CORNELL NOTES

TOPIC/OBJECTIVE: G5 Triangle Proofs

NAME:

CONTENT/CLASS: Geometry

CLASS/PERIOD: 5

DATE: 1/29/16

ESSENTIAL QUESTION: What information do I need to prove that two triangles are congruent?

QUESTIONS:

~ means similar ≅ means congruent △ means triangle

Look around at the posters of triangles we created. Which posters show triangles that are all the same? Which posters show triangles that are different? Based on this, list what you need to know about a triangle in order to prove they are congruent (for example, one side, a side and an adjacent angle, all three sides, a side an an opposite angle, etc.)

Same △s (△s are ≅)	Not Same △s (△s are not ≅)
B: side-side-side (SSS)	A: side-side
G: side-angle-side (SAS)	C: side-adj angle
H: angle-angle-side (AAS)	D: side-opp angle
F: angle-side-angle (ASA)	E: angle-angle (AA)
all of these postulates are enough to prove △s are ≅	I: angle-side-side (ASS)
	side-side-angle (SSA)
	all of these were not enough to prove ≅ △s

Reminders from Semester 1:

similar: shape is same, size could be different
used similarity postulates (SSS, SAS, AA) to prove similarity (~) → symbol for similarity

keywords: proportional

congruent: same shape AND size. All side lengths are the same.
symbol: ≅
keywords: the same, equal

SUMMARY:

CORNELL NOTES

TOPIC/OBJECTIVE:

CONTENT/CLASS:

NAME:

CLASS/PERIOD:

DATE:

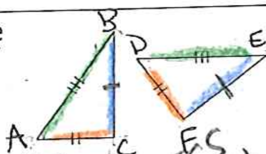
ESSENTIAL QUESTION:

ways to prove triangles are ≅

QUESTIONS:

Congruence Conjectures for Triangles

side-side-side



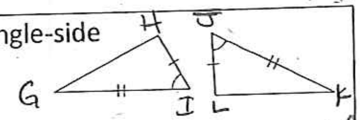
S $\overline{AB} \cong \overline{DE}$

S $\overline{AC} \cong \overline{DF}$

S $\overline{CB} \cong \overline{EF}$

use SSS when all sides are marked ≅

side-angle-side



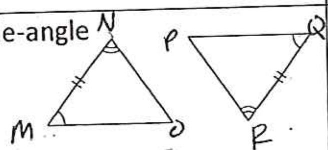
S $\overline{HI} \cong \overline{JL}$

A $\angle I \cong \angle J$

S $\overline{GI} \cong \overline{JK}$

the angle must be between the side

angle-side-angle



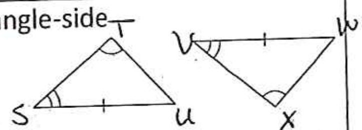
A $\angle N \cong \angle R$

S $\overline{MN} \cong \overline{RQ}$

A $\angle M \cong \angle Q$

* Side must be between angles

angle-angle-side



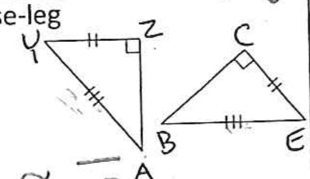
A $\angle T \cong \angle X$

A $\angle S \cong \angle V$

S $\overline{SU} \cong \overline{VW}$

Side is not between angles

hypotenuse-leg



H $\overline{YA} \cong \overline{BE}$

L $\overline{YZ} \cong \overline{CE}$

only works for right △s

Sets of sides and angles that DON'T prove congruence:

ASS
AA
SA
SS
S
A

none of these prove ≅

SUMMARY:

CORNELL NOTES

TOPIC/OBJECTIVE: Proof Notes

NAME:

CONTENT/CLASS: Geometry

CLASS/PERIOD: 5

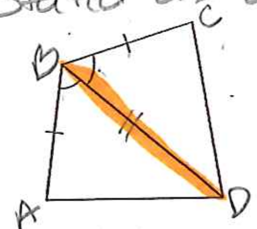
DATE: 2/4/16

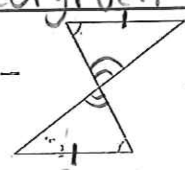
ESSENTIAL QUESTION: What information is helpful when proving 2 triangles are ≅?

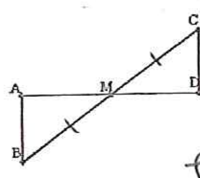
QUESTIONS:

NOTES:

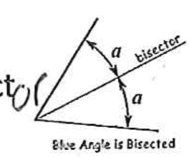
Given - this is a reason used when what you are stating in a proof is marked in a diagram or stated as a given

Reflexive Property –  this property is used to state if a line segment is congruent to itself (shared side) ex/ $\overline{BD} \cong \overline{BD}$

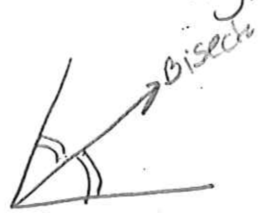
Vertical angles –  not marked on a diagram but they are ≅

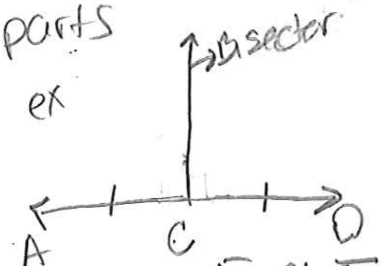
Midpoint  divides line segment into two ≅ parts

ex/ if pnt M is a midpoint of $\overline{AD}$ then $\overline{BM} \cong \overline{CM}$

Bisect or 

line/segment/ray that divides an angle or line into 2 congruent parts

ex/ 

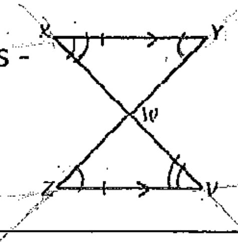
ex 

$\overline{AC} \cong \overline{CD}$

SUMMARY:

QUESTIONS:

NOTES:

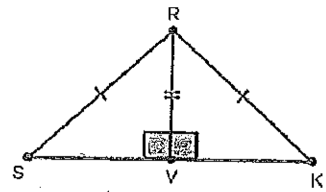
Parallel lines & their angles - 

$\overline{XY} \parallel \overline{ZV}$ Symbol: $\parallel$

Alt. Int. Angles are $\cong$

parallel lines have the same slope

AIA are not marked on a diagram

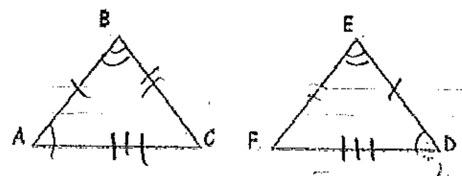
Perpendicular lines & their angles - 

Symbol: $\perp$

$\overline{RV} \perp \overline{SK}$

create two 90° angles (they are $\cong$): $\angle RVS \cong \angle RVK$

List the six corresponding parts of the congruent triangles. Mark the congruences on the figure.

 $\triangle ABC \cong \triangle DEF$	$\angle A \cong \angle D$	$\overline{AB} \cong \overline{DE}$
	$\angle B \cong \angle E$	$\overline{BC} \cong \overline{EF}$
	$\angle C \cong \angle F$	$\overline{AC} \cong \overline{FD}$

Corresponding Parts of Congruent Triangles are Congruent (CPCTC) –

If 2 or more triangles are prove to be $\cong$ then all corresponding angle and sides are $\cong$

SUMMARY:

CORNELL NOTES

TOPIC/OBJECTIVE: G6: Area, Arc length, Sector and Equations of Circles

~~CONTENT/CLASS:~~ Geometry

NAME:

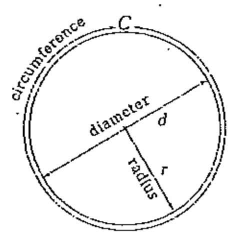
CLASS/PERIOD: 5

DATE: 3/4/16

ESSENTIAL QUESTION: What are important parts of and formulas for circles?

QUESTIONS:

(Half the diameter) *all radii in a circle are $\cong$



r = radius - distence from center to edge of a circle

d = diameter - distence through the center from one side to the other side in a circle.

Circumference- distence around the circle

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

$d = 2r$

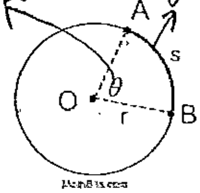
$r = \frac{1}{2}d$

Area of a Circle = πr^2

Sector = Section of a circle (slice)

central angle

arc

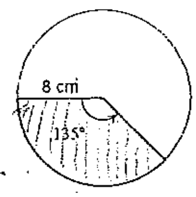


Central Angle = Angle whose vertex is at the center of a circle

Arc = portion of the circumference

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

Example



$AS = \frac{135°}{360°} \cdot \pi (8\text{cm})^2$

$= 24\pi \text{ cm}^2$ (exact)

$= 75.4 \text{ cm}^2$ (approximate)

To get an "exact" answer put everything except π in calculator

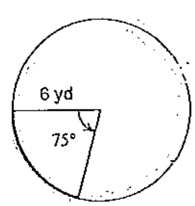
Length of Arc AB = $\frac{\theta}{360°} \cdot \pi d$

Or

Length of Arc AB = $\frac{\theta}{360°} \cdot 2\pi r$

θ = central angle

Example



$AL = \frac{75°}{360°} \cdot 2\pi (6\text{yd})$

$= 2.5\pi$ yd (exact)

≈ 7.85 yd (approx.)

SUMMARY:

QUESTIONS:

NOTES:

The Equation of a Circle

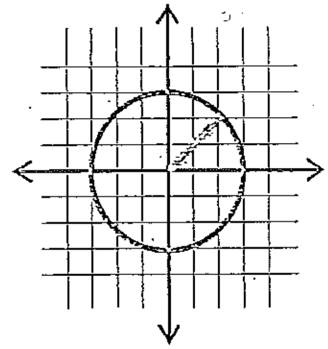
Circle: $(x-h)^2 + (y-k)^2 = r^2$

Given : Circle C

Let (h,k) be the center of circle C.

Let (x, y) be any point on the circle

Let *r* = the radius of circle C



The **standard form** or **center-radius form** equation of a circle:

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

Where **(h, k) is the center** and **r is the radius.**

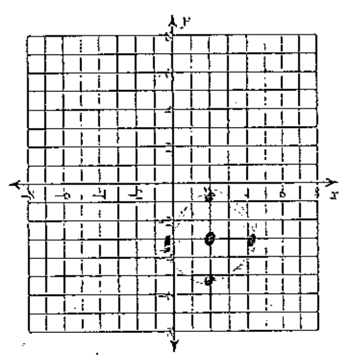
Example 1. Write an equation with the center of (13, -12) and radius of 4 :

$(x-13)^2 + (y+12)^2 = 4^2$

Examples of graphing equations

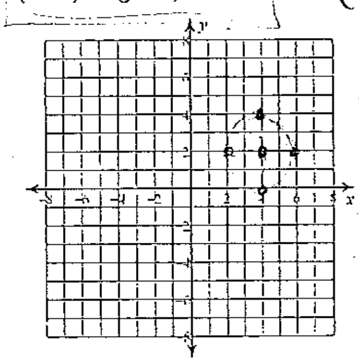
$(x-2)^2 + (y+3)^2 = 5$

center
(2, -3)
$r = \sqrt{5}$
≈ 2.24



$(x-4)^2 + (y-2)^2 = 4$

center
(4, 2)
$r = 2$



Completing the Square Example Problem

Complete the square to find the center and the radius of the circle.

$4x^2 + 4y - 16x + 24y - 36 = 0$

CORNELL NOTES

TOPIC/OBJECTIVE: G6b: Arcs & Chords

CONTENT/CLASS: Geometry

NAME:

CLASS/PERIOD: 5+7

DATE: 3/10/16

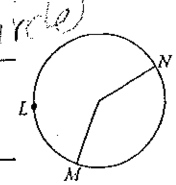
ESSENTIAL QUESTION: What are special relationships between the arcs, chords, and angles in a circle?

QUESTIONS:

NOTES:

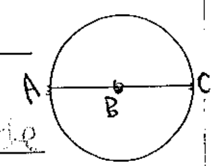
arc $\overset{\frown}{MN}$ is minor arc $\overset{\frown}{MLN}$ is major

Major Arc - arc bigger than 180° (more than ½ of circle)



Minor Arc - less than 180° (less than ½ of circle)

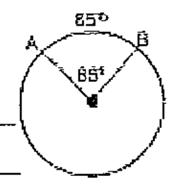
Semicircle - exactly 180° (exactly ½ of circle)



Central Angle - angle whose vertex is at the center of a circle

Every central angle has a corresponding/intercepted arc

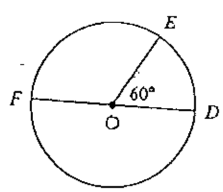
For example, in ⊙P at right, $\angle APB$ is a central angle and corresponds to $\overset{\frown}{AB}$.



Arc measure (*different than arc length*) is equal to the corresponding central angle

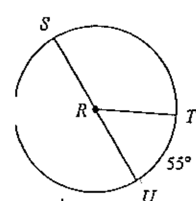
Examples:

Find $m\overset{\frown}{ED}$



$m\angle EOD = 60°$
so $m\overset{\frown}{ED} = 60°$

Find $m\angle TRU$

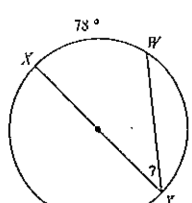


Since $m\overset{\frown}{TU} = 55°$, then $m\angle TRU = 55°$

Inscribed Angle - angle whose vertex is on the circumference of a circle. The measure of an inscribed angle is half of the arc measure or the arc measure is twice that of measure of inscribed angle

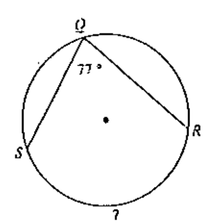
Examples:

Find $m\angle XYW$



Since $m\overset{\frown}{XW}$ is 78° and $\angle XYW$ is inscribed, then $\angle XYW$ is half of 78°, which is 39°

Find $m\overset{\frown}{SR}$



Since $m\angle SQR$ is 77°, then $m\overset{\frown}{SR}$ is 154°

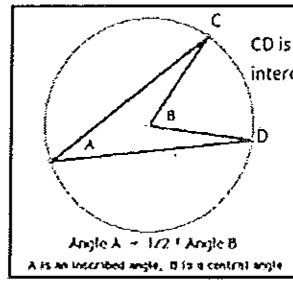
SUMMARY:

QUESTIONS:

NOTES:

Corresponding/Intercepted Arc - arc that is formed when line segments intersect portions of the circumference of a circle and create arcs

$\angle CAD$ is an example of an inscribed angle, because its vertex, point A, lies on the circle's circumference.

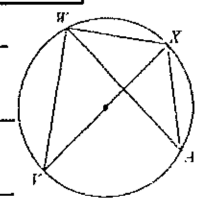


Angle A = 1/2 * Angle B
A is an inscribed angle, B is a central angle

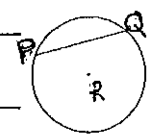
It corresponds to central angle $\angle DBC$ because they both intercept the same arc, $\widehat{CD}$.

An intercepted arc is an arc with endpoints on each side of the angle.

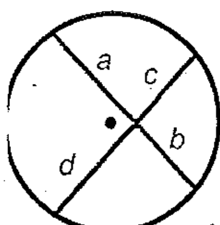
Inscribed Angles Sharing Same Arc - if two inscribed angles intercept the same arc, then the angles are $\cong$ i.e. $\angle AWV$ and $\angle AXV$ both intercept $\widehat{VA}$, so they are $\cong$



Chord - a line segment whose endpoints both lie on the circumference of the circle i.e. $\overline{PQ}$ does not need to go through center

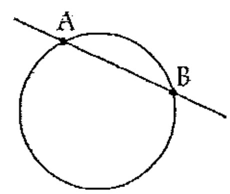


Intersecting Chords = when 2 chords intersect each other inside a circle, the product of their segments are equal

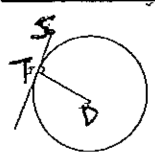


i.e. $a \cdot b = d \cdot c$

Secant - a line that intersects a circle at 2 points, i.e. $\overline{AB}$ is a secant



Tangent - a line that intersects with a curve (or circle) at exactly one point. In a circle, a tangent is always $\perp$ to the radius

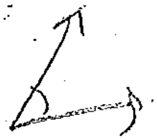
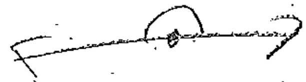
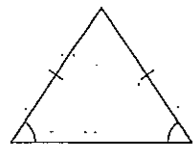
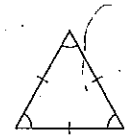
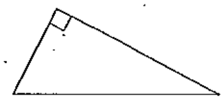


ex) $\overline{ST}$ is tangent to $\odot D$, so $\overline{ST} \perp \overline{DT}$ $\therefore \angle DTS = 90°$

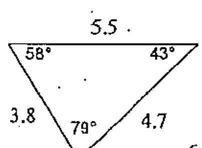
SUMMARY:

ANGLES, TRIANGLES AND QUADRILATERALS TOOLKIT

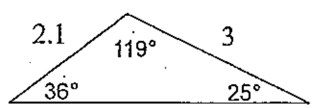
For each shape or angle below, draw a diagram and state all you know about the angles, sides and/or diagonals of the shape.

Acute Angle	Obtuse Angle	Straight Angle
an angle less than 90° 	an angle greater than 90° but less than 180° 	 angle of 180°
Right Angle	**Isosceles Triangle**	**Equilateral Triangle**
90° angle 	 with 2 ≅ sides and 2 ≅ angles	 with all ≅ sides and all ≅ angles angle measures are 60°
Right Triangle	**Scalene Triangle**	
 with a 90° angle	 with 3 different length sides and 3 different angle measures	

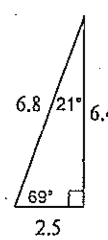
Examples of labeling triangles using sides and angles



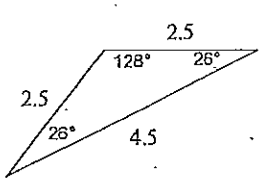
acute scalene



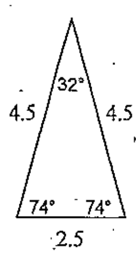
obtuse scalene



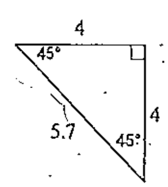
right scalene



Obtuse isosceles

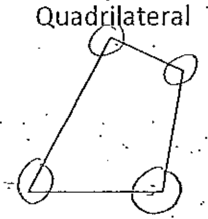
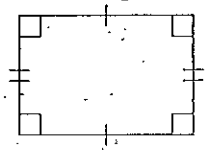
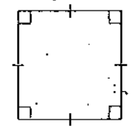
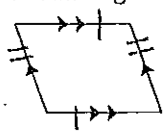
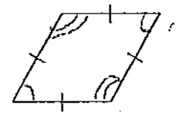
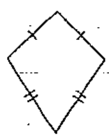
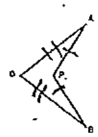
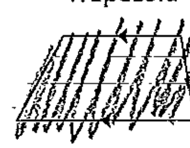
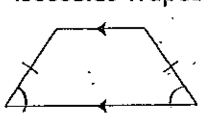
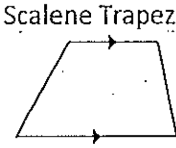


acute isosceles



right isosceles

$\parallel$ = parallel

Quadrilateral  • four sides • four vertices • Interior angles = 360°	Rectangle  • 2 sets of ≅ sides • 2 sets of $\parallel$ sides • 4 right angles.	Square  • all sides are ≅ • 2 sets of $\parallel$ lines • 4 right angles
Parallelogram  • opposite sides are $\parallel$ • opposite sides are ≅	Rhombus  • all sides are ≅ • opposite sides are $\parallel$ • opp. angles are ≅	
Kite  • adjacent sides are ≅	Inverted Kite  • adjacent sides are ≅	Trapezoid  • one pair of $\parallel$ sides
Isosceles Trapezoid  • one pair of $\parallel$ sides • one pair of ≅ sides • one pair of ≅ angles	Scalene Trapezoid  • one pair of $\parallel$ sides • no ≅ sides	Right Trapezoid  • one pair of $\parallel$ sides • two right angles

MEASUREMENTS

1 meter = 100 centimeters
1 kilometer = 1000 meters

1 gram = 1000 milligrams
1 kilogram = 1000 grams

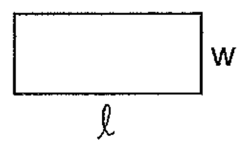
1 liter = 1000 cubic centimeters

1 yard = 3 feet
1 mile = 5280 feet
1 hour = 60 minutes
1 minute = 60 seconds

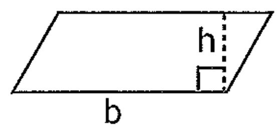
1 pound = 16 ounces
1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts

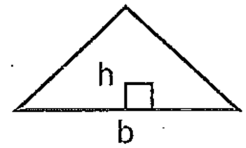
AREA (A)



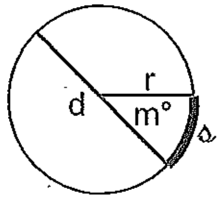
$A = \ell w$



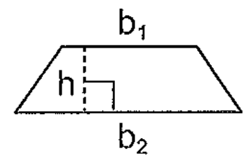
$A = bh$



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

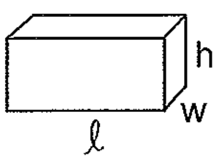


$A = \pi r^2$
$C = 2\pi r = \pi d$
Arc Length: $s = \left(\frac{m}{360}\right) 2\pi r$

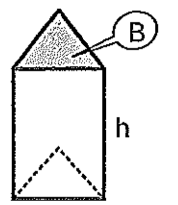


$A = \frac{1}{2} h (b_1 + b_2)$

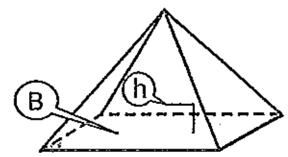
SURFACE AREA (SA) and VOLUME (V)



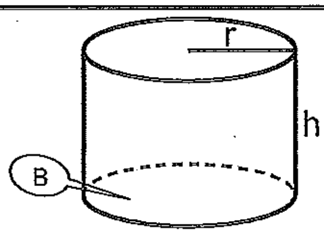
$SA = 2(\ell w + wh + \ell h)$
$V = \ell wh = Bh$
B = Area of Base



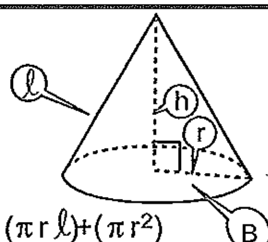
SA = Sum of Areas of all faces
$V = Bh$
B = Area of Base



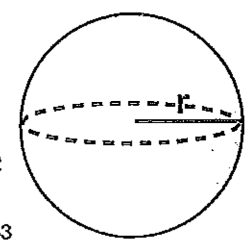
SA = Sum of Areas of all faces
$V = \frac{1}{3} Bh$
B = Area of Base



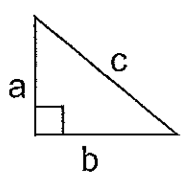
$SA = 2\pi rh + 2\pi r^2$
$V = \pi r^2 h = Bh$
B = Area of Base



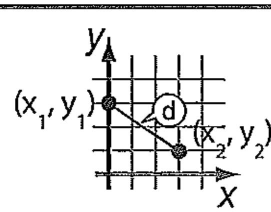
$SA = (\pi r \ell) + (\pi r^2)$
$V = (\frac{1}{3}\pi r^2)(h) = \frac{1}{3} Bh$
B = Area of Base



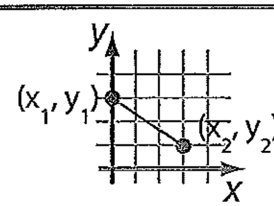
$SA = 4\pi r^2$
$V = \frac{4}{3}\pi r^3$



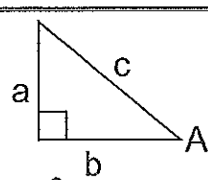
$a^2 + b^2 = c^2$



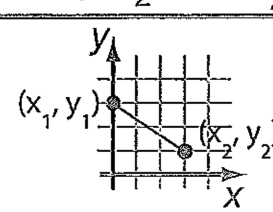
$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$



Midpoint = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$



$\sin A = \frac{a}{c}$ $\tan A = \frac{a}{b}$
$\cos A = \frac{b}{\dots}$



Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

MEDIDAS

1 metro = 100 centímetros
1 kilómetro = 1000 metros
1 yarda = 3 pies
1 milla = 5280 pies
1 hora = 60 minutos
1 minuto = 60 segundos

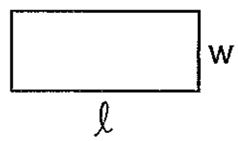
1 gramo = 1000 miligramos
1 kilogramo = 1000 gramos

1 libra = 16 onzas
1 tonelada = 2000 libras

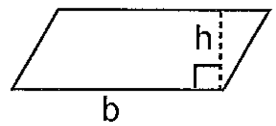
1 litro = 1000 centímetros cúbicos

1 taza = 8 onzas líquidas
1 pinta = 2 tazas
1 cuarto de galón = 2 pintas
1 galón = 4 cuartos de galón

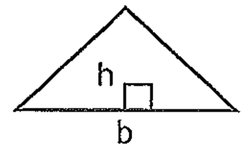
ÁREA (A)



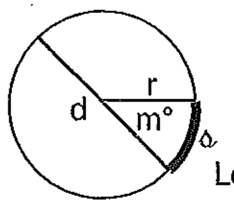
$A = \ell w$



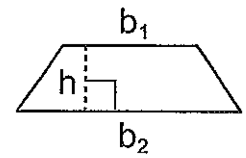
$A = bh$



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

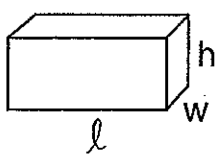


$A = \pi r^2$
$C = 2\pi r = \pi d$
Longitud del arco: $s = \left(\frac{m}{360}\right) 2\pi r$

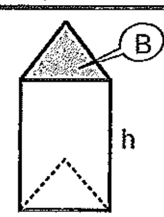


$A = \frac{1}{2} h\ (b_1 + b_2)$

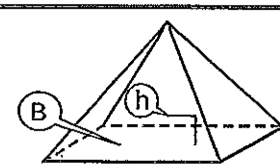
SUPERFICIE (S) y VOLUMEN (V)



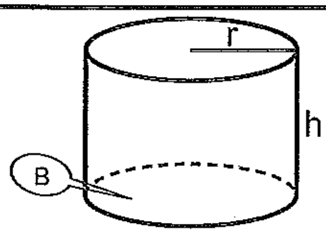
$S = 2\ (\ell w + wh + \ell h)$
$V = \ell wh = Bh$
B = Área de la base



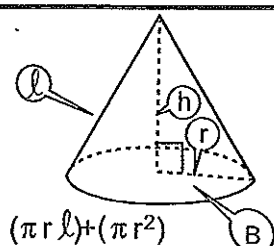
S = Suma de las áreas de todas las caras $V = Bh$
B = Área de la base



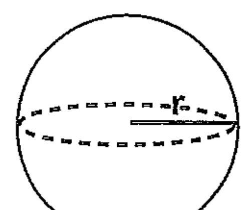
S = Suma de las áreas de todas las caras
$V = \frac{1}{3}\ Bh$
B = Área de la base



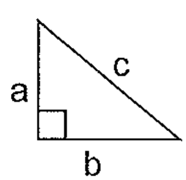
$S = 2\ \pi rh + 2\pi r^2$
$V = \pi r^2 h = Bh$
B = Área de la base



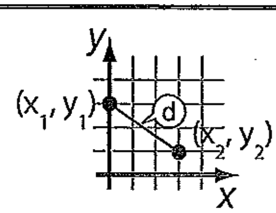
$SA = (\pi r \ell) + (\pi r^2)$
$V = (\frac{1}{3}\pi r^2)(h) = \frac{1}{3}\ Bh$
B = Área de la base



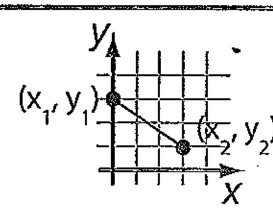
$S = 4\ \pi r^2$
$V = \frac{4}{3}\ \pi r^3$



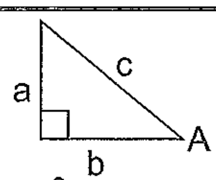
$a^2 + b^2 = c^2$



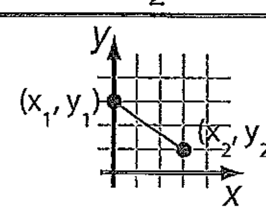
$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$



Punto medio= $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$



$\sin A = \frac{a}{c}$ $\tan A = \frac{a}{b}$
$\cos A = \frac{b}{c}$



Pendiente: $m = \frac{y_2 - y_1}{x_2 - x_1}$