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Important Formulas of Pentagon

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List of 21 Important Formulas of Pentagon

Important Formulas of Pentagon

Area of Pentagon

1) Area of Pentagon

Open Calculator

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

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

2) Area of Pentagon given Edge Length and Inradius

Open Calculator

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

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

Open Calculator

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

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

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4) Area of Pentagon given Edge Length using Interior Angle

Open Calculator

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

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

Open Calculator

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

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

6) Height of Pentagon given Circumradius and Inradius

Open Calculator

fx $$h = r_c + r_i$$

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

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7) Height of Pentagon given Edge Length using Central Angle

Open Calculator

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

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

Open Calculator

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

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

Open Calculator

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

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

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10) Edge Length of Pentagon given Area and Inradius

Open Calculator

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

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

11) Perimeter of Pentagon

Open Calculator

fx $$P = 5 \cdot l_e$$

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

12) Width of Pentagon

Open Calculator

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

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

Radius of Pentagon

13) Circumradius of Pentagon

Open Calculator

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

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

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14) Circumradius of Pentagon given Edge Length using Central Angle

Open Calculator

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

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

Open Calculator

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

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

Open Calculator

fx $$r_c = h - r_i$$

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

17) Inradius of Pentagon

Open Calculator

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

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

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18) Inradius of Pentagon given Area and Edge Length

Open Calculator

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

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

Open Calculator

fx $$r_i = h - r_c$$

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

20) Inradius of Pentagon given Edge Length using Central Angle

Open Calculator

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

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

Open Calculator

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

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)*

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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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- Antiparallelogram Formulas
- Arrow Hexagon Formulas
- Astroid Formulas
- Bulge Formulas
- Cardioid Formulas
- Circular Arc Quadrangle Formulas
- Concave Pentagon 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
- L Shape Formulas
- Line Formulas
- N-gon Formulas
- Nonagon Formulas
- Octagon Formulas
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- Parallelogram Formulas
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- Rectangle Formulas
- Rectangular Hexagon Formulas
- Regular Polygon Formulas
- Reuleaux Triangle Formulas

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- Rhombus Formulas
- Right Trapezoid Formulas
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- Salinon Formulas
- Semicircle Formulas
- Sharp Kink Formulas
- Square Formulas
- Star of Lakshmi Formulas
- T Shape Formulas
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