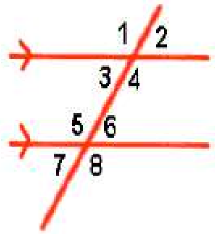
Things to Remember from Geometry

If two parallel lines are cut by a transversal, then …



Corresponding ∠s are ≅.
∠1≅∠5, ∠2≅∠6,
∠3≅∠7, ∠4≅∠8
Alternate Interior ∠s are ≅.
∠3≅∠6, ∠4≅∠5
Alternate Exterior ∠s are ≅.
∠1≅∠8, ∠2≅∠7
Consecutive ∠s are supplementary.
m∠3+m∠5=180,
m∠4+m∠6=180

Special Quadrilaterals

Parallelogram:
- Opposite sides || & =
- opposite ∠s ≅
- consecutive ∠s supplementary
- diagonals bisect each other

Rectangle:
- All characteristics of parallelograms
- 4 right ∠s
- ≅ diagonals

Rhombus:
- All characteristics of parallelograms
- 4 ≅ sides
- Diagonals ⊥
- Diagonals bisect ∠s

Square:
- All characteristics of rectangles,& rhombi

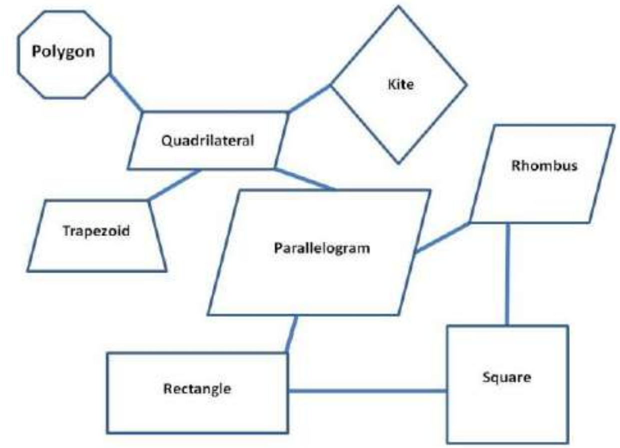
Other Quadrilaterals

Trapezoid:
•Only one set || sides (bases)

Isosceles Trapezoid:
- ≅ legs
- base ∠s ≅
- diagonals ≅
- opposite ∠s supplementary

Kite:
- 2 pairs of adjacent ≅ sides
- diagonal from the vertex ∠s is ⊥ bisector of the other diagonal & ∠ bisector for the vertex ∠s

•Non-vertex ∠s ≅



Slope Formula
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
Slope-Intercept Form
$$y = mx + b$$
Point-Slope Formula
$$(y - y_1) = m(x - x_1)$$

Polygons

Interior ∠s:
Sum of interior ∠s = $180(n - 2)$
Each interior ∠ (regular) = $\frac{180(n-2)}{n}$

Exterior ∠s:
Sum of exterior ∠s = 360°
Each exterior ∠ (regular) = 360 ÷ n

Triangle Inequalities:
·Sum of the lengths of any 2 sides of a Δ is > the length of the 3rd side.
·Longest side of a Δ is opposite the largest ∠.

Pythagorean Theorem
$$a^2 + b^2 = c^2$$
•a and b are legs
• c is always the hypotenuse (side opposite the right angle)
Converse:
If the sides of a triangle satisfy $a^2 + b^2 = c^2$,
then the Δ *is a* right triangle.

Classifying Triangles
By Sides:
Scalene – no congruent sides
Isosceles – 2 congruent sides
Equilateral – 3 congruent sides
By Angles:
Acute – all acute angles
Right – one right angle
Obtuse – one obtuse angle

Distance Formula:
$$\sqrt{\left((x_2 - x_1)^2 + (y_2 - y_1)^2\right)}$$
Midpoint Formula
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Proving Triangles Congruent
SSS SAS
ASA AAS
HL (right triangles only)
NO donkey theorem (SSA)
or car insurance (AAA)
*CPCTC (use after the triangles are ≅).

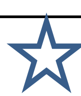
Proving Similar Triangles
AA, SSS, SAS
*Corresponding sides of similar triangles are proportional.

Regular: all angles are ≅ and all sides are ≅.
Equiangular:
all angles are ≅.
Equilateral: all sides are ≅.

Points of Concurrency

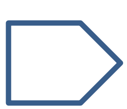
Centroid: Medians (from vertex to midpoint)
Center of Gravity/ Balance Point
Incenter: Angle Bisectors
Equal distance from all sides
Circumcenter:
Perpendicular Bisectors
Equal distance from all vertices
Orthocenter: Altitudes (perpendicular & can be outside the Δ).

Naming Polygons
triangle – 3 sides
quadrilateral – 4 sides
pentagon – 5 sides
hexagon – 6 sides
heptagon – 7 sides
octagon – 8 sides
decagon – 10 sides
dodecagon – 12 sides



Concave
(a place to hide)

Convex
no diagonals lying outside



Things to Remember from Geometry

Conditional Statements

If – hypothesis;
Then – conclusion
p → q

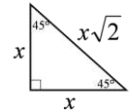
Converse: switch if and then
q → p

Inverse: negate if and then
~p → ~q

Contrapositive: negate the converse
~q → ~p

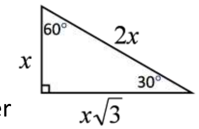
(contrapositive has the same truth value as the original statement)

Special Right Triangles



hyp = leg * √2
leg = hyp ÷ √2

multiply →
make it bigger
divide →
make it smaller



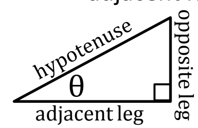
hypotenuse = short leg * 2
short leg = hypotenuse ÷ 2
long leg = short leg * √3
short leg = long leg ÷ √3

Trigonometric Ratios

$$\sin\theta = \frac{\text{opposite leg}}{\text{hypotenuse}}$$

$$\cos\theta = \frac{\text{adjacent leg}}{\text{hypotenuse}}$$

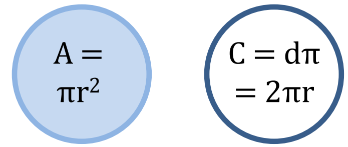
$$\tan\theta = \frac{\text{opposite leg}}{\text{adjacent leg}}$$



*To find the angle, use $\boxed{2^{nd}}$ key.

Spheres

Circles



Sector Area

$$\frac{\text{arc measure}}{360^o} = \frac{\text{sector area}}{\pi r^2}$$

Arc Length

$$\frac{\text{arc measure}}{360^o} = \frac{\text{arc length}}{2\pi r}$$

Conics (Circle Equations):

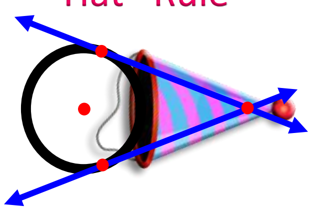
center at (0,0)
$x^2 + y^2 = r^2$

center at (h, k)
$(x - h)^2 + (y - k)^2 = r^2$

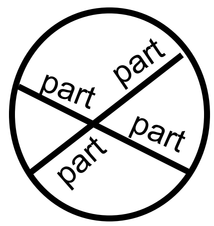
**r is the radius

Segment Lengths

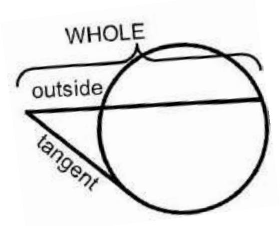
tangent = tangent
"Hat" Rule



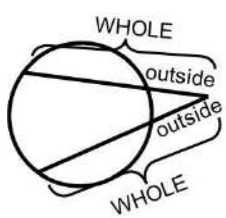
2 intersecting chords
part · part = part · part



tangent & secant
(tangent)² = outside · whole

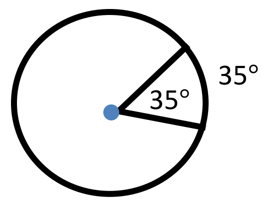


2 secants
outside · whole = outside · whole

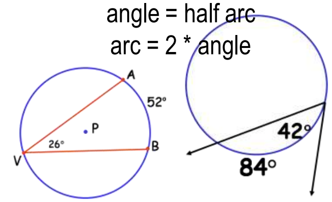


Arc and Angle Measures

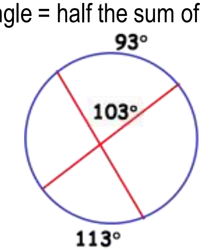
VERTEX IS THE CENTER
central angle = intercepted arc



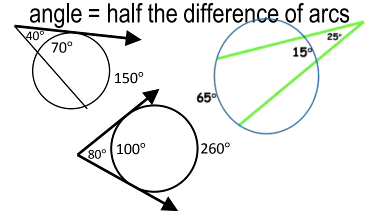
VERTEX ON THE CIRCLE
Angle formed by 2 chords or chord/secant & tangent
angle = half arc
arc = 2 * angle



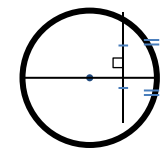
VERTEX IN THE CIRCLE
Angle formed by 2 chords
angle = half the sum of arcs



VERTEX OUTSIDE THE CIRCLE
Angle formed by 2 tangents, or 2 secants, or tangent/secant
angle = half the difference of arcs

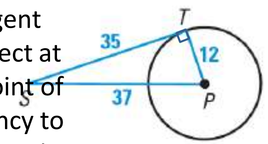


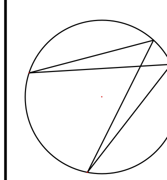
Other circle theorems



A radius or diameter perpendicular to a chord bisects the chord & its arc.

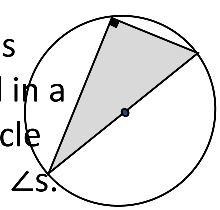
A radius & tangent intersect at the point of tangency to form a right angle.





2 inscribed ∠s that intercept the same arc are ≅.

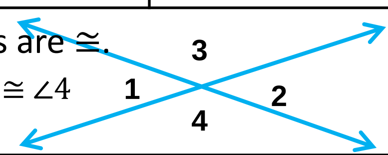
Angles inscribed in a semicircle are right ∠s.



Perimeter

the distance around
(add all sides)

All vertical ∠s are ≅.
∠1 ≅ ∠2; ∠3 ≅ ∠4



minor arc – named with 2 letters – < 180°
major arc – named with 3 letters – > 180°
Sum of all ∠s in a circle = 360°
semicircle = 180°