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Important Formulas of Triangle

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List of 31 Important Formulas of Triangle

Important Formulas of Triangle

Angles of Triangle

1) Angle A of Triangle

Open Calculator

fx $$\angle A = a\cos\left(\frac{S_c^2 + S_b^2 - S_a^2}{2 \cdot S_c \cdot S_b}\right)$$

ex $$27.66045^\circ = a\cos\left(\frac{(20\text{m})^2 + (14\text{m})^2 - (10\text{m})^2}{2 \cdot 20\text{m} \cdot 14\text{m}}\right)$$

2) Angle B of Triangle

Open Calculator

fx $$\angle B = a\cos\left(\frac{S_c^2 + S_a^2 - S_b^2}{2 \cdot S_c \cdot S_a}\right)$$

ex $$40.5358^\circ = a\cos\left(\frac{(20\text{m})^2 + (10\text{m})^2 - (14\text{m})^2}{2 \cdot 20\text{m} \cdot 10\text{m}}\right)$$

3) Angle C of Triangle

Open Calculator

fx $$\angle C = a\cos\left(\frac{S_b^2 + S_a^2 - S_c^2}{2 \cdot S_b \cdot S_a}\right)$$

ex $$111.8037^\circ = a\cos\left(\frac{(14\text{m})^2 + (10\text{m})^2 - (20\text{m})^2}{2 \cdot 14\text{m} \cdot 10\text{m}}\right)$$

4) Third Angle of Triangle given Two Angles

Open Calculator

fx $$\angle C = \pi - (\angle A + \angle B)$$

ex $$110^\circ = \pi - (30^\circ + 40^\circ)$$

Area of Triangle

5) Area of Triangle

Open Calculator

$$A = \frac{\sqrt{(S_a + S_b + S_c) \cdot (S_b + S_c - S_a) \cdot (S_a - S_b + S_c) \cdot (S_a + S_b - S_c)}}{4}$$

ex

$$64.99231\text{m}^2 = \frac{\sqrt{(10\text{m} + 14\text{m} + 20\text{m}) \cdot (14\text{m} + 20\text{m} - 10\text{m}) \cdot (10\text{m} - 14\text{m} + 20\text{m}) \cdot (10\text{m} + 14\text{m} - 20\text{m})}}{4}$$

6) Area of Triangle by Heron's Formula

Open Calculator

$$A = \sqrt{s \cdot (s - S_a) \cdot (s - S_b) \cdot (s - S_c)}$$

ex $64.99231\text{m}^2 = \sqrt{22\text{m} \cdot (22\text{m} - 10\text{m}) \cdot (22\text{m} - 14\text{m}) \cdot (22\text{m} - 20\text{m})}$

7) Area of Triangle given Base and Height

Open Calculator

$$A = \frac{1}{2} \cdot S_c \cdot h_c$$

ex $60\text{m}^2 = \frac{1}{2} \cdot 20\text{m} \cdot 6\text{m}$

8) Area of Triangle given Inradius and Semiperimeter

Open Calculator

$$A = r_i \cdot s$$

ex $66\text{m}^2 = 3\text{m} \cdot 22\text{m}$

9) Area of Triangle given Two Angles and Third Side

Open Calculator

$$A = \frac{S_a^2 \cdot \sin(\angle B) \cdot \sin(\angle C)}{2 \cdot \sin(\pi - \angle B - \angle C)}$$

ex $60.40228\text{m}^2 = \frac{(10\text{m})^2 \cdot \sin(40^\circ) \cdot \sin(110^\circ)}{2 \cdot \sin(\pi - 40^\circ - 110^\circ)}$

10) Area of Triangle given Two Sides and Third Angle

Open Calculator

fx $$A = S_a \cdot S_b \cdot \frac{\sin(\angle C)}{2}$$

ex $$65.77848\text{m}^2 = 10\text{m} \cdot 14\text{m} \cdot \frac{\sin(110^\circ)}{2}$$

Heights of Triangle

11) Height on Side A of Triangle

Open Calculator

fx $$h_a = \frac{\sqrt{(S_a + S_b + S_c) \cdot (S_b - S_a + S_c) \cdot (S_a - S_b + S_c) \cdot (S_a + S_b - S_c)}}{2 \cdot S_a}$$

ex $$12.99846\text{m} = \frac{\sqrt{(10\text{m} + 14\text{m} + 20\text{m}) \cdot (14\text{m} - 10\text{m} + 20\text{m}) \cdot (10\text{m} - 14\text{m} + 20\text{m}) \cdot (10\text{m} + 14\text{m} - 20\text{m})}}{2 \cdot 10\text{m}}$$

12) Height on Side B of Triangle

Open Calculator

fx $$h_b = \frac{\sqrt{(S_a + S_b + S_c) \cdot (S_b - S_a + S_c) \cdot (S_a - S_b + S_c) \cdot (S_a + S_b - S_c)}}{2 \cdot S_b}$$

ex $$9.284615\text{m} = \frac{\sqrt{(10\text{m} + 14\text{m} + 20\text{m}) \cdot (14\text{m} - 10\text{m} + 20\text{m}) \cdot (10\text{m} - 14\text{m} + 20\text{m}) \cdot (10\text{m} + 14\text{m} - 20\text{m})}}{2 \cdot 14\text{m}}$$

13) Height on Side C of Triangle

Open Calculator

fx $$h_c = \frac{\sqrt{(S_a + S_b + S_c) \cdot (S_b - S_a + S_c) \cdot (S_a - S_b + S_c) \cdot (S_a + S_b - S_c)}}{2 \cdot S_c}$$

ex $$6.499231\text{m} = \frac{\sqrt{(10\text{m} + 14\text{m} + 20\text{m}) \cdot (14\text{m} - 10\text{m} + 20\text{m}) \cdot (10\text{m} - 14\text{m} + 20\text{m}) \cdot (10\text{m} + 14\text{m} - 20\text{m})}}{2 \cdot 20\text{m}}$$

Medians of Triangle

14) Median on Side A of Triangle

Open Calculator

fx $$M_a = \frac{\sqrt{2 \cdot S_c^2 + 2 \cdot S_b^2 - S_a^2}}{2}$$

ex $$16.52271\text{m} = \frac{\sqrt{2 \cdot (20\text{m})^2 + 2 \cdot (14\text{m})^2 - (10\text{m})^2}}{2}$$

15) Median on Side B of Triangle

Open Calculator

fx $$M_b = \frac{\sqrt{2 \cdot S_a^2 + 2 \cdot S_c^2 - S_b^2}}{2}$$

ex $$14.17745\text{m} = \frac{\sqrt{2 \cdot (10\text{m})^2 + 2 \cdot (20\text{m})^2 - (14\text{m})^2}}{2}$$

16) Median on Side C of Triangle

Open Calculator

fx $$M_c = \frac{\sqrt{2 \cdot S_a^2 + 2 \cdot S_b^2 - S_c^2}}{2}$$

ex $$6.928203\text{m} = \frac{\sqrt{2 \cdot (10\text{m})^2 + 2 \cdot (14\text{m})^2 - (20\text{m})^2}}{2}$$

Perimeter of Triangle

17) Perimeter of Triangle

Open Calculator

fx $$P = S_a + S_b + S_c$$

ex $$44\text{m} = 10\text{m} + 14\text{m} + 20\text{m}$$

18) Semiperimeter of Triangle

Open Calculator

fx $$s = \frac{P}{2}$$

ex $$22\text{m} = \frac{44\text{m}}{2}$$

19) Semiperimeter of Triangle given all Sides

Open Calculator

fx $$s = \frac{S_a + S_b + S_c}{2}$$

ex $$22\text{m} = \frac{10\text{m} + 14\text{m} + 20\text{m}}{2}$$

Radius of Triangle

20) Circumradius of Triangle

Open Calculator

fx $$r_c = \frac{S_a \cdot S_b \cdot S_c}{\sqrt{(S_a + S_b + S_c) \cdot (S_b - S_a + S_c) \cdot (S_a - S_b + S_c) \cdot (S_a + S_b - S_c)}}$$

ex $$10.77051\text{m} = \frac{10\text{m} \cdot 14\text{m} \cdot 20\text{m}}{\sqrt{(10\text{m} + 14\text{m} + 20\text{m}) \cdot (14\text{m} - 10\text{m} + 20\text{m}) \cdot (10\text{m} - 14\text{m} + 20\text{m}) \cdot (10\text{m} + 14\text{m} - 20\text{m})}}$$

21) Exradius Opposite to Angle A of Triangle

Open Calculator

fx $$r_{e(\angle A)} = \sqrt{\frac{\left(\frac{S_a+S_b+S_c}{2}\right) \cdot \left(\frac{S_a-S_b+S_c}{2}\right) \cdot \left(\frac{S_a+S_b-S_c}{2}\right)}{\frac{S_b+S_c-S_a}{2}}}$$

ex $$5.416026\text{m} = \sqrt{\frac{\left(\frac{10\text{m}+14\text{m}+20\text{m}}{2}\right) \cdot \left(\frac{10\text{m}-14\text{m}+20\text{m}}{2}\right) \cdot \left(\frac{10\text{m}+14\text{m}-20\text{m}}{2}\right)}{\frac{14\text{m}+20\text{m}-10\text{m}}{2}}}$$

22) Inradius of Triangle

Open Calculator

fx $$r_i = \frac{\sqrt{(S_a + S_b + S_c) \cdot (S_b + S_c - S_a) \cdot (S_a - S_b + S_c) \cdot (S_a + S_b - S_c)}}{2 \cdot (S_a + S_b + S_c)}$$

ex $$2.954196\text{m} = \frac{\sqrt{(10\text{m} + 14\text{m} + 20\text{m}) \cdot (14\text{m} + 20\text{m} - 10\text{m}) \cdot (10\text{m} - 14\text{m} + 20\text{m}) \cdot (10\text{m} + 14\text{m} - 20\text{m})}}{2 \cdot (10\text{m} + 14\text{m} + 20\text{m})}$$

Sides of Triangle

23) Side A of Triangle

Open Calculator

fx $$S_a = \sqrt{S_b^2 + S_c^2 - 2 \cdot S_b \cdot S_c \cdot \cos(\angle A)}$$

ex $$10.53688\text{m} = \sqrt{(14\text{m})^2 + (20\text{m})^2 - 2 \cdot 14\text{m} \cdot 20\text{m} \cdot \cos(30^\circ)}$$

24) Side A of Triangle given Two Angles and Side B

Open Calculator

fx $$S_a = S_b \cdot \frac{\sin(\angle A)}{\sin(\angle B)}$$

ex $$10.89007\text{m} = 14\text{m} \cdot \frac{\sin(30^\circ)}{\sin(40^\circ)}$$

25) Side A of Triangle given Two Angles and Side C

Open Calculator

fx $$S_a = S_c \cdot \frac{\sin(\angle A)}{\sin(\angle C)}$$

ex $$10.64178\text{m} = 20\text{m} \cdot \frac{\sin(30^\circ)}{\sin(110^\circ)}$$

26) Side B of Triangle

Open Calculator

fx $$S_b = \sqrt{S_a^2 + S_c^2 - 2 \cdot S_a \cdot S_c \cdot \cos(\angle B)}$$

ex $$13.91338\text{m} = \sqrt{(10\text{m})^2 + (20\text{m})^2 - 2 \cdot 10\text{m} \cdot 20\text{m} \cdot \cos(40^\circ)}$$

27) Side B of Triangle given Two Angles and Side A

Open Calculator

fx $$S_b = S_a \cdot \frac{\sin(\angle B)}{\sin(\angle A)}$$

ex $$12.85575\text{m} = 10\text{m} \cdot \frac{\sin(40^\circ)}{\sin(30^\circ)}$$

28) Side B of Triangle given Two Angles and Side C

Open Calculator

fx $$S_b = S_c \cdot \frac{\sin(\angle B)}{\sin(\angle C)}$$

ex $$13.68081\text{m} = 20\text{m} \cdot \frac{\sin(40^\circ)}{\sin(110^\circ)}$$

29) Side C of Triangle

Open Calculator

fx $$S_c = \sqrt{S_b^2 + S_a^2 - 2 \cdot S_a \cdot S_b \cdot \cos(\angle C)}$$

ex $$19.79307\text{m} = \sqrt{(14\text{m})^2 + (10\text{m})^2 - 2 \cdot 10\text{m} \cdot 14\text{m} \cdot \cos(110^\circ)}$$

30) Side C of Triangle given Two Angles and Side A

Open Calculator

fx $$S_c = S_a \cdot \frac{\sin(\angle C)}{\sin(\angle A)}$$

ex $$18.79385\text{m} = 10\text{m} \cdot \frac{\sin(110^\circ)}{\sin(30^\circ)}$$

31) Side C of Triangle given Two Angles and Side B

Open Calculator

fx $$S_c = S_b \cdot \frac{\sin(\angle C)}{\sin(\angle B)}$$

ex $$20.46663\text{m} = 14\text{m} \cdot \frac{\sin(110^\circ)}{\sin(40^\circ)}$$

Variables Used

- $\angle A$ Angle A of Triangle *(Degree)*
- $\angle B$ Angle B of Triangle *(Degree)*
- $\angle C$ Angle C of Triangle *(Degree)*
- A Area of Triangle *(Square Meter)*
- h_a Height on Side A of Triangle *(Meter)*
- h_b Height on Side B of Triangle *(Meter)*
- h_c Height on Side C of Triangle *(Meter)*
- M_a Median on Side A of Triangle *(Meter)*
- M_b Median on Side B of Triangle *(Meter)*
- M_c Median on Side C of Triangle *(Meter)*
- P Perimeter of Triangle *(Meter)*
- r_c Circumradius of Triangle *(Meter)*
- $r_{e(\angle A)}$ Exradius Opposite to $\angle A$ of Triangle *(Meter)*
- r_i Inradius of Triangle *(Meter)*
- s Semiperimeter of Triangle *(Meter)*
- S_a Side A of Triangle *(Meter)*
- S_b Side B of Triangle *(Meter)*
- S_c Side C of Triangle *(Meter)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **acos**, acos(Number)
  The inverse cosine function, is the inverse function of the cosine function. It is the function that takes a ratio as an input and returns the angle whose cosine is equal to that ratio.
- Function: **cos**, cos(Angle)
  Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- Function: **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.
- Function: **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.
- 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

- Equilateral Triangle Formulas
- Isosceles Right Triangle Formulas
- Isosceles Triangle Formulas
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