U7D2_T Angle relationships in Quadrilaterals

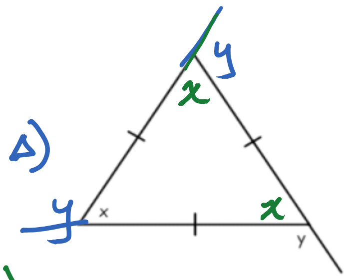
Tuesday, May 1, 2018 1:13 PM

U7D2_T
Angle rela...

U7D2 MPM1DI

Warm Up:

Determine the value of x and y.



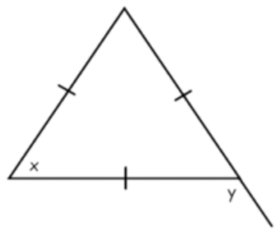
$3x = 180°$ (ASTT, equilateral Δ)
$x = 60°$

$3y = 360°$ (PEAST, equilateral Δ)
$y = 120°$

OR

$y = 180° - 60°$ (SA)
$y = 120°$

SOLUTION:



x = 180° (ASTT, equilateral triangle)
x = 60°

3y = 360° (PEAST, equilateral triangle)
y = 120°

7.2 Angle Relationships in Quadrilaterals

***Common Terms*:**

Adjacent: adjoining or next to or beside

~~Complementary: two angles that sum to 90°~~

~~Supplementary: two angles that sum to 180°~~

Transversal: A line that cuts through or intersects with two parallel lines

Obtuse Angle: an angle ~~greater than~~ between 90° and 180°

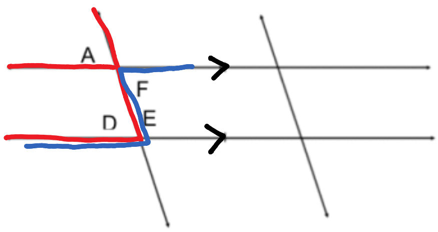
Acute Angle: an angle less than 90°

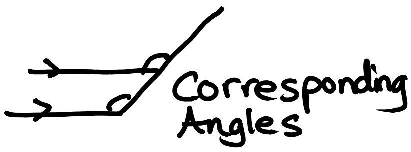
Acronyms for Justification

T.P.T. - C.A. – Transversal Parallel Line Theorem-
Corresponding Angles are equal
(F-pattern) e.g., A = D (TPT-CA)

T.P.T. - A.A. – Transversal Parallel Line Theorem –
Alternate Angles are equal
(Z- Pattern) e.g., D = F (TPT – AA)

T.P.T. - C.I.A. – Transversal Parallel Line Theorem – Co-Interior Angles are supplementary
(C-Pattern) e.g., E + F = 180°

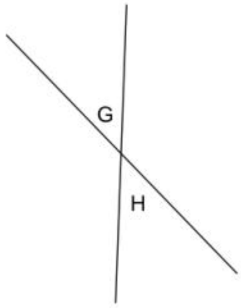




Note: Arrows on lines indicate lines are parallel… if there are no arrows, you may not assume lines are parallel.

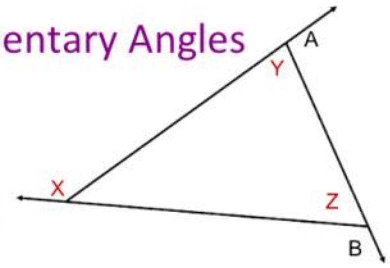
O.A.T. - Opposite Angle Theorem

e.g., G = H (OAT)



From last day:

S.A. – Straight Angle or Supplementary Angles
e.g., Y + A = 180°



E.A.T. – Exterior Angle Theorem
e.g., Y + Z = X

P.E.A.S.T – Polygon Exterior Angle Sum Theorem
e.g., A + B + X = 360°

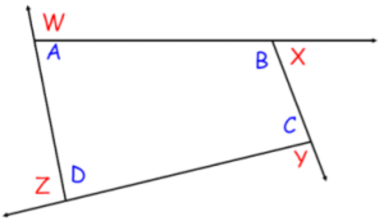
QUADRILATERAL: A polygon with 4 sides.

Summary:

1. The sum of the **interior** angles of a quadrilateral is __360_____ degrees.

A.S.Q.T. – Angle Sum Quadrilateral Theorem

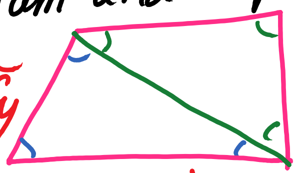
E.g., A+B+C+D = 360°



2. The sum of the **exterior** angles of a quadrilateral is __360_____ degrees.

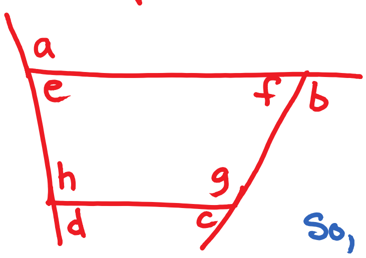
P.E.A.S.T – Polygon Exterior Angle Sum Theorem

* You can verify those theorems using a diagram and a protractor (or geogebra)



2 triangles inside quadrilateral & both with a total of 180° ∴ sum of angles inside quadrilateral is 360°

OR you can verify them using algebraic techniques and reasoning.



$a+e=180°$
$b+f=180°$
$c+g=180°$
$d+h=180°$

So, $a+b+c+d+e+f+g+h = 4 \times 180° = 720°$

since $e+f+g+h=360°$,
$a+b+c+d+360°=720°$
$a+b+c+d=360°$

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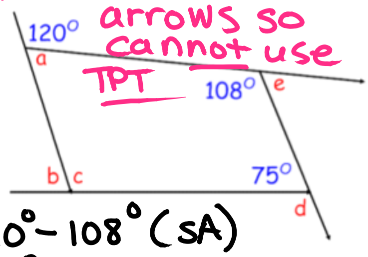
Examples:

1. Find each of the unknown angles:



*no lines have arrows so cannot use TPT

$a = 60°$ (SA)

$c = 360° - (60° + 108° + 75°)$

$c = 117°$ (ASQT)

$d = 180° - 75°$ (SA)

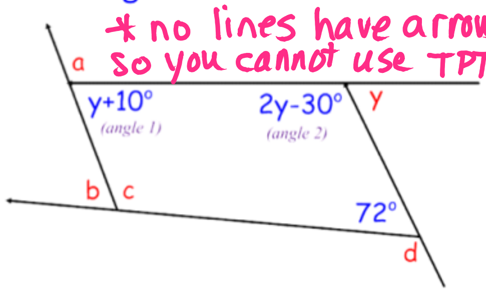
$d = 105°$

$e = 180° - 108°$ (SA)

$e = 72°$

$b = 180° - 117°$ (SA) $\boxed{b = 63°}$ OR you can use PEAST to find b

2. Find the measure of each unknown angle:



*no lines have arrows so you cannot use TPT.

Steps:

1. Calculate y:

$y + 2y - 30 = 180$ (S.A.)

$3y - 30 = 180$

$3y = 210$

$\boxed{y = 70°}$

2. Calculate interior angles:

angle 1: $70° + 10°$

$= 80°$

angle 2: $2(70°) - 30°$

$= 110°$

3. Calculate exterior angles:

$d = 180° - 72°$ (SA)

$d = 108°$

$a = 180° - 80°$ (SA)

$a = 100°$

$c = 360° - (80° + 110° + 72°)$ (ASQT)

$c = 360° - 262°$

$c = 98°$

$b = 180° - 98°$ (SA)

$b = 82°$

U7D2 HW: Pages 381 – 383 # 1-7, 9-13, 16, 18

OR

you could use PEAST to solve for b, if you prefer to.