon given Width

$$\text{fx } r_c = \frac{w}{2}$$

[Open Calculator !\[\]\(3cb60d42b10e53f9522bb0b392c1c4cd\_img.jpg\)](#)

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

### 18) Inradius of Decagon

$$\text{fx } r_i = \frac{\sqrt{5 + (2 \cdot \sqrt{5})}}{2} \cdot S$$

[Open Calculator !\[\]\(0d7ca0919e6c47bbd874bfa0189fe22e\_img.jpg\)](#)

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



19) Inradius of Decagon given Height 

$$fx \quad r_i = \frac{h}{2}$$

[Open Calculator !\[\]\(6605b201d6f14d9b3bcb8ab5f274d107\_img.jpg\)](#)


$$ex \quad 15.5m = \frac{31m}{2}$$

Side of Decagon 20) Side of Decagon given Area 

$$fx \quad S = \sqrt{\frac{2 \cdot A}{5 \cdot \sqrt{5} + (2 \cdot \sqrt{5})}}$$

[Open Calculator !\[\]\(f95dab70c751fda7d824b8b03650f7aa\_img.jpg\)](#)

$$ex \quad 10.00376m = \sqrt{\frac{2 \cdot 770m^2}{5 \cdot \sqrt{5} + (2 \cdot \sqrt{5})}}$$

21) Side of Decagon given Circumradius 

$$fx \quad S = \frac{2 \cdot r_c}{1 + \sqrt{5}}$$

[Open Calculator !\[\]\(e9474ce1d70442456f8fe9c393ea149c\_img.jpg\)](#)

$$ex \quad 9.888544m = \frac{2 \cdot 16m}{1 + \sqrt{5}}$$





22) Side of Decagon given Width 

$$fx \quad S = w \cdot \sin\left(\frac{\pi}{10}\right)$$

Open Calculator 

$$ex \quad 9.888544m = 32m \cdot \sin\left(\frac{\pi}{10}\right)$$

Width of Decagon 23) Width of Decagon 

$$fx \quad w = \frac{S}{\sin\left(\frac{\pi}{10}\right)}$$

Open Calculator 

$$ex \quad 32.36068m = \frac{10m}{\sin\left(\frac{\pi}{10}\right)}$$

24) Width of Decagon given Area 

$$fx \quad w = \left(1 + \sqrt{5}\right) \cdot \sqrt{\frac{2 \cdot A}{5 \cdot \sqrt{5} + (2 \cdot \sqrt{5})}}$$

Open Calculator 

$$ex \quad 32.37286m = \left(1 + \sqrt{5}\right) \cdot \sqrt{\frac{2 \cdot 770m^2}{5 \cdot \sqrt{5} + (2 \cdot \sqrt{5})}}$$



## 25) Width of Decagon given Diagonal across Five Sides

**fx**  $w = 1 \cdot d_5$

Open Calculator 

**ex**  $32m = 1 \cdot 32m$





## Variables Used

- **A** Area of Decagon (Square Meter)
- **d<sub>2</sub>** Diagonal across Two Sides of Decagon (Meter)
- **d<sub>3</sub>** Diagonal across Three Sides of Decagon (Meter)
- **d<sub>4</sub>** Diagonal across Four Sides of Decagon (Meter)
- **d<sub>5</sub>** Diagonal across Five Sides of Decagon (Meter)
- **h** Height of Decagon (Meter)
- **P** Perimeter of Decagon (Meter)
- **r<sub>c</sub>** Circumradius of Decagon (Meter)
- **r<sub>i</sub>** Inradius of Decagon (Meter)
- **S** Side of Decagon (Meter)
- **w** Width of Decagon (Meter)



## Constants, Functions, Measurements used





















- **Constant:** **pi**, 3.14159265358979323846264338327950288  
*Archimedes' constant*
- **Function:** **sin**,  $\sin(\text{Angle})$   
*Trigonometric sine function*
- **Function:** **sqrt**,  $\text{sqrt}(\text{Number})$   
*Square root function*
- **Measurement:** **Length** in Meter (m)  
*Length Unit Conversion* 
- **Measurement:** **Area** in Square Meter ( $\text{m}^2$ )  
*Area Unit Conversion* 



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