Geometry

Distance Formula

$$d = \sqrt{(X_2 - X_1)^2 + (Y_2 - Y_1)^2}$$

Midpoint Formula

$$X_{mp} = \frac{X_2 + X_1}{2}$$

$$Y_{mp} = \frac{Y_2 + Y_1}{2}$$

Sum of internal Angles in polygon

Sum = $(n - 2)180^o$

Sum of External Angles in polygon

= 360^o for any polygon

Number of diagonal in polygon

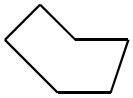
$$\text{diagonals} = \frac{n(n-3)}{2}$$

Convex polygon

All internal angles < 180^o

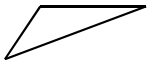
Concave polygon

At least one internal angles > 180^o



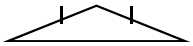
Scalene Triangle

All sides are different
All angles are different



Isoceles Triangle

Two sides are same
Two angles are same



Equilateral Triangle

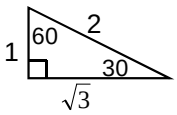
All 3 sides are same
All 3 angles are same

Pythagorean Formula

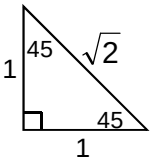
$c = \sqrt{a^2 + b^2}$

c = hypothenus

30-60-90 triangle

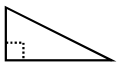


45-45-90 triangle



Right Triangle

One 90^o angles

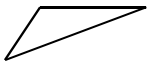


Acute Triangle

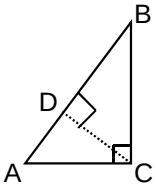
All angles < 90^o

Obtuse Triangle

One angles > 90^o



Right Triangle Similarity



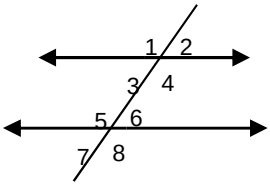
$\Delta BAC \sim \Delta CAD \sim \Delta BCD$

$(CD)^2 = (AD)(BD)$

$(BC)^2 = (AB)(BD)$

$(AC)^2 = (AB)(AD)$

Angles & Parallel Lines



Vertical Angles

<1 = <4 <5 = <8
<2 = <3 <7 = <6

Corresponding Angles

<1 = <5 <4 = <8
<2 = <6 <3 = <7

Alternate Interior Angles

<5 = <4 <6 = <3

Alternate Exterior Angles

<1 = <8 <7 = <2

Consecutive Interior Angle

<3 + <5 = 180^o
<4 + <6 = 180^o

Congruency Tests

SSS SAS ASA
AAS HL

Similarity Tests

SSS SAS AA

Kite

- One pair congruent angle
- Long diag. bisect short diag.
- Adjacent sides congruent
- Diagonals perpendicular

Rhombus

-4 congruent sides
-Opposite angles congruent
-Diagonals perpend. bisector

Parallelogram

- Opposite sides are parallel
- Opposite angles are congruent
- Diagonals bisect each other
- Sum of interior angles = 360^o
- Sum of adjacent angles = 180^o

Rectangle

- Opposite sides are parallel
- Opposite sides are congruent
- Diagonals bisect each other
- Diagonals are congruent
- All four angles = 90^o

Square

- Opposite sides are parallel
- All sides are congruent
- All angles = 90^o
- Diagonals are congruent
- Diagonals are perpendicular
- Diagonals bisect each other
- Diagonals are angle bisectors

Trapezoid

- Bases are parallel
- Median is leg bisector
- Adjacent top+bottom angles = 180^o

Isoceles Trapezoid

- Bases are parallel
- Legs are congruent
- Diagonals are congruent
- Lower base angles are congruent
- Upper base angles are congruent
- Adjacent top+bottom angles = 180^o

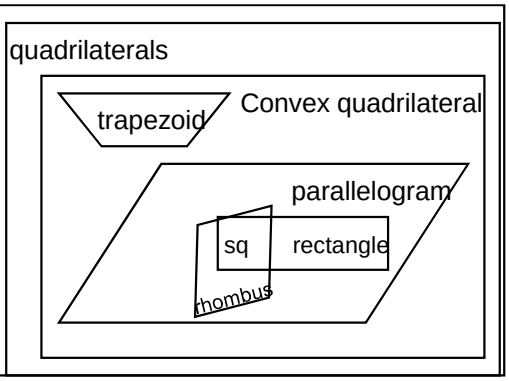
Median

- Bisect opposite side

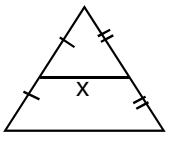
Altitude

- Perpendicular to opposite side

Quadrilaterals- Family Tree



Midsegment bisector



If mid-segment is bisector
Then larger base 2x smaller base

Centroid

- Intersection of medians
- Balance point or center of mass

Incenter

- Intersection of angle bisector
- Inscribed circle

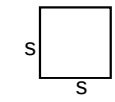
-Circumcenter

- Intersection of perpendicular bisector
- circumscribed circle

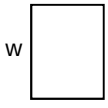
Orthocenter

- Intersection of altitudes
- Larger segment = 2 x small segment

Geometry

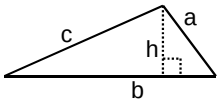


Square
P = 4s
A = s x s



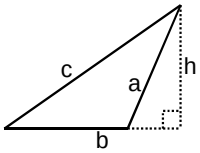
Rectangle
P = 2L + 2w
A = L x w

Triangle



$P = a + b + c$

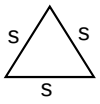
$A = \frac{b \times h}{2}$



$P = a + b + c$

$A = \frac{b \times h}{2}$

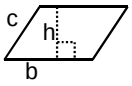
Equilateral Triangle



$P = 3s$

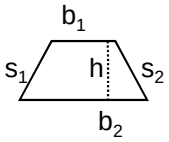
$A = \frac{\sqrt{3}\, s^2}{4}$

Parallelogram



P = 2b + 2c
A = b x h

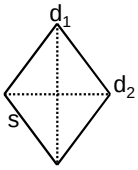
Trapezoid



$P = b_1 + b_2 + s_1 + s_2$

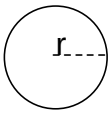
$A = \frac{(b_1 + b_2)\, h}{2}$

Rhombus

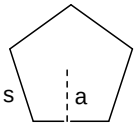


P = 4s

$A = \frac{d_1 \times d_2}{2}$



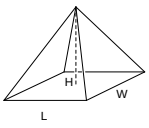
circle
$P = 2\pi r$
$A = \pi r^2$



Regular Polygon

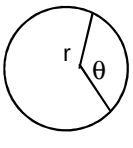
$P = (n)(s)$

$A = \frac{(s)(a)(n)}{2}$



Regular Pyramid

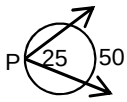
$V = \frac{l \times w \times h}{3}$



Sector of circle

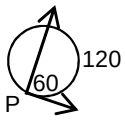
$Arc = (\frac{\theta}{360})(2\pi r)$

$A = (\frac{\theta}{360})(\pi r^2)$



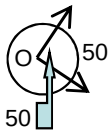
Inscribed Angle

$\angle P = \frac{\text{Outside arc}}{2}$



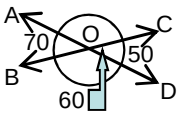
Inscribed Angle

$\angle P = \frac{\text{Outside arc}}{2}$



Central Angle
m∠O = same as arc

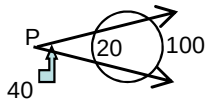
Inside Circle Angle
m∠COD = m∠AOB = vertical angle



$\angle AOB = \frac{\text{outside arc} + \text{outside arc}}{2}$

$\angle AOB = \frac{70 + 50}{2} = 60$

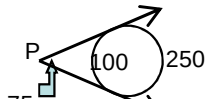
Outside Circle Angle



$\angle P = \frac{\text{outside arc - inside arc}}{2}$

$\angle P = \frac{100 - 20}{2} = 40$

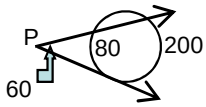
Outside Circle Angle



$\angle P = \frac{\text{outside arc - inside arc}}{2}$

$\angle P = \frac{250 - 100}{2} = 75$

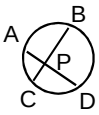
Outside Circle Angle



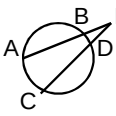
$\angle P = \frac{\text{outside arc - inside arc}}{2}$

$\angle P = \frac{200 - 80}{2} = 60$

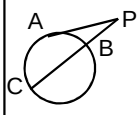
Segment Proportionalities



(AP)(PD) = (BP)(PC)

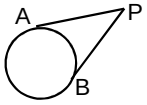


(PB)(PA) = (PD)(PC)



(PA)(PA) = (PB)(PC)

$(PA)^2 =$ (PB)(PC)



PA = PB

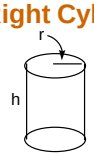
If cords parallel,
then arcs are congruent

If cords congruent
then arcs are congruent

If radius perpendicular
then cord is bisected

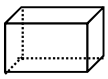
If cords congruent,
then equidistance
from center

Right Cylinder



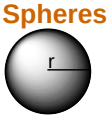
LA = 2πrh
SA = 2πrh + 2πr²
V = πr²h

Prisms



LA = all sides
SA = all sides + base + top
V = BH

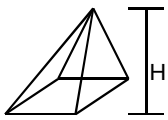
Spheres



$SA = 4\pi r^2$

$V = \frac{4\pi r^3}{3}$

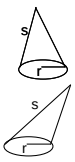
Pyramids



LA = all sides
SA = all sides + base

$V = \frac{BH}{3}$

Cones



$LA = \pi r s$

$SA = \pi r s + \pi r^2$

$V = \frac{\pi r^2 H}{3}$