

Warm Up

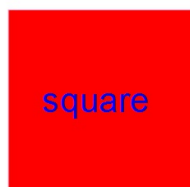
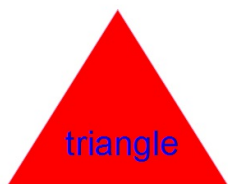
Compass Learning 15 minutes

Check your answers for the homework with your table group.

A polygon is a closed figure with a least three sides.

A regular polygon is polygon with all of its sides congruent and all of its angles congruent.

Four regular polygons are:



You can classify polygons using the number of sides:

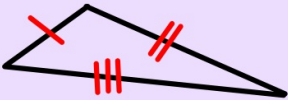
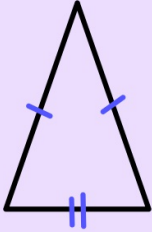
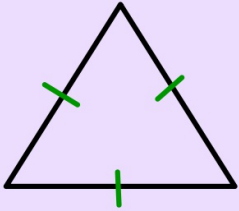
Triangle	3
Quadrilateral	4
Pentagon	5
Hexagon	6
Heptagon	7
Octagon	8
Nonagon	9
Decagon	10

There are 2 ways to classify triangles:

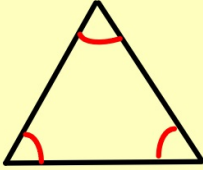
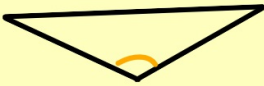
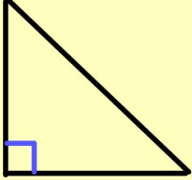
1) By their angles

2) By their sides

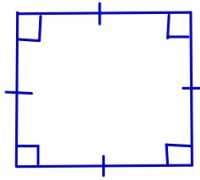
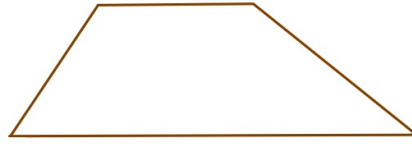
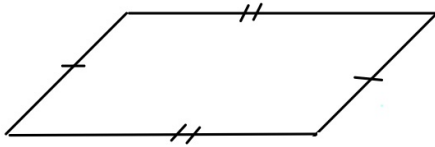
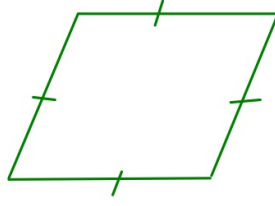
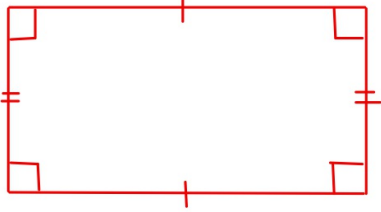
Sides

Scalene Triangle	All sides are different lengths.	 A scalene triangle with three different side lengths. The top-left side has one red tick mark, the top-right side has two red tick marks, and the bottom side has three red tick marks.
Isosceles Triangle	Has 2 congruent sides.	 An isosceles triangle with two congruent sides. The two slanted sides each have one blue tick mark, and the bottom side has two blue tick marks.
Equilateral Triangle	Has 3 congruent sides.	 An equilateral triangle with three congruent sides. Each of the three sides has one green tick mark.

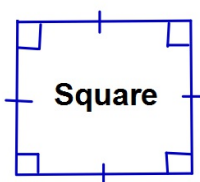
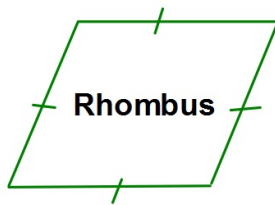
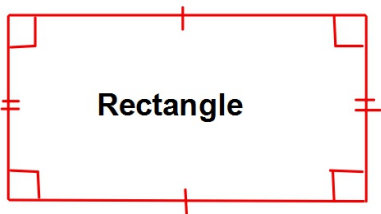
Angles

Acute Triangle	Has 3 acute angles.	 An acute triangle with three acute angles. Each of the three interior angles is marked with a red arc.
Obtuse Triangle	Has 1 obtuse angle.	 An obtuse triangle with one obtuse angle. The obtuse angle at the bottom is marked with an orange arc.
Right Triangle	Has 1 right angle.	 A right triangle with one right angle. The right angle at the bottom-left corner is marked with a blue square symbol.

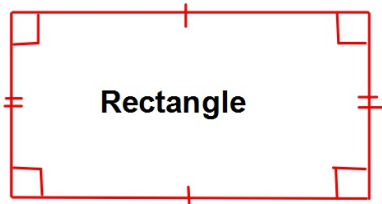
QUADRILATERALS



QUADRILATERALS

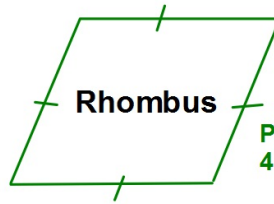


QUADRILATERALS



Rectangle

Parallelogram with 4 right angles.



Rhombus

Parallelogram with 4 congruent sides.



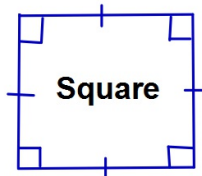
Parallelogram

Opposite sides parallel and congruent.
Opposite angles congruent.



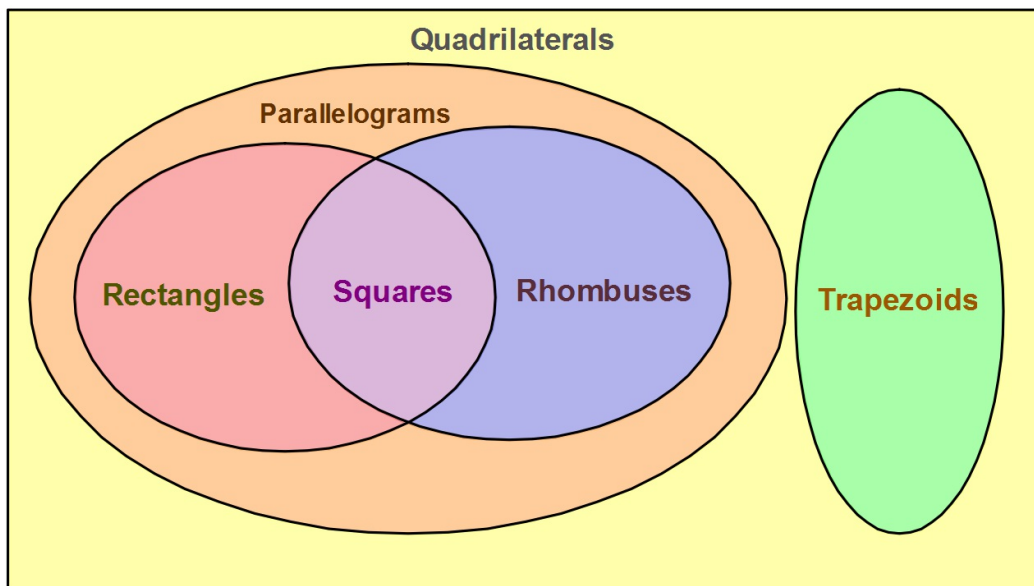
Trapezoid

Quadrilateral with exactly 2 parallel sides.



Square

Rectangle with 4 congruent sides.



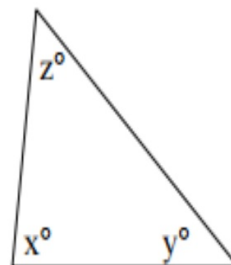
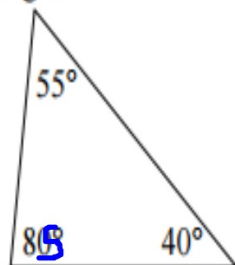
Add a notecard!

Triangle Sum Theorem

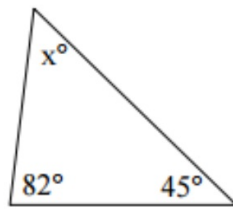
***All the angles in a triangle always add to 180°**

Triangle Sum Theorem

Preliminary Information: The measures of the three interior angles of any triangle in a plane always sums to 180° . For example, in the triangle below at left, $55^\circ + 40^\circ + 85^\circ = 180^\circ$. This relationship may be expressed more generally using algebra as $x + y + z = 180^\circ$, as in the triangle below right.



Example 1: Determine the unknown angle in the triangle pictured below:



Step 1: Set up an equation to represent the situation:

Since the three angles must sum to 180° , we write

$$x + 82 + 45 = 180$$

Step 2: Solve for the unknown variable:

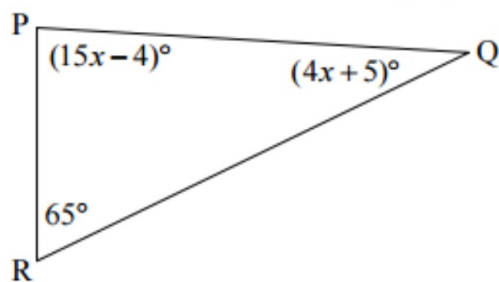
$$x + 127 = 180$$

$$-127 = -127$$

$$x = 53^\circ$$

Step 3: Check for reasonableness: Since $53 + 82 + 45 = 180$, this solution is reasonable.

Example 2: Determine the measure of $\angle P$ in the triangle pictured below.



Step 1: Set up an equation to represent the situation: Since the three interior angles must sum to 180° , we write

$$(15x - 4) + (4x + 5) + 65 = 180$$

By combining like terms, we obtain

$$15x + 4x - 4 + 5 + 65 = 180$$

$$19x + 66 = 180$$

$$-66 = -66$$

$$19x = 114$$

$$\frac{19x}{19} = \frac{114}{19}$$

$$x = 6$$

Step 2: Solve for the unknown variable:

$$m\angle P = 15x - 4$$

$$m\angle P = 15(6) - 4$$

$$m\angle P = 90 - 4$$

$$m\angle P = 86^\circ$$

So the measure of $\angle P$ is 86° .

Step 3: Check for reasonableness: We must obtain the measure of $\angle Q$ to determine if the three angles do, in fact, sum to 180° :

$$m\angle Q = 4x + 5$$

$$m\angle Q = 4(6) + 5$$

$$m\angle Q = 24 + 5$$

$$m\angle Q = 29^\circ$$

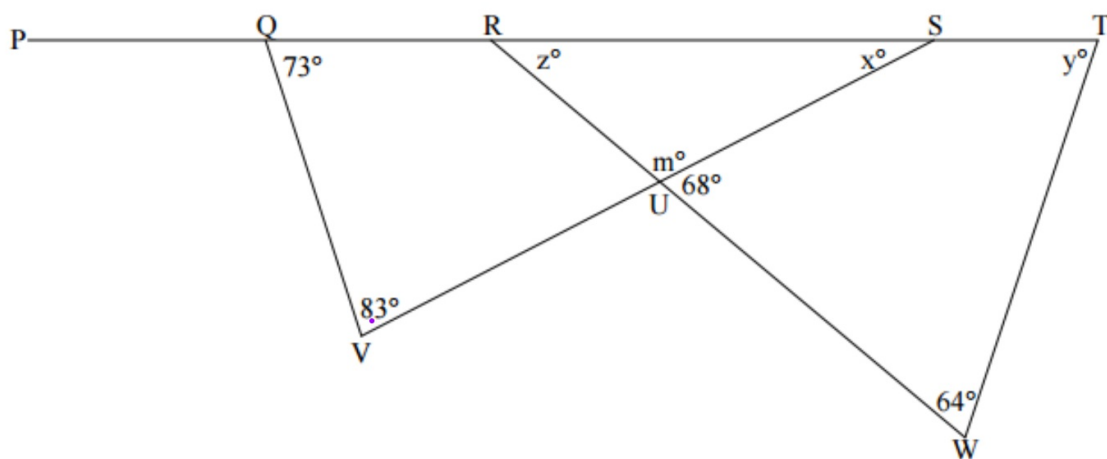
So we check the sum of all three angles:

$$m\angle P + m\angle Q + m\angle R = 180$$

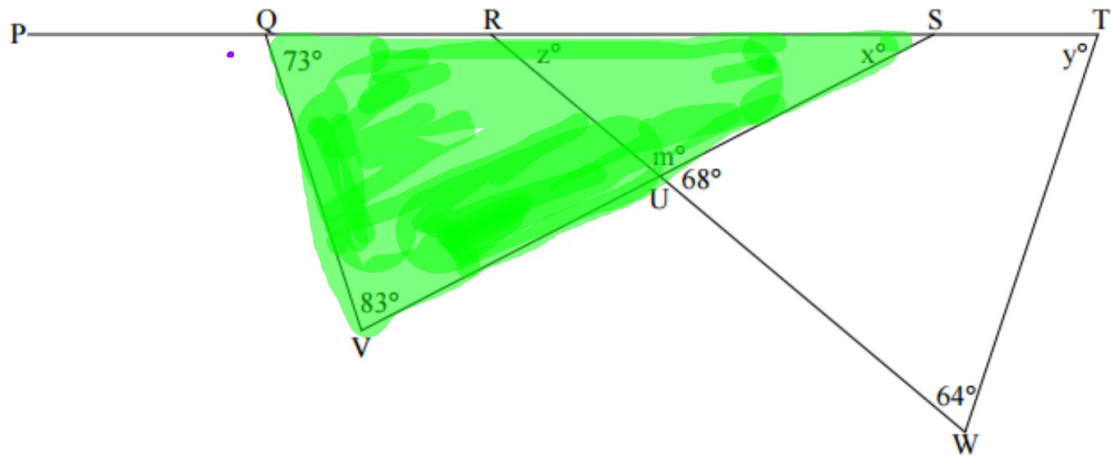
$$86 + 29 + 65 = 180 \quad \odot$$

$$180 = 180$$

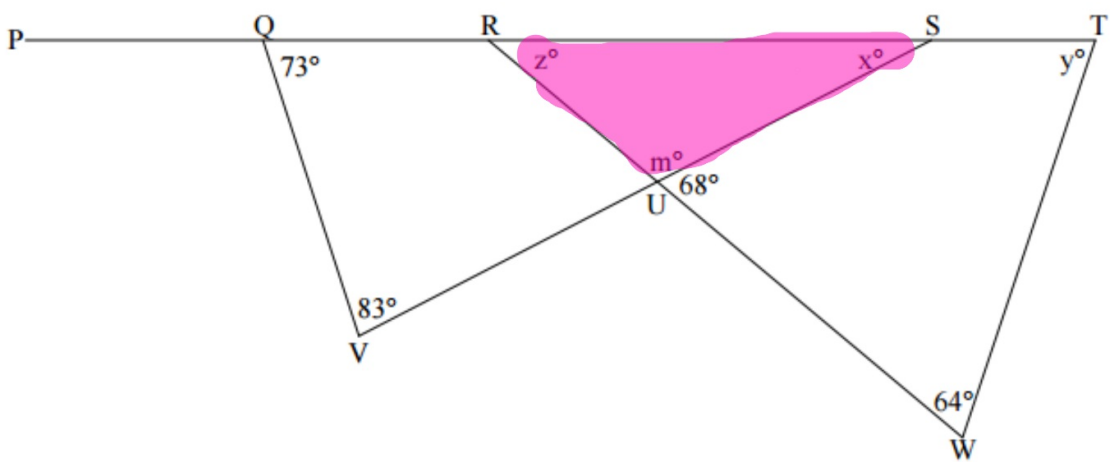
Example 3: Determine the measures of all unknown angles in the figure below:



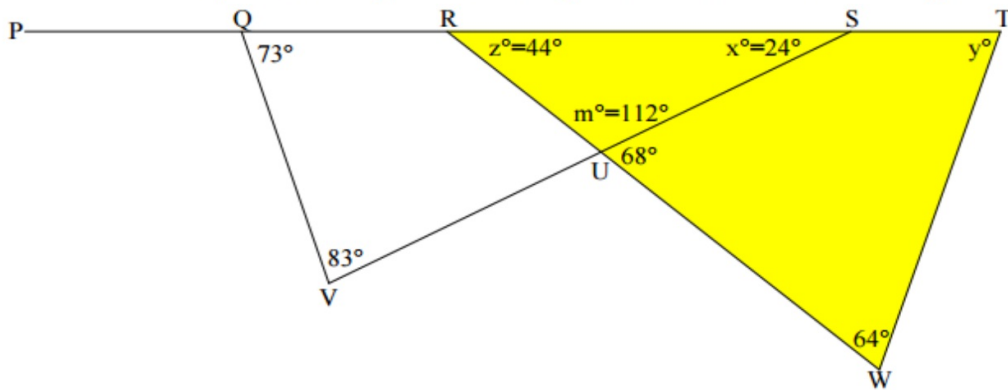
Example 3: Determine the measures of all unknown angles in the figure below:



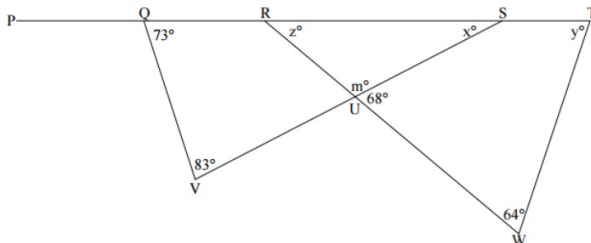
Example 3: Determine the measures of all unknown angles in the figure below:



The figure is drawn again here for clarity. We now focus on the third triangle:



Example 3: Determine the measures of all unknown angles in the figure below:



Step 1: Set up an equation to represent the sum of the three angles of a triangle. In the figure above, there are three triangles: $\triangle SQV$, $\triangle TRW$, and $\triangle RSU$. In $\triangle SQV$, we know two of the three angles, so we write an equation to represent it:

$$\begin{aligned} m\angle QSV + m\angle SQV + m\angle V &= 180 \\ x + 73 + 83 &= 180 \\ x + 156 &= 180 \\ -156 &= -156 \\ x &= 24^\circ \end{aligned}$$

Step 2: Determine the value of m : Because the angles marked m° and 68° form a linear pair, they are supplementary. So

$$m + 68 = 180 \text{ or } m = 180 - 68 = 112^\circ$$

Step 3: Continue to set up equations to represent the sum of the three angles of a triangle. In $\triangle RSU$, we know two of the three angles, so we write an equation to represent it:

$$\begin{aligned} m\angle RSU + m\angle SUR + m\angle URS &= 180 \\ x + m + z &= 180 \\ 24 + 112 + z &= 180 \\ 136 + z &= 180 \\ -136 &= -136 \\ z &= 44^\circ \end{aligned}$$

Step 4: Continue to set up equations to represent the sum of the three angles of a triangle. In $\triangle TRW$, we know two of the three angles, so we write an equation to represent it:

$$m\angle TRW + m\angle RWT + m\angle WTR = 180$$

$$z + 64 + y = 180$$

$$44 + 64 + y = 180$$

$$y + 108 = 180$$

$$-108 = -108$$

$$y = 72^\circ$$

Step 6: Check for reasonableness. Since we used three different triangles, we should check that all three have interior angles that sum to 180° :

$\triangle SQV$	$\triangle TRW$	$\triangle RSU$
$73 + 83 + 24 = 180$ ☺ $180 = 180$	$44 + 64 + 72 = 180$ ☺ $180 = 180$	$44 + 24 + 112 = 180$ ☺ $180 = 180$