Georgia Milestones Assessment System

Geometry Formula Sheet

Below are the formulas you may find useful as you work the problems. However, some of the formulas may not be used. You may refer to this page as you take the test.

Geometry Formulas

Perimeter

The perimeter of a polygon is equal to the sum of the length of its sides.

Distance Formula

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Coordinates of point which partitions a directed line segment AB at the ratio of $a:b$ from $A(x_1, y_1)$ to $B(x_2, y_2)$

$(x, y) = \frac{bx_1 + ax_2}{b + a}, \frac{by_1 + ay_2}{b + a}$

OR

$(x, y) = \left(x_1 + \frac{a}{a+b}(x_2 - x_1), y_1 + \frac{a}{a+b}(y_2 - y_1)\right)$

Circumference of a Circle

$C = \pi d$ or $C = 2\pi r$

$\pi \approx 3.14$

Arc Length of a Circle

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

Area

Triangle	$A = \frac{1}{2}bh$
Rectangle	$A = bh$
Circle	$A = \pi r^2$

Area of a Sector of a Circle

Area of Sector $= \frac{\pi r^2\theta}{360}$

Pythagorean Theorem

$a^2 + b^2 = c^2$

Trigonometric Relationships

$\sin\theta = \frac{opp}{hyp}$; $\cos\theta = \frac{adj}{hyp}$; $\tan\theta = \frac{opp}{adj}$

Equation of a Circle

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

Volume

Cylinder	$V = \pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$
Cone	$V = \frac{1}{3}\pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$

Statistics Formulas

Conditional Probability

$P(A/B) = \frac{P(A \text{ and } B)}{P(B)}$

Multiplication Rule for Independent Events

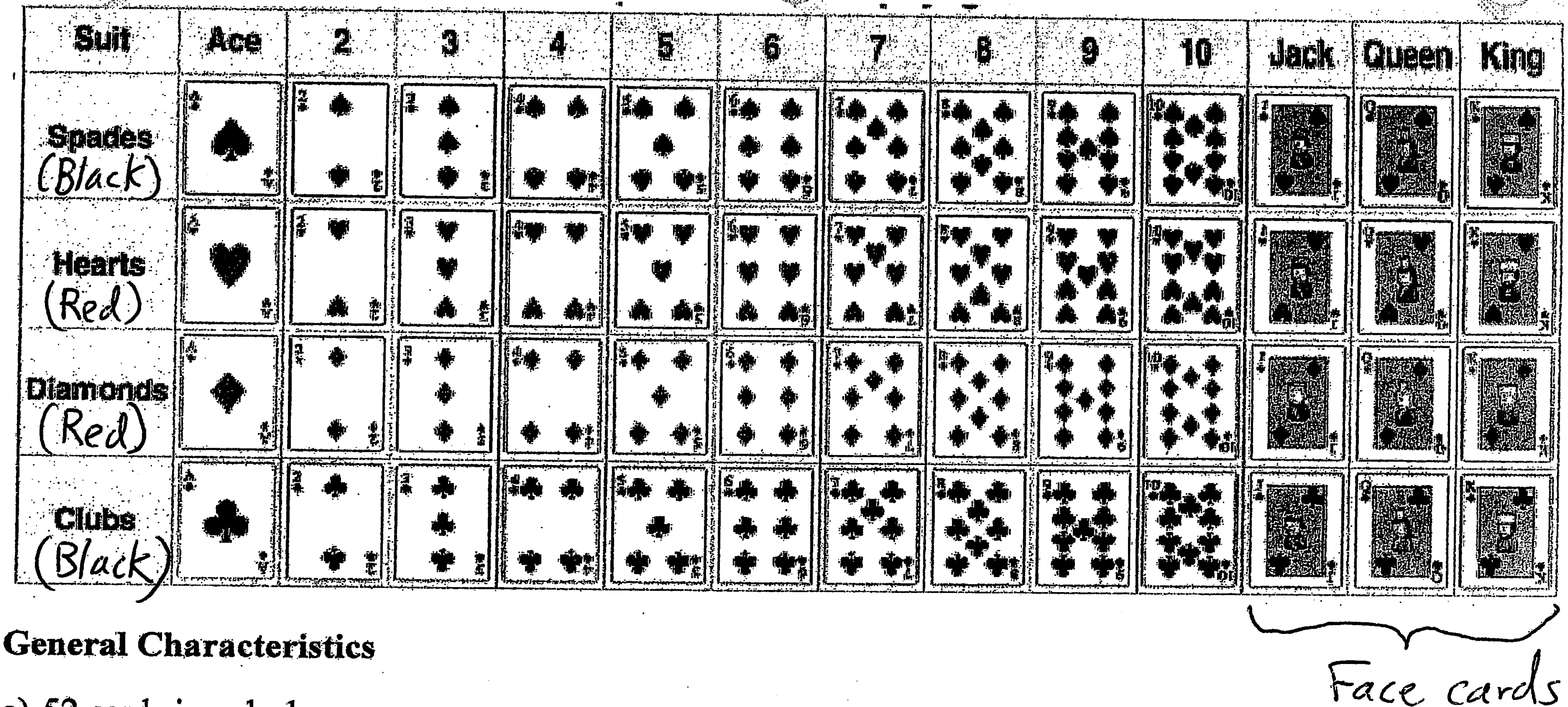
$P(A \text{ and } B) = P(A) \cdot P(B)$

Addition Rule

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

Sum of Interior Angles = $180(n-2)$

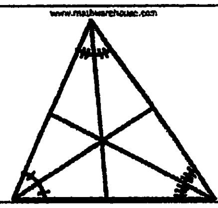
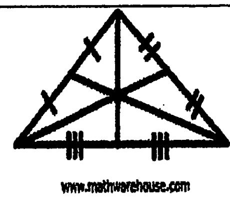
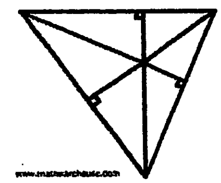
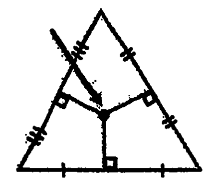
Sum of Exterior Angles = 360



General Characteristics

a) 52 cards in a deck
b) 13 cards in each suit (13 spades , 13 Hearts , 13 Diamonds, 13 Clubs)
c) Red cards: Hearts and Diamonds
d) Black cards: Spades and Clubs
e) Face cards are the Jack, Queen, and King (12 Total)
f) 26 total black cards
g) 26 total red cards

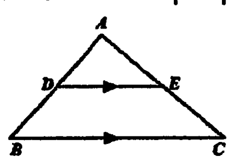
Points of Concurrency

	Incenter	Centroid	Orthocenter	Circumcenter
Picture:				
constructed from:	Angle bisectors	Medians	Altitudes	Perpendicular Bisectors
Location:	Always inside	Always inside	Acute: Inside Obtuse: Outside Right: on the vertex of 90° angle	Acute: Inside Obtuse: Outside Right: on the midpoint of hypotenuse
Significance:	Equidistant to sides of triangle (circle inside)	Balancing point Vertex to centroid 2/3 Centroid to midpoint 1/3	No Significance	Equidistant to vertices (circle outside)

Other Triangle Theorems

Triangle Proportionality Theorem:

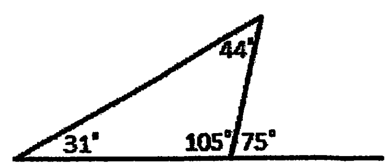
If a line parallel to one side of a triangle intersects the other two sides of the triangle, then the line divides these two sides proportionally.



If $\overline{DE} \parallel \overline{BC}$, then $\frac{AD}{DB} = \frac{AE}{EC}$.

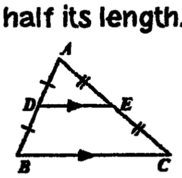
Exterior Angle Theorem:

A measure of an exterior angle of a triangle is equal to the sum of the measures of the two non-adjacent interior angles.



Triangle Midsegment Theorem:

In a triangle, the segment joining the midpoints of any two sides will be parallel to the third side and half its length.



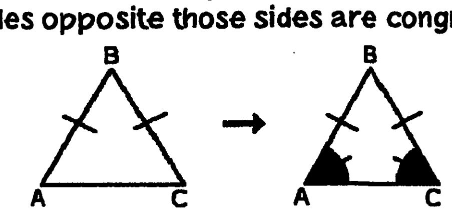
If $AD = DB$ and $AE = EC$,

then $\overline{DE} \parallel \overline{BC}$ and $DE = \frac{1}{2}BC$.

Isosceles Triangle Theorem

(Converse of the Base Angles Theorem):

If two sides of a triangle are congruent, then the angles opposite those sides are congruent.



Unit 3: Similarity/Transformations/Parallel Lines

Transformation Types: **Translation**(slide), **Reflection**(flip), **Rotation**(turn), **Dilation**(stretch/compress)
Ratio: comparison of 2 quantities using division
Scale Factor: ratio or corresponding sides: new/original
Similar Polygons/Triangles : corresponding angles are congruent and corresponding side lengths are proportional

Triangle Similarity Theorems: 1) **SSS** (If corresponding side lengths of 2 triangles are proportional, then triangles are similar) 2) **SAS** (If 2 corresponding lengths are proportional between 2 triangles and the included angles are congruent, then the triangles are similar:

Transformation Rules:
Line Reflections
$r_{x\text{-axis}}(x, y) = (x, -y)$
$r_{y\text{-axis}}(x, y) = (-x, y)$
$r_{y=x}(x, y) = (y, x)$
$r_{y=-x}(x, y) = (-y, -x)$
Dilation:
$D_k(x, y) = (kx, ky)$

Rotations:
(counterclockwise→ 90, 180, 270°)
$R_{90°}(x, y) = (-y, x)$
$R_{180°}(x, y) = (-x, -y)$
$R_{270°}(x, y) = (y, -x)$
(clockwise → – 90°)
$R_{-90°}(x, y) = (y, -x)$
Translation:
$T_{a,b}(x, y) = (x + a, y + b)$

Polygon Measures:

Sum of Interior Angles = $180(n-2)$ Interior Angle Measure = $\frac{180(n-2)}{n}$

Sum of Exterior Angles = 360° Exterior Angle Measure = $\frac{360°}{n}$

Points of Concurrency:

Interestingly **Aunt Betty Can Make Outstandingly Awesome Chocolate Chip Peanut Butter**

Incenter – Angle Bisector → Inscribed circles – equal distance from incenter to sides of circle

Centroid – Median → Centroid divides segment into 1 part, 2 part → center of gravity

Orthocenter – Altitude → no special property we need to be responsible for

Circumcenter – Perpendicular Bisector → Circumscribed circle – equal distance from circumcenter to the vertex

Applications of Probability

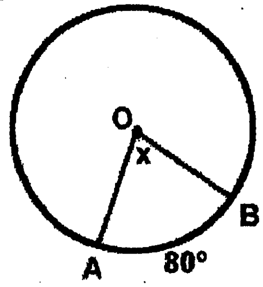
- Mutually Exclusive: events are mutually exclusive when they have no overlap in their sample space

- $P(A \text{ or } B) = P(A) + P(B)$ if events are mutually exclusive
- $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ subtract the overlap!

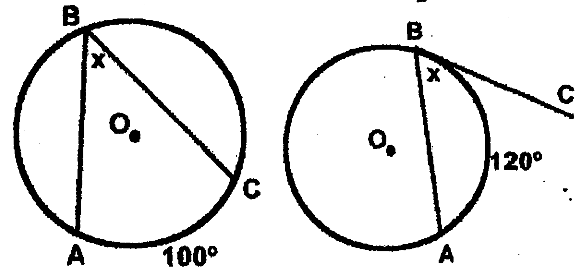
- Independent Events: $P(A \text{ and } B) = P(A) * P(B)$
- Dependent Events: remember to change the denominator and sometimes you need change the numerator

Ch. 10 Circles Concept Review

Central Angle: $m\angle AOB = m\widehat{AB}$

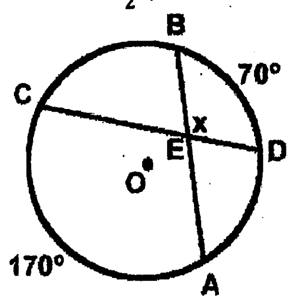


Inscribed Angles: $m\angle ABC = \frac{1}{2} m\widehat{AC}$



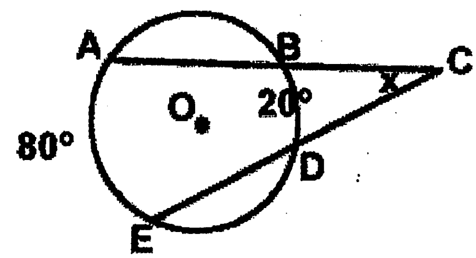
Intersecting Chords inside circle:

$m\angle BED = \frac{1}{2}(m\widehat{BD} + m\widehat{AC})$



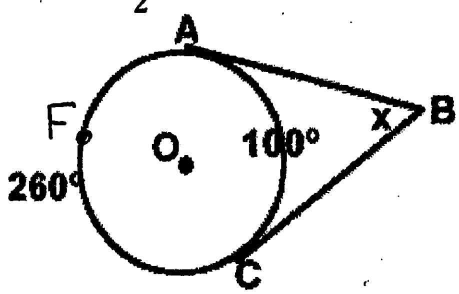
Angle outside circle formed by secants/tangents:

$m\angle ACE = \frac{1}{2}(m\widehat{AE} - m\widehat{BD})$



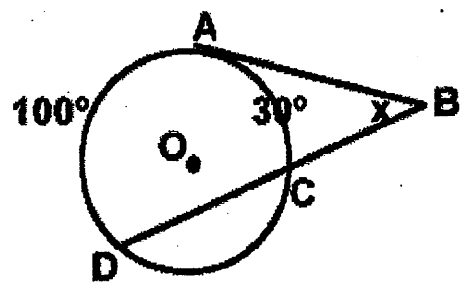
Angle outside circle formed by secants/tangents:

$m\angle ABC = \frac{1}{2}(m\widehat{AFC} - m\widehat{AC})$

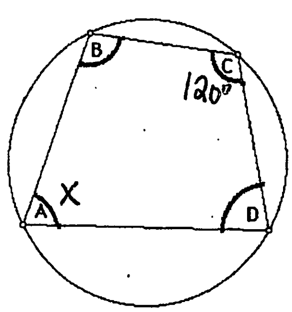


Angle outside circle formed by secants/tangents:

$m\angle ABD = \frac{1}{2}(m\widehat{AD} - m\widehat{AC})$

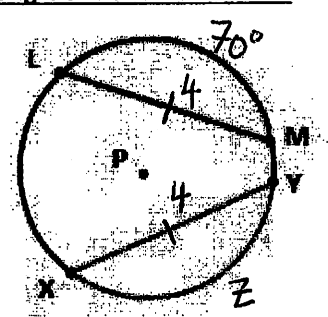


Inscribed Quadrilateral Property:



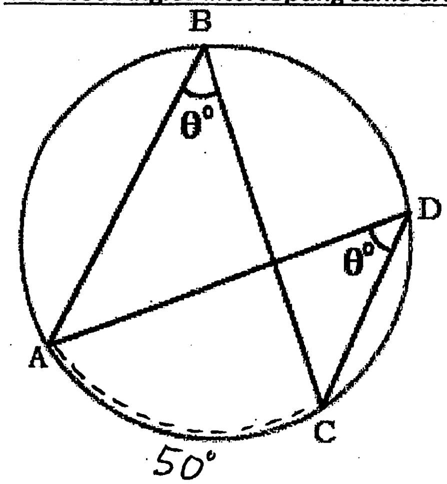
A + C = 180
B + D = 180

Congruent chords in circle:

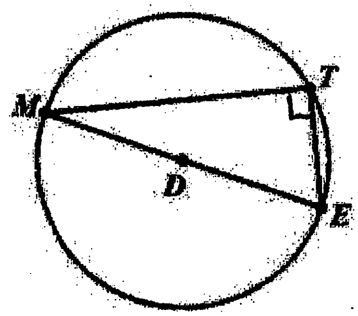


$\overline{LM} \cong \overline{XY}$ and $\widehat{LM} \cong \widehat{XY}$

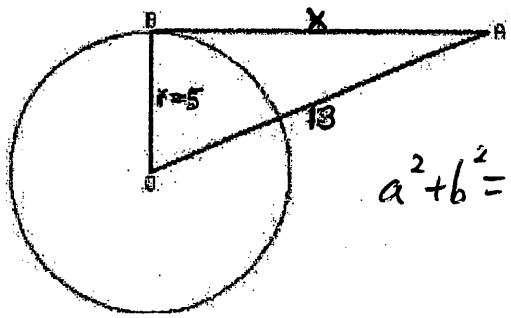
Inscribed Angles intercepting same arc:



Inscribed Angle Intercepting diameter:

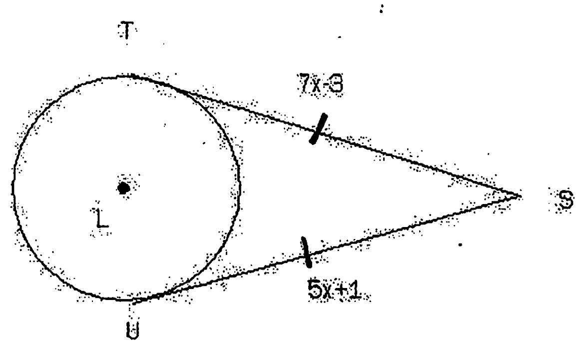


Line tangent to circle is perpendicular to radius:

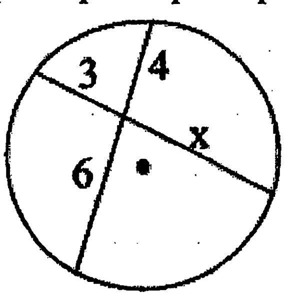


$a^2+b^2=c^2$

Tangents to circles are congruent: (party hat problems):



Chord segment lengths:
part * part = part * part

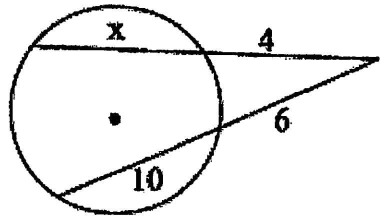


$3 \cdot x = 4 \cdot 6$

$3x = 24$

$x = 8$

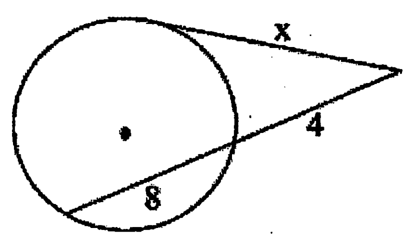
Secant segment lengths:
outside * whole = outside * whole



$4(x+4) = 6(6+10)$

$4x+16 = 36+60$

Secant/tangent segment lengths:
outside * whole = outside * whole



$x \cdot x = 4 \cdot (4+8)$

$x^2 = 4(12)$

$x^2 = 48$