

What's Going On?

Checking In

Minds on

LGL

Action!

Investigation

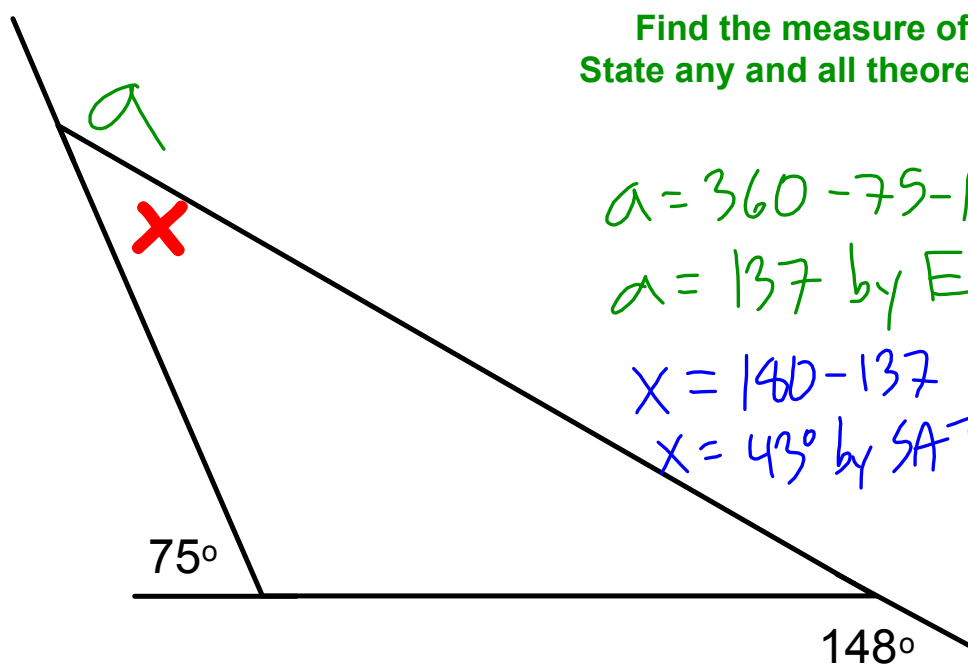
Consolidation

Exit Question

Learning Goal - I will explore and discover angle relationships in quadrilaterals and will be able to problem solve with them.

Minds on

L.G.L.



Find the measure of angle x.
State any and all theorems you use.

$$a = 360 - 75 - 148$$

$$a = 137 \text{ by EAT}$$

$$x = 180 - 137$$

$$x = 43^\circ \text{ by SAT}$$

Unit 5: Geometric Relationships

Topic #2

Angle Relationships in Quadrilaterals

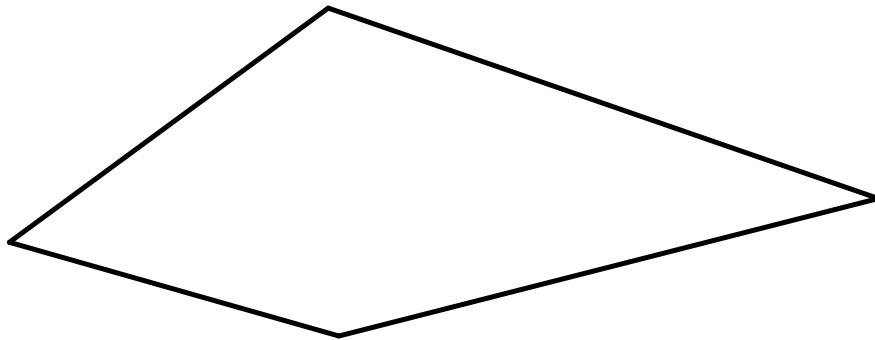
Learning Goal - I will explore and discover angle relationships in quadrilaterals and will be able to problem solve with them.

Action!

iPad Investigation

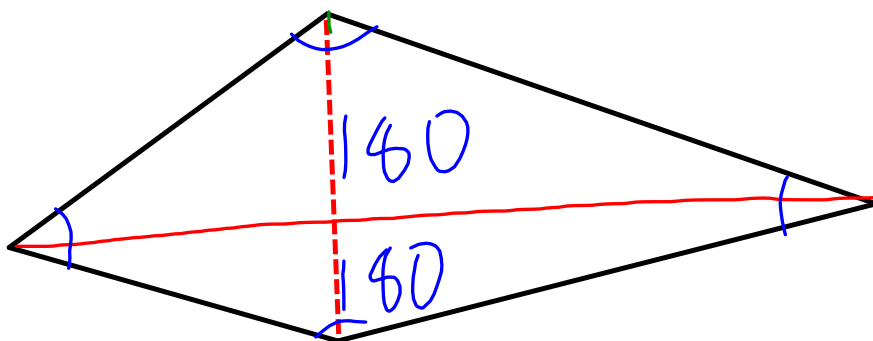
Action!

Angle Investigation



Action!

Angle Investigation



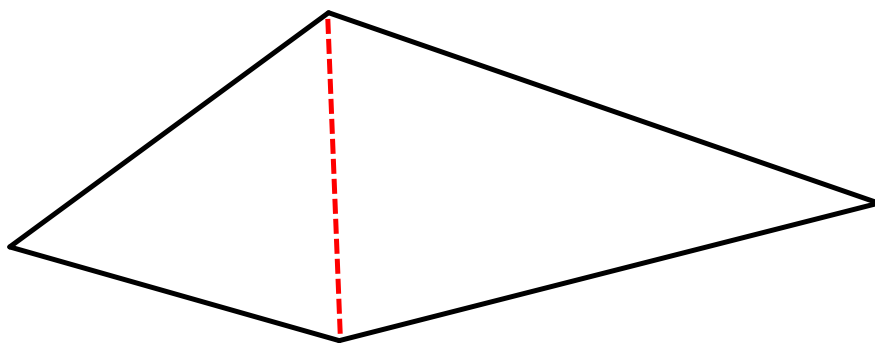
Any quadrilateral can be cut into **two triangles**

The sum of the angles in a triangle is 180°.

Therefore the sum of the angles in a quadrilateral is
 $2 \times 180^\circ = 360^\circ$

Action!

Angle Investigation

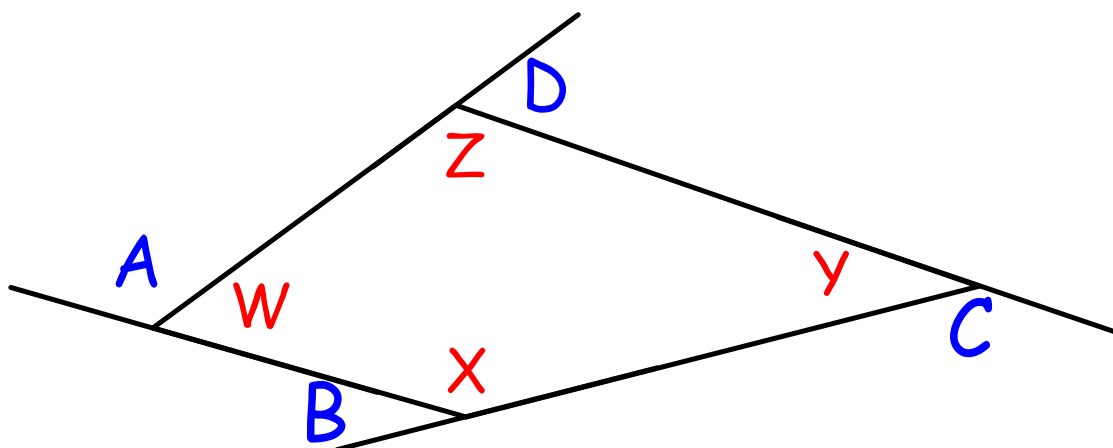


Theorem

The sum of the interior angles of a quadrilateral is always 360° .

Action!

What About the Exterior Angles?



W, X, Y and Z are the **interior** angles of this quadrilateral.
A, B, C and D are the **exterior** angles of this quadrilateral.

Action!

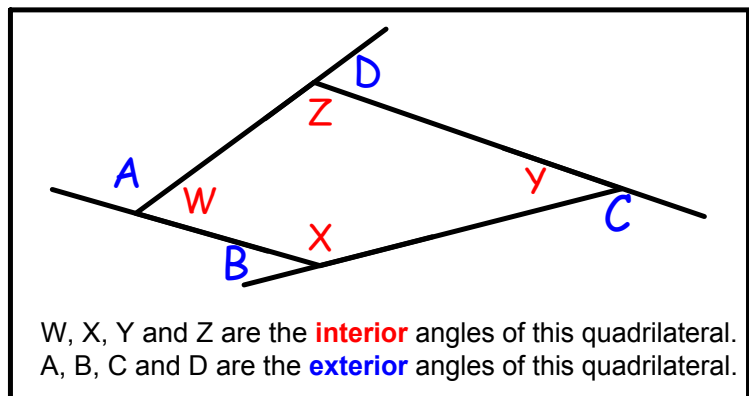
We know that

$$A + W = 180^\circ \text{ BY SAT}$$

$$B + X = 180^\circ \text{ BY SAT}$$

$$C + Y = 180^\circ \text{ BY SAT}$$

$$D + Z = 180^\circ \text{ BY SAT}$$



$$\text{So: } A + W + B + X + C + Y + D + Z = 720^\circ. \quad (1)$$

We also know that

$$W + X + Y + Z = 360^\circ \text{ (the interior angles of a quadrilateral sum to } 360^\circ)$$

If we remove W, X, Y and Z from (1) we are left with A, B, C and D on the left and just 360° on the right!

$$\text{Therefore } A + B + C + D = 360^\circ$$

Action!

The Exterior Angle Theorem (EAT)

The sum of the exterior angles
of a quadrilateral is 360° .

HUH?
But Mr. Gilbert, last
week you said...

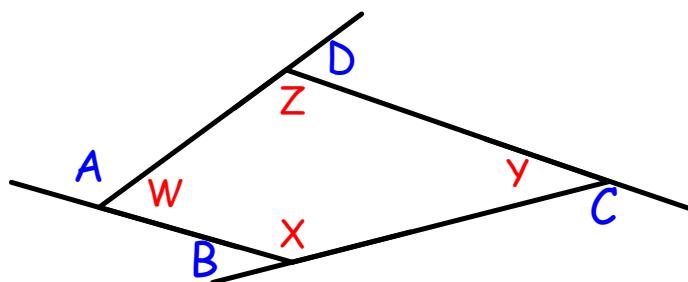
The Exterior Angle Theorem (EAT)

The sum of the exterior angles of a
triangle is always 360° .

BOTH!!
WHICH IS IT?!?!?!?!?

Action!

The Exterior Angle Theorem (EAT)



$$A + B + C + D = 360^\circ$$

The sum of the exterior angles of a triangle OR a quadrilateral is 360° .

Action!

Let's Get Parallel!



a and d are adjacent angles

a and b are adjacent angles

a and c are opposite angles

b and d are opposite angles

Supplementary

What other angles are adjacent?

Action!

Let's Get Parallel!



Adjacent angles are adjoining, or next to one another.

Opposite angles in a parallelogram are supplementary.

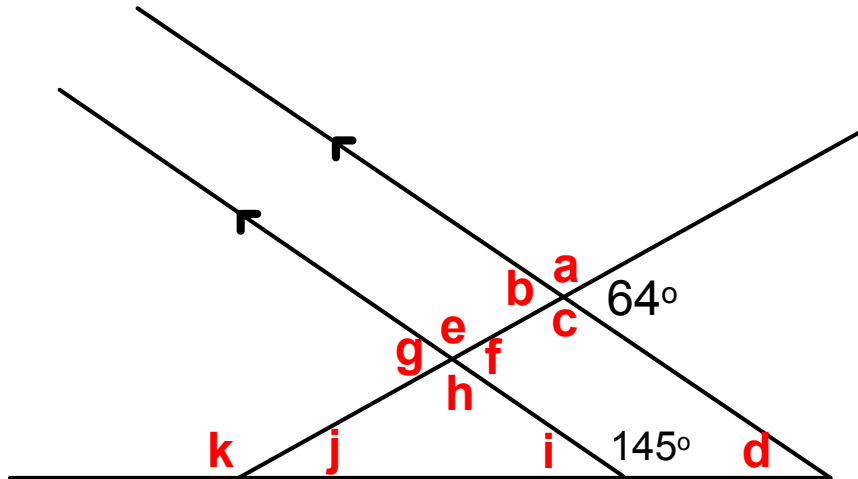
Adjacent angles in a parallelogram are the same.

Supplementary angles sum to 180° .

Consolidation

Exit Question

Determine the measure of each angle AND identify what property or THEOREM you used!



$$a = 180 - 64$$

$$a = 116^\circ \text{ by SAT}$$

$$b = 64^\circ \text{ by opposite angles with } 64^\circ$$

$$c = 116^\circ \text{ by opposite with } a$$

$$d = 180 - 145$$

$$d = 35^\circ \text{ by co-interior}$$

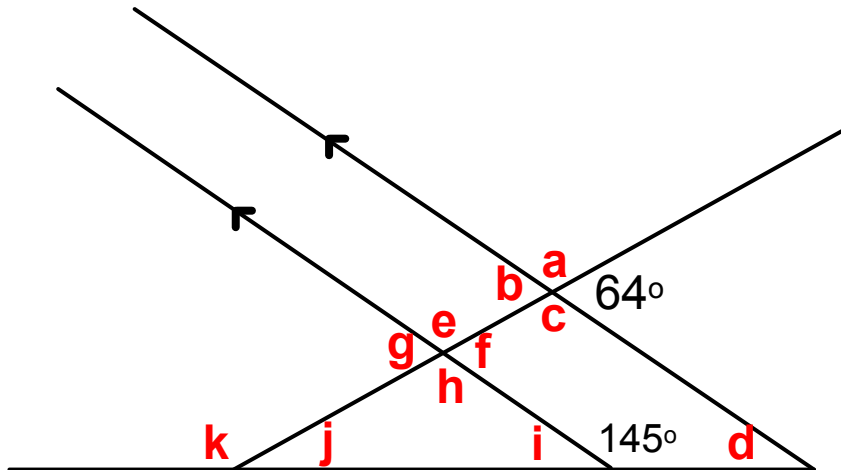
$$e = 180 - 64$$

$$e = 116^\circ \text{ by co-interior with } b$$

Consolidation

Exit Question

Determine the measure of each angle AND identify what property or THEOREM you used!



$$f = 64^\circ \text{ by corresponding with } 64^\circ$$

$$g = 64^\circ \text{ by opposite with } f$$

$$h = 116^\circ \text{ by opposite with } e$$

$$\therefore = 180 - 145$$

$$i = 35^\circ \text{ by SAT with } 145$$

$$j = 180 - 35 - 116$$

$$j = 29^\circ \text{ by IAT with } h \text{ \& } i$$

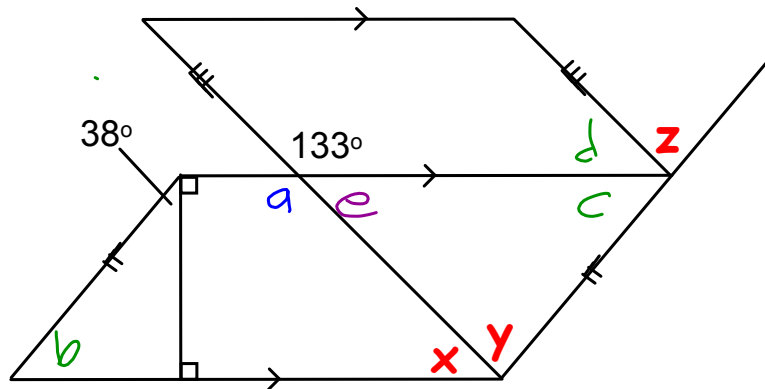
$$k = 180 - 29$$

$$k = 151^\circ \text{ by SAT with } j$$

Consolidation

Exit Question

Determine the measures of angles x , y and z .
Justify! (show and explain your work)



$$a = 133^\circ \text{ by opposite angles}$$

$$x = 360 - 90 - 90 - 133$$

$$x = 47^\circ \text{ by IAT for quadrilaterals}$$

$$b = 180 - 90 - 38$$

$$b = 52^\circ \text{ by IAT}$$

$$c = 52^\circ \text{ by opposite angles in parallelogram}$$

$$d = 180 - 133$$

$$d = 47^\circ \text{ by adjacent angles in parallelogram}$$

$$z = 180 - 52 - 47$$

$$z = 81^\circ \text{ by SAT with } c \text{ and } d$$

$$e = 180 - 133$$

$$e = 47^\circ \text{ by SAT}$$

$$y = 180 - 47 - 52$$

$$y = 81^\circ \text{ by IAT}$$

Consolidation**Exit Question**

Determine the measures of angles x , y and z .
Justify! (**show and explain your work**)

