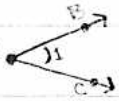
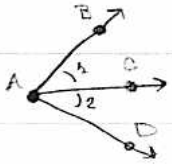
Angles & Measuring Angles

Angle - 

- figure formed by two rays with a common endpoint, ∠BAC, ∠CAB, ∠A or ∠1

vertex - the common endpoint, from above vertex is A.
sides - the rays, from above $\overrightarrow{AB}$ and $\overrightarrow{AC}$

note: when naming angles, vertex must be in the middle.

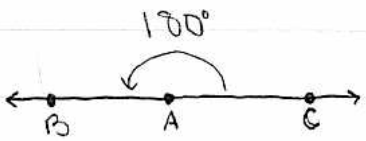
ex 

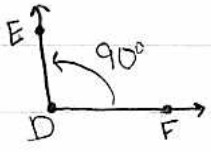
Now I can't write ∠A since I don't know which I mean ∠1 or ∠2
(that is ∠BAC or ∠CAD.)

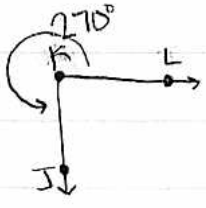
Measuring Angles

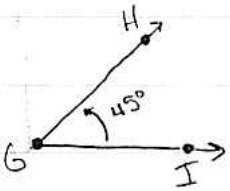
Angles are measured in degrees, denoted °.
An entire circle is 360°.

some common measures





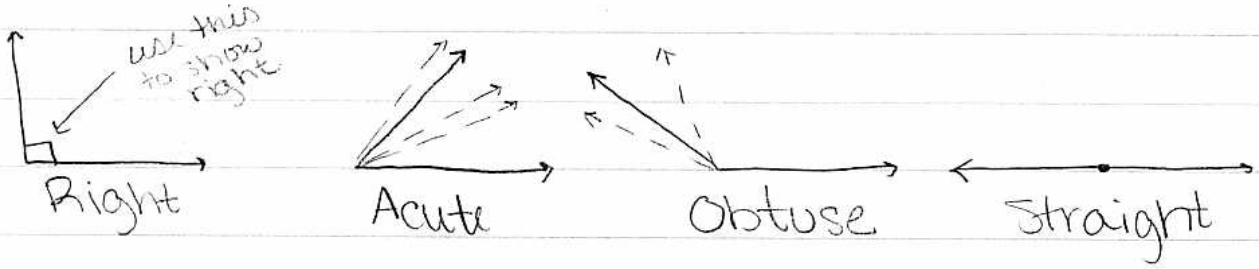




We write $m(\angle BAC) = 180°$, $m(\angle EDF) = 90°$, $m(\angle GHI) = 45°$, $m(\angle JKL) = 270°$

Acute Angle - has measure between 0° and 90°
Right Angle - has measure 90°
Obtuse Angle - has measure between 90° and 180°
Straight Angle - has measure 180°

ex

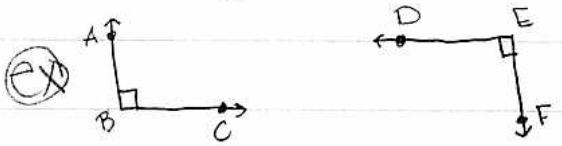


Using a Protractor
Center at vertex, edge along one side.

Do example.

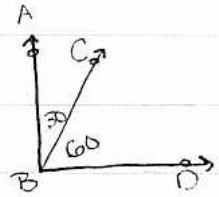
Two angles with the same measure are Congruent, $\angle ABC \cong \angle DEF$

ex



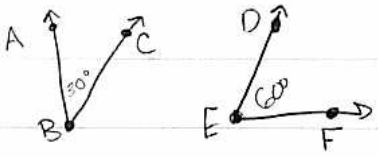
Complementary & Supplementary Angles

Complementary Angles - sum to 90°
Supplementary Angles - sum to 180°

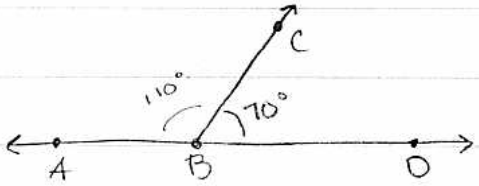
ex 

∠1, ∠2 are complementary
since $m(\angle ABC) + m(\angle CBD) = 30° + 60° = 90°$

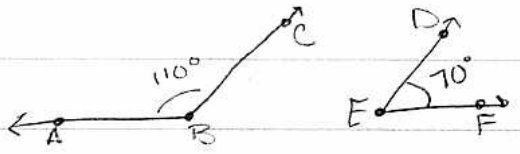
Don't need to be adjacent



$m(\angle ABC) + m(\angle DEF) = 90°$ so complementary.



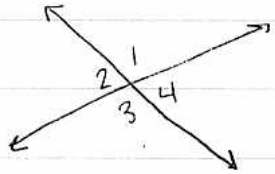
$m(\angle ABC) + m(\angle CBD) = 180°$ so supplementary



Still supplementary.

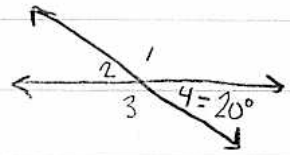
Vertical Angles

When two lines intersect, pairs of nonadjacent angles are <u>Vertical angles</u>

ex 

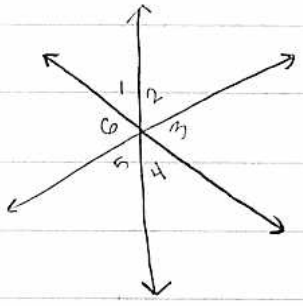
∠1 and ∠3 are vertical angles - "across from each other"
so are ∠2 and ∠4.
(note ∠1 and ∠2 are adjacent - "next to each other")

Vertical Angles always have the same measure
(that is they are congruent)

ex 

∠1 and ∠4 are adjacent and
$m(\angle 1) + m(\angle 4) = 180°$
$m(\angle 1) + 20° = 180°$
so $m(\angle 1) = 160°$
I could do the same for ∠3 ($m(\angle 3) + m(\angle 4) = 180°$, etc.)
or just notice that $m(\angle 3) = m(\angle 1) = 160°$
so $m(\angle 3) = 160°$.

Could have more than 2 lines.

ex 

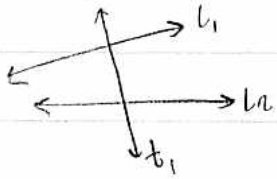
∠1, ∠4 are Vertical
∠2, ∠5
∠3, ∠6

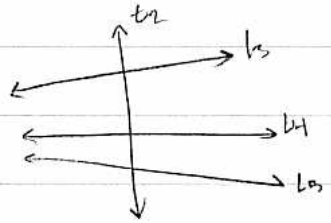
∠1, ∠2 are adjacent.
∠2, ∠3
etc

ex If I told you, from ↑, $m(\angle 1) = x + 12$ and $m(\angle 4) = 4x - 3$
then $x + 12 = 4x - 3$
$15 = 3x \rightarrow x = 5$ so $m(\angle 1) = 17° = m(\angle 4)$

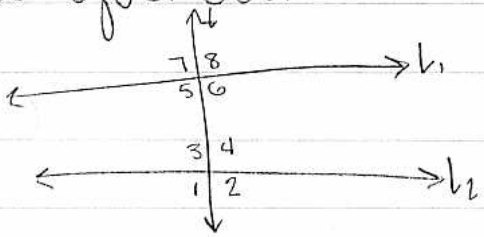
Transversals and Angles

transversal - a line that intersects two or more coplanar lines

ex 

or 

When a transversal cuts 2 lines, 8 angles are formed.



$l_1 \parallel l_2$

Use this to define some terms

corresponding angles - in the same spot on both lines

$\angle 1, \angle 5$ $\angle 2, \angle 6$

$\angle 3, \angle 7$ $\angle 4, \angle 8$

Interior angles - angles between 2 lines

$\angle 3, \angle 4, \angle 5, \angle 6$

Alternate interior angles - opposite lines, opposite sides of traversal "form a Z or S"

$\angle 5, \angle 4$ $\angle 3, \angle 6$

ex