SHARP

Worksheet 11 Memo – Euclidian geometry

Grade 10 Mathematics

1. a) True b) True.

c) False. A trapezium only has one set of opposite sides parallel and the opposite sides are not equal in length.

d) False. A rectangle does not have all four sides equal but a square does.

e) True. A square has all four sides equal and opposite angles are equal, opposite sides are parallel, which is the description of a rhombus.

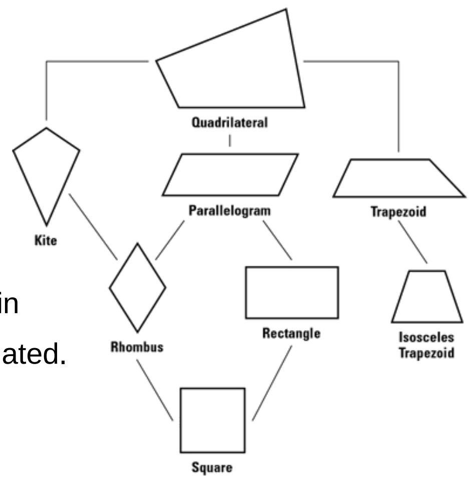
f) True. (Only FALSE if your definition of a kite includes the fact that pairs of adjacent sides cannot be equal to each other)

g) False. A rhombus cannot be a square because the interior angles in a rhombus are not equal to $90°$.

h) True.

i) False. A rectangle has all angles at $90°$ and this is not true for all parallelograms.

j) True.



This is a summary to assist in remembering how quads are related.

2. a) $360° - 243.43° = 116.57°$ Angles around a point = $360°$

b) $B\hat{A}C = A\hat{C}D$ Alternate <'s = $(AB \parallel CD)$

$A\hat{B}C = A\hat{D}C = 116.57°$ Calculated in question 2a)

AC is common

$\therefore\ \Delta ABC \equiv \Delta ACD$ AAS (angle, angle, side)

c) $B\hat{C}D = 180° - A\hat{B}C$ — Co-interior angles $= 180°$ $(AB \parallel CD)$

$B\hat{C}D = 180° - 116.57°$

$B\hat{C}D = 63.43°$

$B\hat{A}D = 180° - A\hat{D}C$ — Co-interior angles $= 180°$ $(AB \parallel CD)$

$B\hat{A}D = 180° - 116.57°$

$B\hat{A}D = 63.43°$

$B\hat{A}D + A\hat{B}C = 63.43° + 116.57° = 180°$

Since $B\hat{A}D + A\hat{B}C = 180°$ this means that co-interior angles $= 180°$

$\therefore BC \parallel AD$ So QUAD ABCD is a parallelogram.

3. a) Rectangle b) Rhombus
c) Trapezium d) Square
e) Parallelogram

4. a) $\hat{C}2 = 66°$ — Alternate angles are =

b) $\hat{C}1 = 180° - 66° = 114°$ — Angles in a straight line $= 180°$

c) $\hat{C}1 = \hat{A}1 = 114°$ — Corresponding angles are =

$\hat{A}1 = \hat{A}4 = 114°$ — Vertically opposite angles are =

5. a) $\hat{H}3 = \hat{D}2 = 61°$ — Corresponding angles are =

b) $\hat{D}3 = 180° - \hat{D}2$ — Angles in a straight line $= 180°$

$\hat{D}3 = 180° - 61° = 119°$

c) $\hat{D}4 = \hat{D}2 = 61°$ — Vertically opposite angles are =

d) $\hat{E}3 = 180° - \hat{E}2$ — Angles in a straight line $= 180°$

$\hat{E}3 = 180° - 106° = 74°$

e) $\hat{E}3 = \hat{H}1 = 74°$ — Alternate angles are =

$180° = \hat{H}1 + \hat{H}2 + \hat{H}3$ — Angles in a straight line $= 180°$

$180° = 74° + \hat{H}2 + 61°$

$\hat{H}2 = 45°$

	f)	$\hat{D}1 = 180° - 61°$	Angles in a straight line = 180°
		$\hat{D}1 = 119°$	
		$\hat{M}1 = \hat{D}1 = 119°$	Corresponding angles are =
	g)	$\hat{M}2 = \hat{D}2 = 61°$	Corresponding angles are =
	h)	$\hat{H}6 = 180° - \hat{M}1$	Co-interior angles = 180°
		$\hat{H}6 = 180° - 119° = 61°$	
	i)	$\hat{H}5 = \hat{H}2 = 45°$	Vertically opposite angles are =
	j)	$\hat{H}4 = 180° - \hat{H}2 - \hat{H}3$	Angles in a straight line = 180°
		$\hat{H}4 = 180° - 45° - 61°$	
		$\hat{H}4 = 74°$	
		$\hat{G}4 = \hat{K}2 = 90°$	Alternate angles are =
		$\hat{K}1 = 180° - 90° - 74°$	Interior angles of a $\Delta = 180°$
		$\hat{K}1 = 180° - (164°)$	
		$\hat{K}1 = 16°$	
6.	a)	$A\hat{D}E = P\hat{A}D = 53°$	Alternate angles are =
	b)	$A\hat{B}E = 180° - A\hat{B}E$	Co-interior angles = 180°
		$A\hat{B}E = 180° - 104°$	
		$A\hat{B}E = 76°$	
	c)	$C\hat{B}X = A\hat{B}E = 76°$	Vertically opposite angles are =
	d)	$E\hat{F}Y = 180° - E\hat{F}C$	Angles in a straight line = 180°
		$E\hat{F}Y = 180° - 149°$	
		$E\hat{F}Y = 31°$	
	e)	$B\hat{C}F = 31° = E\hat{F}Y$	Corresponding angles are =
	f)	$C\hat{B}E = 180° - A\hat{B}E$	Angles in a straight line = 180°
		$C\hat{B}E = 180° - 76°$	
		$C\hat{B}E = 104°$	

g) $B\hat{C}F = 31$ Answer to question 6. e)

$C\hat{B}E = 104°$ Answer to question 6. f)

$31° + 104° \neq 180°$

This is because the lines XY and YZ are not parallel so the two angles are not co-interior.

7. a) $D\hat{A}B = 180° - 65°$ Co-interior angles $= 180°$

$D\hat{A}B = 115°$

b) $180° = D\hat{A}B + x + (2x + 5)$ Angles in a straight line $= 180°$

$180° = 115° + x + 2x + 5$

$180° - 120° = 3x$

$60° = 3x$

$x = 20°$

c) $180° = x + \hat{F} + \hat{B}$ Interior angles of a $\Delta = 180°$

$180° = 20° + \hat{F} + \hat{B}$

$180° - 20° = \hat{F} + \hat{B}$

$160° = 2\hat{F}$ $\hat{F} = \hat{B}$ given

$80° = \hat{F}$

d) ΔABF is an isosceles triangle, due to the fact that $\hat{F} = \hat{B}$.

e) $QUAD\ ABCD$ is a parallelogram because $AD \parallel BC$ $because\ \hat{D} + \hat{A} = 180°$ and $AB \parallel CD$ $because\ \hat{C} + \hat{B} = 180°$.

8. a) $a = \frac{90°}{2}$ Angles in a square are bisected by diagonals, angles $= 90°$

$a = 45°$

b) $b = 90°$ Angle between diagonals in a square $= 90°$

c) $BQ = BR = 2{,}7\ cm$ Diagonals bisect each other ∴ same length

$c^2 = (BQ)^2 + (BR)^2$ Pythagoras

$c^2 = 2.7^2 + 2.7^2$

$c^2 = 7.29 + 7.29$

$c^2 = 14.58$

c = 3.82 cm

d) $180° - 45° = d$ Angles in a straight line = 180°

$d = 135°$

9. a) $y = z + 2$ $A\hat{B}C = 180° - 92° = 88°$ ∠'s on str line = 180°

$y = 3 + 2 = 5$ $D\hat{B}E = 180° - 92° = 88°$ ∠'s on str line = 180°

$x = 2y$ $\hat{C} = \hat{E}$ Alternate ∠'s =

$x = 2(5) = 10$ $\hat{A} = \hat{D}$ Alternate ∠'s =

$p = \frac{2yz}{3}$

$p = \frac{2(5)(3)}{3} = 10$ $\therefore \Delta ABC \equiv \Delta BDE \ (AAS)$

$x = p = 10$ AAS = angle, angle, side