Determine the value of x and y.

$180 \div 3 = 60$

$180 - 60 = 120$

$60°$

A.S.T.T

$x \, 60°$

y

$120°$

S.A.T.
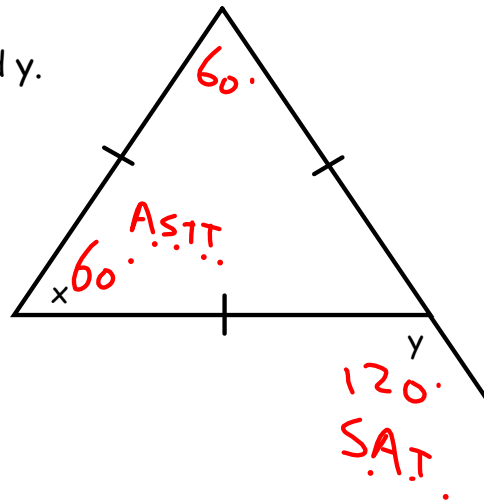
MPM 1DI Unit 6
Geometric Relationships

7.2 Angle Relationships in Quadrilaterals

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Common Terms:

Adjacent: adjoining or next to

Complementary: adding to 90 degrees

Supplementary: adding to 180 degrees

Transversal: a line intersecting two parallel lines

Obtuse Angle: angle greater than 90 degrees

Acute Angle: angle less than 90 degrees

Acronyms for Justification

T.P.T. - C.A. - Transversal Parallel Line Theorem
Corresponding Angles (F-pattern)

T.P.T. - A.A. - Alternate Angles
(Z-pattern)

T.P.T. - C.I.A. - Co-interior Angles (C-pattern)
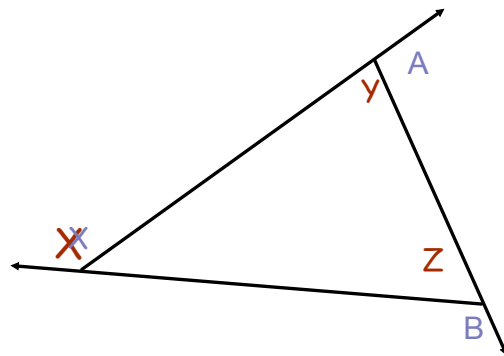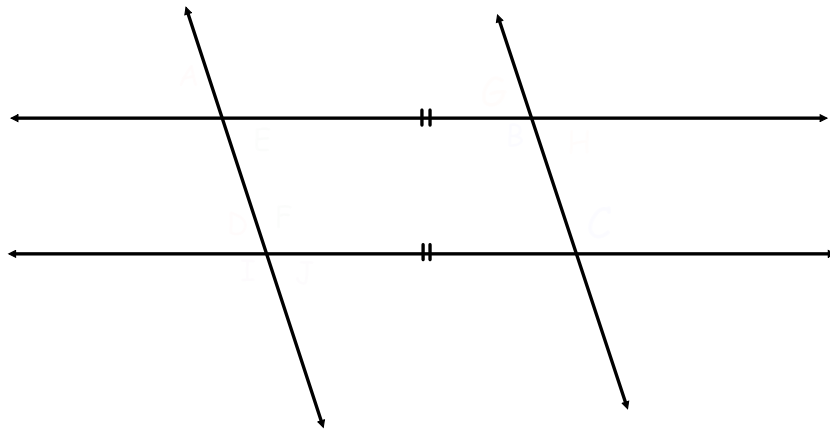
e.g. E + F = 180°   (T.P.T - C.I.A.)

O.A.T. - Opposite Angle Theorem

S.A.T. - Supplementary Angles Theorem

E.A.T. - Exterior Angle Theorem

e.g.   X = Y+Z   (E.A.T.)

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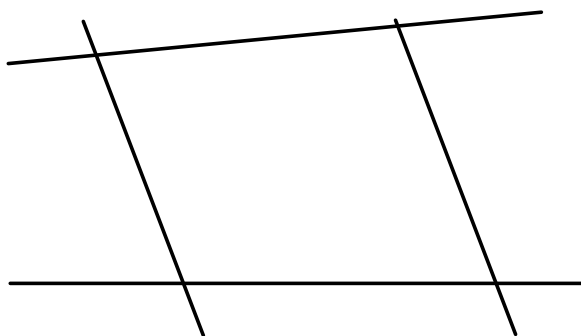Theorem

e.g.   360 = X+A+B   (P.E.A.S.T.)

A.S.Q.T. - Angle Sum Quadrilateral Theorem
(Or you may just say ...
sum of interior angles of quadrilateral)

A

y

X

Z

B

QUADRILATERAL:

Triangle.gsp

1. Draw a large quadrilateral (label vertices).
2. Measure the interior angles.
3. Find the sum of the interior angles
4. Draw a line between two non-adjacent vertices (this is called a diagonal).
5. Notice we have created two triangles inside our quadrilateral.
6. Measure and label the 4 exterior angles, then find their sum.

Summary:

1. The sum of the interior angles of a quadrilateral is 360 degrees.

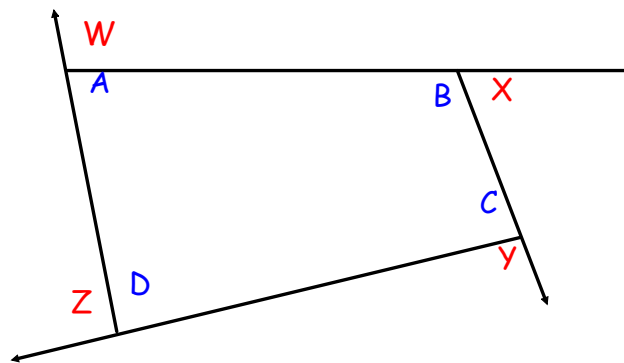   A.S.Q.T. - Angle Sum Quadrilateral Theorem
   (Or you may just say ...
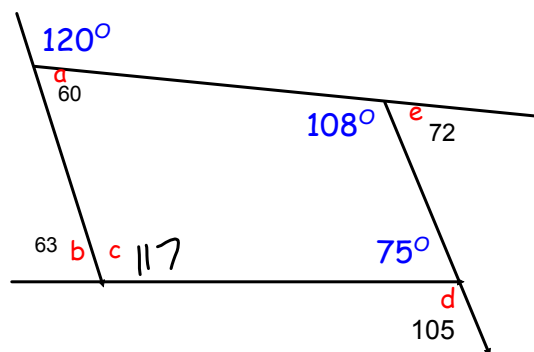   sum of interior angles of quadrilateral)

   A+B+C+D = 360°

2. The sum of the exterior angles of a quadrilateral is 360 degrees. (P.E.A.S.T)

   W+X+Y+Z = 360°

W

A

B   X

C

Y

Z   D

Examples:
1. Find each of the unknown angles:

120°
a
60

108°   e
72

63 b c 117

75°

d
105

a   = 180° - 120° (Supp)
     = 60°

$\angle e = 180° - 108°$ (supplementary angles)

   $= 72°$

$\angle d = 180° - 75°$ (supplementary angles)

   $= 105°$

$\angle c = 360° - 60° - 108° - 75°$ (sum of interior angles of quadrilateral)

   $= 117°$

$\angle b = 180° - 117°$ (supplementary angles)

   $= 63°$

2. Find the measure of each unknown angle:

a
80
y+10°
(angle 1)
2y-30°
(angle 2)
110
y
70
b c
72°
d
108
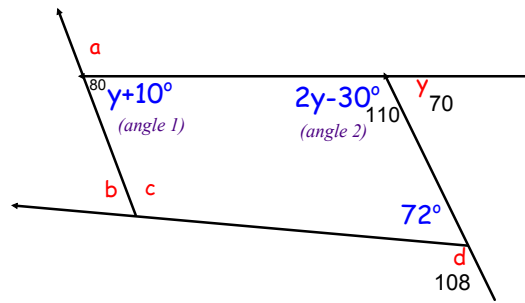
Steps:
1. Calculate y:

$$y + 2y - 30 = 180° \text{(Supp)}$$
$$3y = 210°$$
$$y = 70°$$

2. Calculate interior angles:

$angle\ 1 = y + 10$ $angle\ 2 = 2y - 30$ $angle\ c = 360 - 110 - 80 - 72$
$= 80°$ $= 110°$ $= 98°$

3. Calculate exterior angles:

$angle\ a = 180 - 80$ $angle\ d = 180 - 72$ $angle\ b = 180 - 98$
$= 100°$ $= 108°$ $= 82°$

Today's Practice Questions:

pg. 381 # 1 - 7, 9 - 13, 16, 18

Attachments

Triangle.gsp