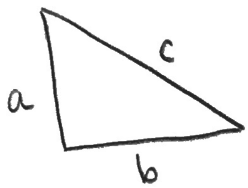
SEMESTER

GEOMETRY REVIEW NOTES

RIGHT TRIANGLES AND THE PYTHAGOREAN THEOREM

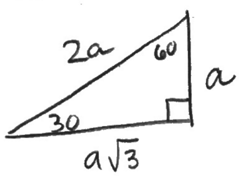
⇒ IF A TRIANGLE IS A <u>RIGHT TRIANGLE</u>, THEN THE SUM OF THE SQUARES OF THE LEG LENGTHS IS EQUAL TO THE SQUARE OF THE HYPOTENUSE.

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



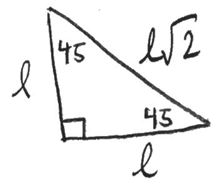
1. USE TO FIND MISSING SIDE LENGTH (C IS <u>ALWAYS</u> THE HYP.)
2. USE TO DETERMINE IF A TRIANGLE IS A RIGHT TRIANGLE BY PLUGGING IN SIDE LENGTHS (Make sure longest side is c)

<u>30-60-90 Δ's</u>

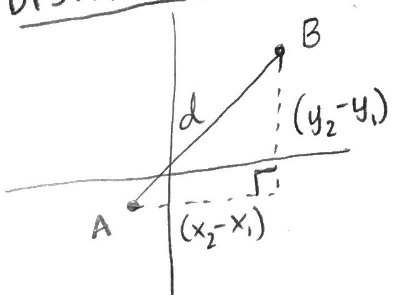


Hyp. is double the length of shortest side

<u>45-45-90 Δ's</u> (ISOSCELES RIGHT Δ)



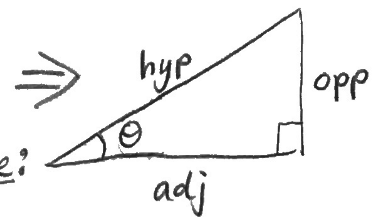
<u>DISTANCE FORMULA</u> (comes FROM THE PYTHAGOREAN THEOREM)



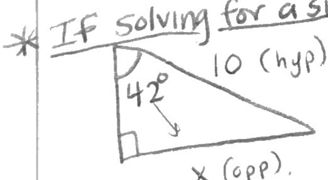
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

TRIG AND RIGHT TRIANGLES

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

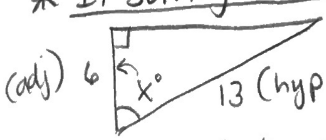


* <u>If solving for a side</u>:



1. Look at the given angle and 2 sides.
2. Choose a trig function that relates all 3
3. Write an equation [$\sin 42° = \frac{X}{10}$]
4. Solve

* <u>If solving for an angle</u>:

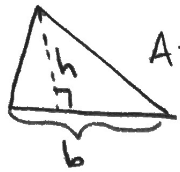


1. Look at the given 2 sides and unknown angle.
2. Choose a trig function that relates all 3.
3. Write an equation [$\cos X = \frac{6}{13}$]
4. Get "x" by itself using <u>inverse</u> trig functions

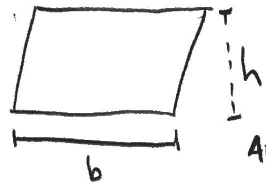
$\cancel{\cos^{-1}}(\cancel{\cos} x) = \cos^{-1}(6/13)$

$x = \cos^{-1}(6/13) \rightarrow$ Evaluate!

AREA

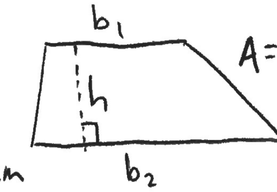


$A = \frac{1}{2}bh$

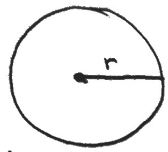


$A = bh$

Any parallelogram



$A = \left(\frac{b_1 + b_2}{2}\right) \cdot h$

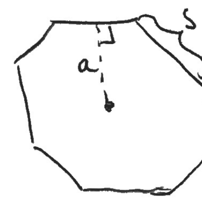


$A = \pi r^2$

Always use radius!

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

*FOR COMPLEX SHAPES, ADD OR SUBTRACT KNOWN SHAPE AREAS



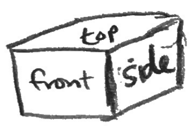
*FOR REGULAR POLYGONS

$A = \frac{1}{2} s \cdot a \cdot n$

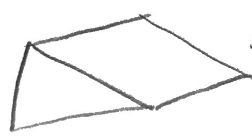
number of sides

SURFACE AREA

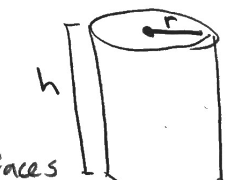
⇒ To find surface area, add up the area of each face on the 3-D figure



$S.A. = 2A_{top} + 2A_{side} + 2A_{front}$



$S.A. = 2A_{triangle} + A_{rectangular\ faces}$



$S.A. = 2\pi r^2 + 2\pi r h$

$S.A = \pi r^2 + \pi r l$

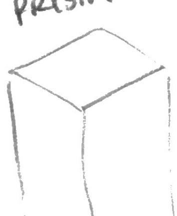
$S.A. = A_{base} + A_{triangular\ faces}$

$S.A. = 4\pi r^2$

VOLUME:

2 figures have equal volume if corresponding cross-sections have equal area at every height (CAVALIERI'S PRINCIPLE)

PRISM



$V = A_B \cdot h$

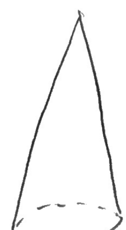
PYRAMID

$V = \frac{1}{3} A_B \cdot h$

CYLINDER

$V = \pi r^2 h$

CONE

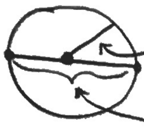


$V = \frac{1}{3} \pi r^2 h$

SPHERE

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

CIRCLES



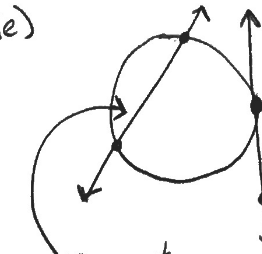
radius

diameter

chord (Line segment connecting any two points on a circle)

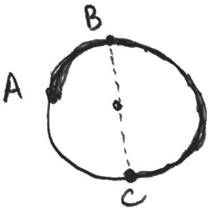
central angle (formed by 2 radii)

inscribed angle (formed by 2 chords)



secant (Line passing thru the circle at 2 points)

tangent (Line or segment touching the circle at exactly <u>one</u> point)



$\overset{\frown}{AB}$ minor arc $< 180°$

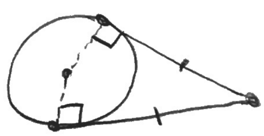
$\overset{\frown}{ABC}$ major arc $> 180°$

semicircle $\overset{\frown}{BC}$ formed by diameter, measure $180°$

* All arc measures add to $360°$

TANGENTS

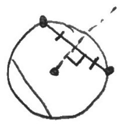
1. FORM 90° ANGLE WITH RADIUS
2. TANGENT SEGMENTS THAT MEET AT A POINT ARE CONGRUENT



CHORDS

1. CONGRUENT CHORDS FORM CONGRUENT ARCS <u>AND</u> CONGRUENT CENTRAL ANGLES

2. CONGRUENT CHORDS ARE EQUIDISTANT FROM THE CENTER OF THE CIRCLE



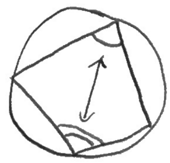
3. A PERPENDICULAR FROM THE CENTER OF THE CIRCLE <u>BISECTS</u> THE CHORD
4. THE PERPENDICULAR BISECTOR OF A CHORD <u>ALWAYS</u> PASSES THRU THE CENTER

ARCS & ANGLES

ARC MEASURE = CENTRAL ANGLE MEASURE

INSCRIBED ANGLE MEASURE IS $\boxed{\text{HALF}}$ THE ARC/CENTRAL ANGLE

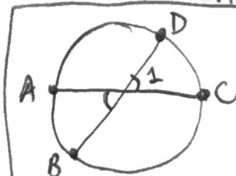
ALL ANGLES INSCRIBED IN A <u>SEMICIRCLE</u> ARE RIGHT ANGLES $\boxed{90°}$



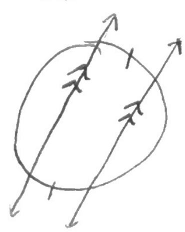
OPPOSITE ANGLES IN A CYCLIC QUAD ARE $\boxed{\text{SUPPLEMENTARY}}$

INSCRIBED ANGLES THAT INTERCEPT THE SAME ARC ARE CONGRUENT

JUST IN CASE!!

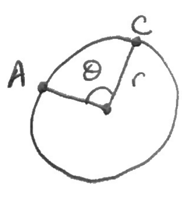


$m\angle 1 = \frac{1}{2}(m\overset{\frown}{AC} + m\overset{\frown}{DC})$



PARALLEL LINES FORM CONGRUENT ARCS

CIRCUMFERENCE/ARC LENGTH



length of $\overset{\frown}{AC} = \frac{\theta}{360}(2\pi r)$

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

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

PROBABILITY

3 TYPES

→ the probability of B given A
→ A is the condition

CONDITIONAL

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

"OR" $\boxed{\text{Add}}$

Inclusive events (can happen simultaneously)

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

Mutually Exclusive events (cannot occur simultaneously)

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

$\boxed{\text{Multiply}}$ "AND"

Independent Events (do not influence each other's probability)

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

Dependent events (one event influences the other)

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

* The sum of all probabilities in a given situation is always 1 or 100%

* Independence and mutual exclusivity are <u>not</u> the same and do not always go together

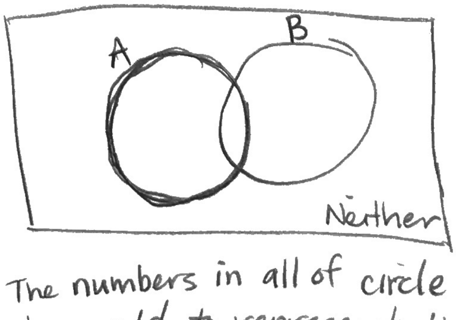
DETERMINING INDEPENDENCE

Check if $P(A \text{ and } B) = P(A) \cdot P(B)$ or $P(B|A) = P(B)$

TWO-WAY TABLES

	OPTION A	OPTION B
OPTION #1		
OPTION #2		

VENN DIAGRAMS



→ The numbers in all of circle A show add to represent the probability of A

→ The number outside the circles represents options that are neither A nor B