L3 Geometry

~~Midyear~~ FINAL Exam Concepts

Name: ______________________

Block: ________ Date: __________

## Chapter 7 Similarity

**7.1** Ratios and Proportions

**7.2** Similar Polygons

Similarity:

CORRESP. ANGLES ≅

CORRESP. SIDES PROPORTIONAL

Congruence:

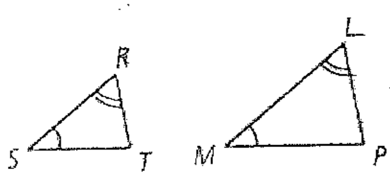
CORRESP. ANGLES ≅

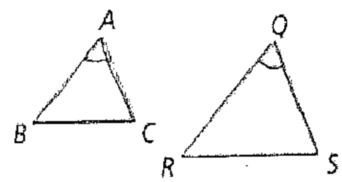
CORRESP. SIDES ≅

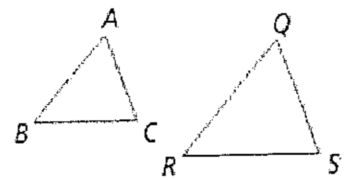
Polygons are similar when (SEE ABOVE) ______________________.

**7.3** Proving Triangles Similar

Three Reasons: AA  SAS  SSS



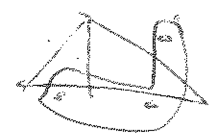




The sides of similar triangles are PROPORTIONAL and the angles are CONGRUENT.

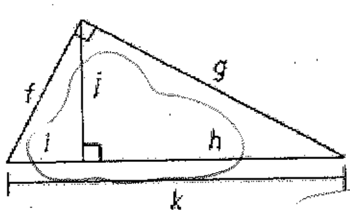
The scale factor is: A RATIO OF 2 CORRESPONDING SIDES.

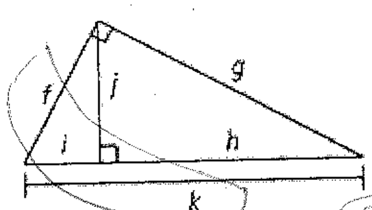
**7.4** Similarity in Right Triangles

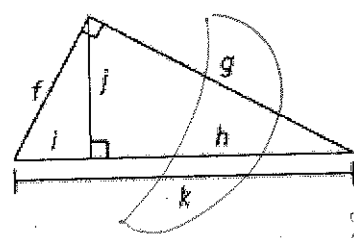


Banana (SHOWS UP TWICE)

Pear (SHOWS UP ONCE)




$\frac{i}{j} = \frac{j}{h}$  j IS G.M. OF i & h

$\frac{i}{f} = \frac{f}{k}$  f IS G.M. OF i & k

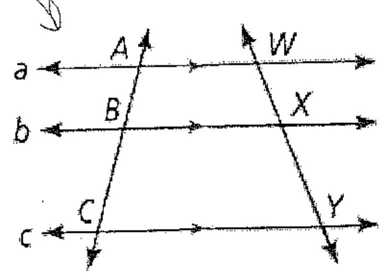
$\frac{h}{g} = \frac{g}{k}$  g IS G.M. OF h & k

Geometric mean:

MULTIPLY & TAKE SQ. ROOT OF 2 #'S

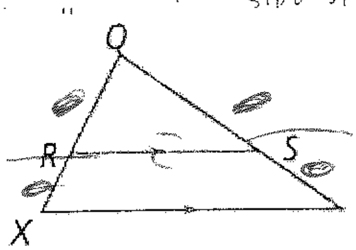
**7.5** Proportions in Triangles

Side Splitter Theorem




$\frac{AB}{BC} = \frac{WX}{XY}$

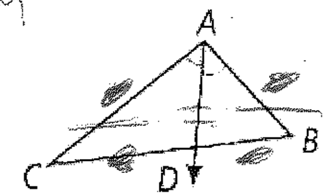
SIDE SPLITTER THEOREM



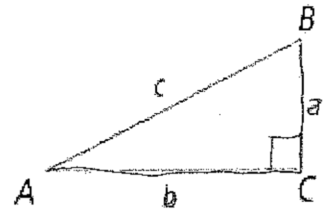

$$\frac{QR}{RX} = \frac{QS}{SY}$$

ANGLE BISECTOR THEOREM

$$\frac{AC}{CD} = \frac{AB}{BD}$$




**Chapter 8 Right Triangles and Trigonometry**




**8.1** The Pythagorean Theorem and Its Converse

Pythagorean Theorem: $A^2 + B^2 = C^2$

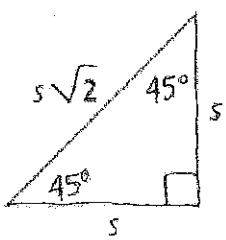
Acute Triangle: $A^2 + B^2 > C^2$

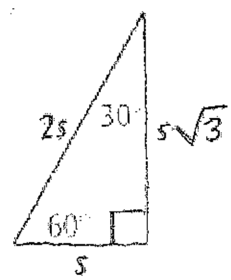
Obtuse Triangle: $A^2 + B^2 < C^2$

**8.2** Special Right Triangles

45-45-90: ISOSCELES RIGHT △

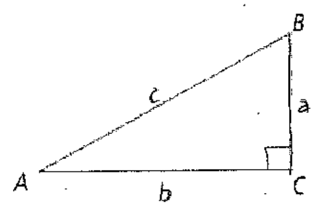
30-60-90: HALF OF AN EQUILATERAL △




**8.3** Trigonometry

SOH CAH TOA



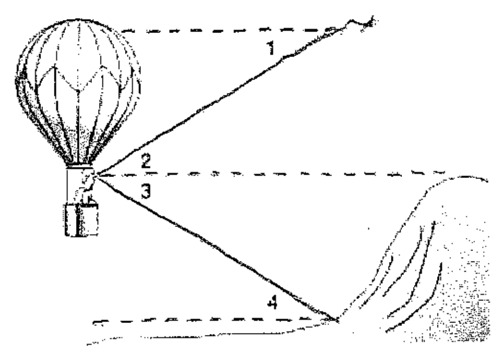

sin A = $\frac{OPP}{HYP}$ $\left(\frac{a}{c}\right)$ cos A = $\frac{ADJ}{hyp}$ $\left(\frac{b}{c}\right)$ tan A = $\frac{OPP}{ADJ}$ $\left(\frac{a}{b}\right)$

sin B = $\frac{OPP}{HYP}$ $\left(\frac{b}{c}\right)$ cos B = $\frac{ADJ}{hyp}$ $\left(\frac{a}{c}\right)$ tan B = $\frac{OPP}{ADJ}$ $\left(\frac{b}{a}\right)$

$\sin^{-1}$ $\cos^{-1}$ $\tan^{-1}$

We use TRIG RATIOS to solve for side lengths and INVERSE RATIOS to solve for angle measures.

**8.4** Angles of Elevation and Depression



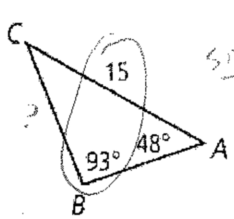

1. Starting Point: UP A FEW FEET ABOVE GROUND

2. MEASURE ANGLE UP/DOWN FROM HORIZONTAL

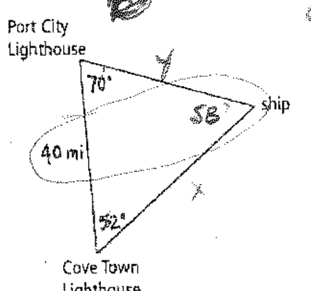
**8.5** Law of Sines

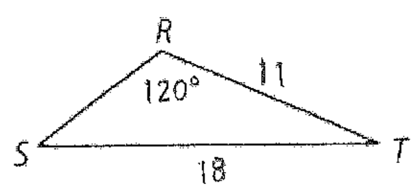
Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Cases:




$$\frac{\sin 93}{15} = \frac{\sin 48}{BC}$$




$$\frac{\sin 58}{40} = \frac{\sin 70}{x} = \frac{\sin 52}{y}$$

$$\frac{\sin 120}{18} = \frac{\sin S}{11}$$

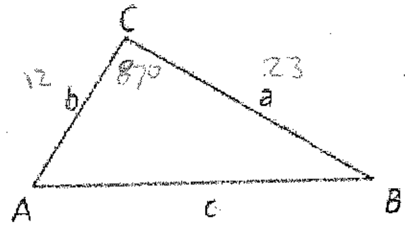
**8.6** Law of Cosines

Law of Cosines:

$a^2 = b^2 + c^2 - (2bc \cos A)$

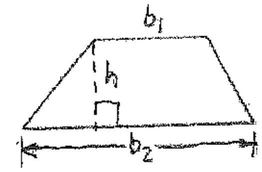
$b^2 = a^2 + c^2 - (2ac \cos B)$

$c^2 = a^2 + b^2 - (2ab \cos C)$




## Chapter 10 Area

**10.1 + 10.2** Area of Parallelograms, Triangles, Trapezoids, Rhombuses and Kites




Parallelograms

A = $bh$

Triangle

A = $\frac{1}{2}bh$

Trapezoid

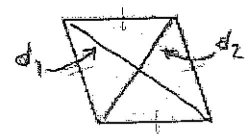
A = $\frac{1}{2}h(b_1 + b_2)$

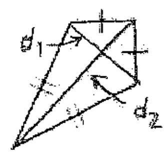
Rhombus

A = $\frac{1}{2}d_1 d_2$

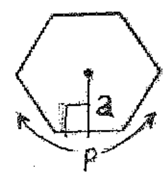
Kite

A = $\frac{1}{2}d_1 d_2$




**10.3** Area of Regular Polygons




Regular: EQUIANGULAR & EQUILATERAL

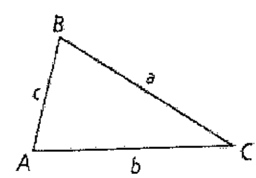
A = $\frac{1}{2}ap$ Inscribed: DRAWN WITHIN ANOTHER SHAPE Circumscribed: DRAWN OUTSIDE OF ANOTHER SHAPE

Apothem: DIST. FROM CENTER TO ANY SIDE PERPENDICULARLY

10.4 Perimeters and Areas of Similar Figures

| Scale Factor | Ratio of Perimeters | Ratio of Areas |
|---|---|---|
| 2 : 3 | 2 : 3 | 4 : 9 |
| 7 : 4 | 7 : 4 | 49 : 16 |
| 11 : 1 | 11 : 1 | 121:1 |
| 9 : 4 | 9 : 4 | 81: 16 |
| a : b | a : b | $a^2 : b^2$ |

~~**10.5** Trigonometry and Area~~




~~Area of a Triangle:~~ (DIDN'T COVER)

**10.6** Circles and Arcs

Major Arc: > 180° Minor Arc: < 180°

Semi-circle: = 180° C = A =

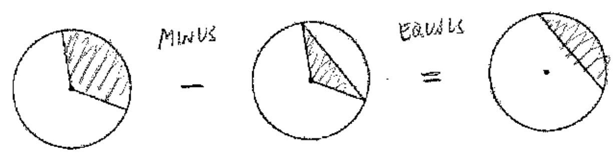
Arc ~~Length~~ measure: equal to central angle measure

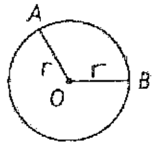
Arc Length = $\frac{m\widehat{AB}}{360}(2\pi r)$

**10.7** Area of Circles and Sectors

Sector: $\frac{m\widehat{AB}}{360}(\pi r^2)$

Segment: sector area minus triangle area






**10.8** Geometric Probability

Probability: $\dfrac{\text{\# of FAVORABLE OUTCOMES (AREA)}}{\text{\# of TOTAL POSSIBLE OUTCOMES (AREA)}}$

**Chapter 11 Surface Area and Volume**

Oblique: NOT STANDING AT 90° TO BASE Lateral Face: ANY FACE THAT IS NOT ONE OF THE 2 CONGRUENT PARALLEL BASES.

Slant height: "ALTITUDE" ALONG ONE OF THE LATERAL FACES

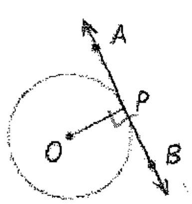
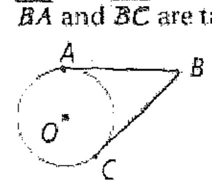
| | LA | SA | Volume |
|---|---|---|---|
| Prism | $Ph$ PERIMETER × HEIGHT | $Ph + 2B$ LA + 2(AREA OF BASE) | (OR $lwh$) $Bh$ AREA OF BASE × HEIGHT |
| Cylinder | ALSO perimeter × height $\pi d h$ | $\pi d h + 2B$ (LA + 2B) AREA OF BASE | $\pi r^2 h$ |
| Pyramid | $\frac{1}{2} p l$ $\frac{1}{2}$ PERIMETER × SLANT HEIGHT | $\frac{1}{2} p l + B$ | $\frac{1}{3} B h$ $\frac{1}{3}$ AREA OF BASE × HEIGHT |
| Cone | $\pi r l$ $\frac{1}{2}$ CIRCUMFERENCE × SLANT HEIGHT | $\pi r l + \pi r^2$ (LA + AREA OF BASE) ONE OF BASE | $\frac{1}{3}\pi r^2 h$ |
| Sphere | -- | $4\pi r^2$ | $\frac{4}{3}\pi r^3$ |

| Scale Factor | Ratio of Areas | Ratio of Volumes |
|---|---|---|
| 2 : 3 | 4 : 9 | 8 : 27 |
| 6 : 7 | 36 : 49 | 216 : 343 |
| 5 : 2 | 25 : 4 | 125 : 8 |
| 9 : 4 | 81: 16 | 729 : 64 |
| a : b | $a^2 : b^2$ | $a^3 : b^3$ |

**Chapter 12 Circles**

**12.1** Tangent Lines

Tangent Line: LINE / RAY / SEGMENT THAT INTERSECTS A CIRCLE AT ONLY ONE POINT

| | |
|---|---|
| **If . . .** $\overleftrightarrow{AB}$ is tangent to $\odot O$ at $P$  Then: $\overline{OP} \perp \overleftrightarrow{AB}$ ~~Then:~~ | **If . . .** $\overline{BA}$ and $\overline{BC}$ are tangent to $\odot O$  $\overline{AB} \cong \overline{CB}$ |

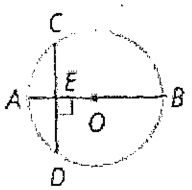


**12.2** Chords and Arcs

If you have congruent chords in a circle then you also have CONGRUENT INTERCEPTED ARCS and THEY'RE EQUIDISTANT FROM THE CENTER

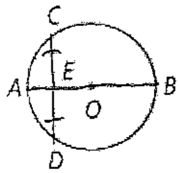
If chords in a circle are equidistant from the center then THEY ARE CONGRUENT.

If



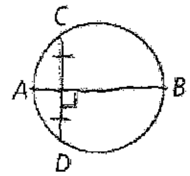

$\overline{CE} \cong \overline{DE}$

Then




$\overline{CD} \perp \overline{AB}$

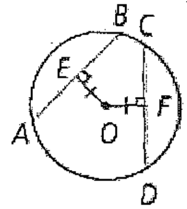
Then




Then

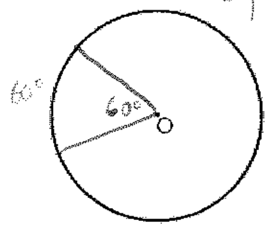
If

If

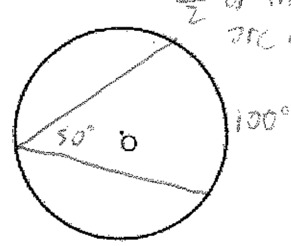



## 12.3 Inscribed Angles

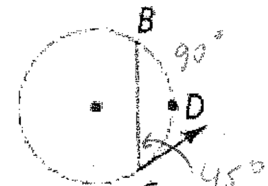
Central Angle equal to arc measure



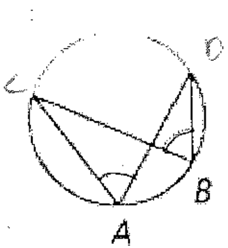

Inscribed Angle ½ of intercepted arc measure




Tangent Chord Angle ½ of intercepted arc measure

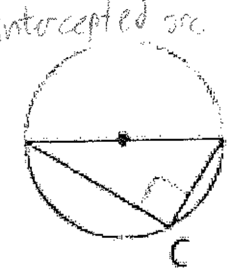



If 2 inscribed angles intercept the same arc



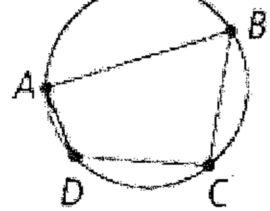

Then the angles (A & B) are congruent

If intercepted arc is a semi-circle




Then $m\angle C = 90°$

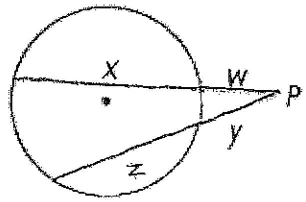
If quadrilateral is inscribed in circle



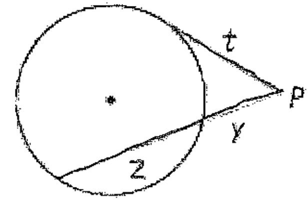

then opposite angles are supplementary

Then

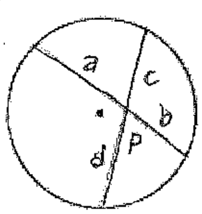
## 12.4 Angle Measures and Segment Lengths



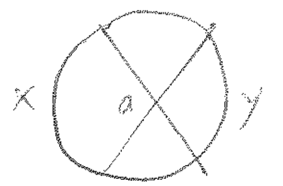

$(w + x)w = (y + z)y$




$(y + z)y = t^2$




$a \cdot b = c \cdot d$

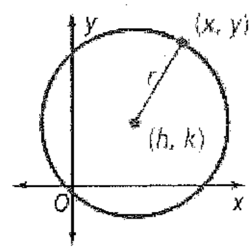



$m\angle a = \frac{1}{2}(x+y)$



$m\angle a = \frac{1}{2}(x-y)$

**12.5** Circles in the Coordinate Plane




Equation of a circle: $(x-h)^2+(y-k)^2=r^2$

Center: $(h,k)$

Radius: Use Pythagorean Theorem or Distance Formula

or plug $(h,k)$ and $(x,y)$ into circle equation and solve for $r$