

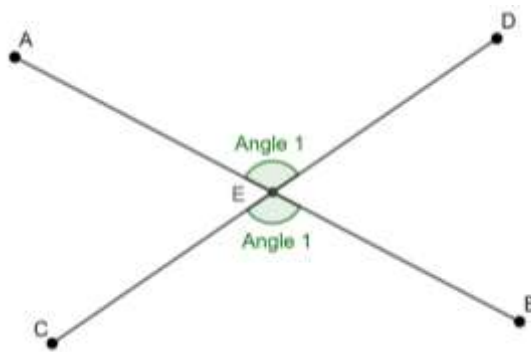
SHARP

Worksheet 12: Geometry of Straight Lines - Memo

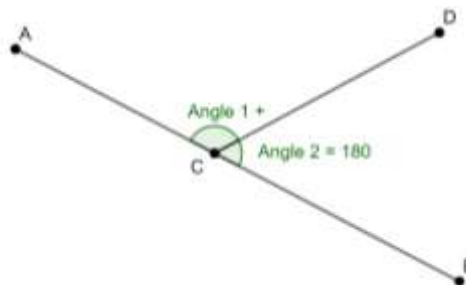
Grade 9 Maths

1. Given a description for how each of these angle relationships work:

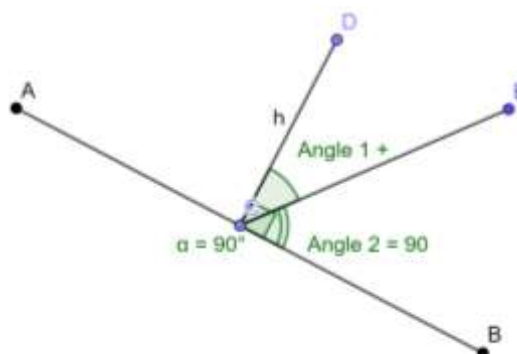
- a) vertically opposite angles - when two lines cross each other, the opposite angles in the cross are equal to each other.



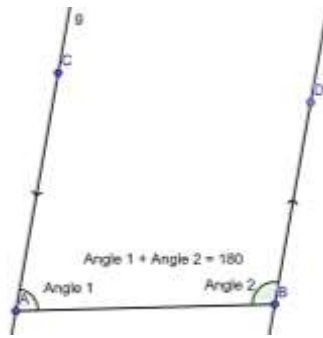
- b) supplementary angles - are angles that add up to 180° , they are found on a straight line.



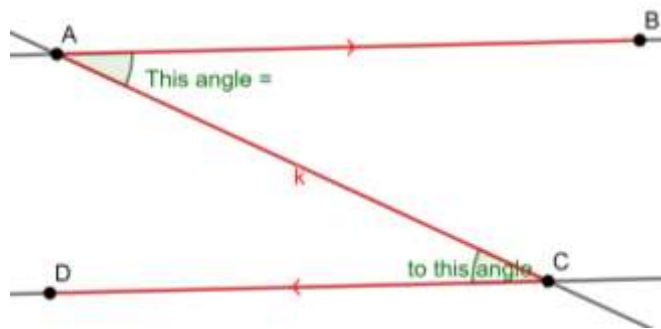
- c) complementary angles - are angles that add up to 90° , they are found in right angles.



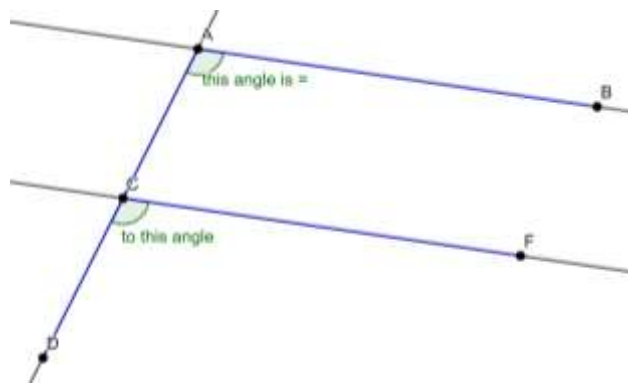
- d) co-interior angles - are angles that add up to 180° . They are between two parallel lines and form a U shape.



- e) alternating angles - are angles that are created by 2 parallel lines and a third line that creates a Z or N shape. These angles are equal to each other.



- f) corresponding angles - are angles that are created by 2 parallel lines and a third line that creates an F shape. These angles are equal to each other.



2. Give the special angle relationships that can result from the following types of lines:

- perpendicular lines - corresponding and supplementary angles
- parallel lines - co-interior, alternating and corresponding angles
- intersecting lines - vertically opposite and supplementary angles.

3. a)

$$\widehat{CGE} = \widehat{DFG}$$

corresponding \angle 's =, $DF \parallel CG$

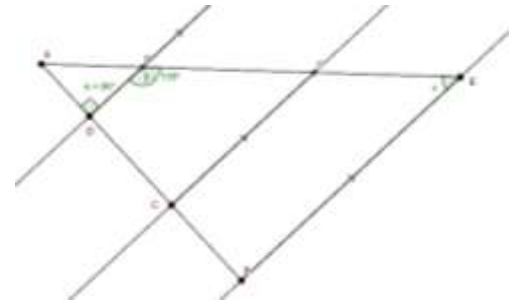
$$\therefore \widehat{CGE} = 135^\circ$$

$$\widehat{CGE} + x = 180^\circ$$

co-interior angles sum to 180° , $BE \parallel CG$

$$\therefore x = 180^\circ - 135^\circ$$

$$\therefore x = 45^\circ$$



b)

$$\widehat{ADC} = \widehat{EAD}$$

alternating angles equal, $EA \parallel DC$

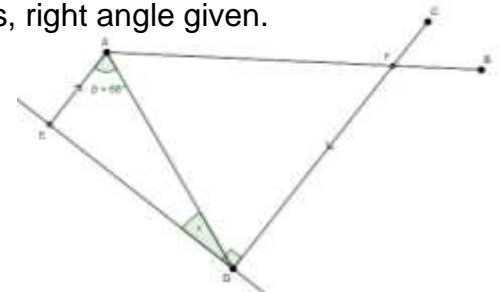
$$\therefore \widehat{ADC} = 68^\circ$$

$$\widehat{ADC} + x = 90^\circ$$

complementary angles, right angle given.

$$\therefore x = 90^\circ - 68^\circ$$

$$\therefore x = 22^\circ$$



c)

$$\widehat{BGD} + 104^\circ = 180^\circ$$

supplementary angles add up to 180°

$$\therefore \widehat{BGD} = 180^\circ - 104^\circ$$

$$\therefore \widehat{BGD} = 76^\circ$$

$$\widehat{BGD} = \widehat{CAG}$$

corresponding angles are equal, $EF \parallel AC$

$$\therefore \widehat{CAG} = 76^\circ$$

$$\text{Now } \widehat{AEC} = \widehat{EAG} + \widehat{BAC}$$

$$\therefore \widehat{AEC} = 33^\circ + 76^\circ = 109^\circ$$

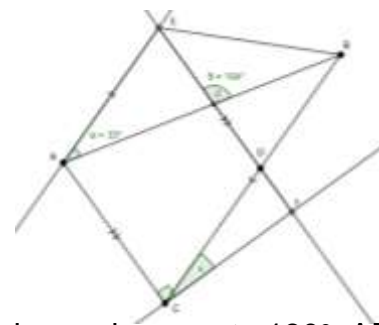
$$\text{Then, } \widehat{AEC} + \widehat{ACD} = 180^\circ$$

co-interior angles sum to 180° , $AE \parallel CB$

$$\therefore 109^\circ + \widehat{ACD} = 180^\circ$$

$$\therefore \widehat{ACD} = 180^\circ - 109^\circ$$

$$\therefore \widehat{ACD} = 71^\circ$$



$$\therefore x = 90^\circ - 71^\circ$$

$$\therefore x = 19^\circ$$

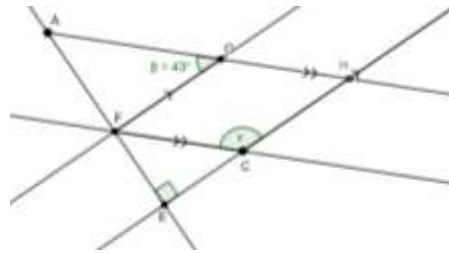
d) $\hat{AGF} = \hat{GHC}$ corresponding angles are equal, $FG \parallel EH$

$$\therefore \hat{GHC} = 43^\circ$$

$\hat{GHC} + x = 180^\circ$ co-interior angles sum to 180° , $FC \parallel GH$

$$\therefore x = 180^\circ - 43^\circ$$

$$\therefore x = 137^\circ$$



4. a) $a = b = 45^\circ$ alternating angles, $AB \parallel CD$

$$\hat{AEC} + c = 180^\circ$$

supplementary angles add to 180°

$$\therefore c = 180^\circ - 74^\circ$$

$$\therefore c = 106^\circ$$

$$\hat{AEB} = c = 106^\circ$$

vertically opposite angles are equal.

$$a + \hat{AEB} + d = 180^\circ$$

sum of angles in $\Delta = 180^\circ$

$$\therefore d = 180^\circ - 45^\circ - 106^\circ$$

$$\therefore d = 29^\circ$$

$$\hat{BED} = \hat{AEC} = 74^\circ$$

vertically opposite angles are equal

$$\hat{BED} + \hat{EDB} + e = 180^\circ$$

sum of angles in $\Delta = 180^\circ$

$$\therefore e = 180^\circ - 74^\circ - 68^\circ$$

$$\therefore e = 38^\circ$$

$$d = f = 29^\circ$$

alternating angles, $AB \parallel CD$

- b) $a + g = 180^\circ$ co-interior angles sum to 180° , $FE \parallel DG$
- $\therefore g = 180^\circ - 51^\circ$
- $\therefore g = 129^\circ$
- $h + g = 180^\circ$ co-interior angles sum to 180° , $ED \parallel CF$
- $h = 180^\circ - 129^\circ$
- $h = 51^\circ$
- $h = i = 51^\circ$ alternating angles equal, $EF \parallel DG$
- $i = j = 51^\circ$ vertically opposite angles equal.
- $H\hat{D}C + j + k = 180^\circ$ sum of angles in $\Delta = 180^\circ$
- $k = 180^\circ - 77^\circ - 51^\circ$
- $k = 52^\circ$
-
- c) $\beta = m = 37^\circ$ corresponding angles are equal, $BC \parallel DE$
- $90^\circ + m + n = 180^\circ$ sum of angles in $\Delta = 180^\circ$
- $n = 180^\circ - 90^\circ - 37^\circ$
- $n = 53^\circ$
- $n + p = 180^\circ$ supplementary angles sum to 180°
- $\therefore p = 180^\circ - 53^\circ$
- $\therefore p = 127^\circ$
- $n = q = 53^\circ$ corresponding angles are equal, $BC \parallel DE$
-
- d) $r + 90^\circ + 60^\circ = 180^\circ$ sum of angles in $\Delta = 180^\circ$
- $r = 180^\circ - 90^\circ - 60^\circ$
- $r = 30^\circ$
- $r = s = 30^\circ$ alternating angles equal, $AC \parallel DE$
- $s + t + 90^\circ = 180^\circ$ supplementary angles sum to 180°

$$t = 180^\circ - 90^\circ - 30^\circ$$

$$t = 60^\circ$$

$$\beta + t + u = 180^\circ$$

sum of angles in $\Delta = 180^\circ$

$$\therefore u = 180^\circ - 60^\circ - 60^\circ$$

$$\therefore u = 60^\circ$$

$$u + v = 180^\circ$$

supplementary angles sum to 180°

$$\therefore v = 180^\circ - 60^\circ$$

$$\therefore v = 120^\circ$$

$$v + w + s = 180^\circ$$

sum of angles in $\Delta = 180^\circ$

$$w = 180^\circ - 120^\circ - 30^\circ$$

$$\therefore w = 30^\circ$$

e) $a = x = 63^\circ$ corresponding angles equal, $AB \parallel DI$

$a = y = 63^\circ$ alternating angles equal, $EH \parallel AF$

$y + z + \delta = 180^\circ$ supplementary angles sum to 180°

$$\therefore z = 180^\circ - 63^\circ - 40^\circ$$

$$\therefore z = 77^\circ$$