Triangle Sum Theorem Part 1

Civon	Triangla Su	m Thoorom.	Simplify
Given:	i i langie Su		Simpiny:
The information provided in the	The three angles of a triangle will		Property used when basic math is
problem or within any	always add to equal 180°.		done on <u>one side</u> of the equal sign
images from the problem.			(example: combining like terms).
Substitution:		Subtrac	ction Property of Equality:
Property used to replace something with a number,		The resulting step after a number, variable or object is	
variable or object that it equals or is congruent to.		subtracted f	rom <u>both sides</u> of the equal sign.

For each triangle, determine the measure of the missing angle, showing and explaining every step of the solution. Use the properties described above in your explanations. Write the angle measures in the provided table, in order from smallest to largest, identifying their opposite sides (use the other two letters), as well.

Example: On $\triangle ABC$, $m \angle A = 27^{\circ} \& m \angle C = 79^{\circ}$. Determine the measure of $\angle B$, and use your solution and the given information to fill in the table on the right.	Small Medium Large	Angles $m \angle A = 27^{\circ}$ $m \angle B = 74^{\circ}$ $m \angle C = 79^{\circ}$	Opposite Sides <u>BC</u> <u>AC</u> <u>AB</u>
The <u>GIVEN</u> information is:	On	$\triangle ABC, m \angle A = 27^{\circ} \& n$	$n \angle C = 79^{\circ}.$
By the <u>TRIANGLE SUM theorem</u> , the three angles of a triangle will always add to equal <u>180°</u> :		$m \angle A + m \angle B + m \angle C$	= 180
Use <u>SUBSTITUTION</u> to replace the angle names with the measures that they equal:	$27 + m \angle B + 79 = 180$		180
SIMPLIFY the equation by combining the like terms		$106 + m \angle B = 18$	30
(adding the numbers) on the left side of the equation:		-106 - 1	106
Use the <u>SUBTRACTION</u> Property of <u>EQUALITY</u> to subtract a number from both sides of the equal sign:		$m \angle B = 74^{\circ}$	

1. On $\triangle DEF$, $m \angle E = 89^\circ \& m \angle F = 81^\circ$. Determine the measure of $\angle D$, and use your solution and the given information to fill in the table on the right.	Small Medium Large	Angles $m \angle$ = $m \angle$ = $m \angle$ =	Opposite Sides
The information is: By the the three angles of a triangle will always add to equal: Use to replace the angle names with the measures that they equal: the equation by combining the like terms			
Use the Property of to to subtract a number from both sides of the equal sign:			

	Nar	ne:	
2. On $\triangle GHI$, $m \angle G = 96^{\circ} \& m \angle I = 13^{\circ}$. Determine the		Angles	Opposite Sides
measure of $\angle H$, and use your solution and the given information to fill in the table on the right.	Small	<i>m∠</i> =	
	Medium	<i>m</i> ∠ =	
	Large	<i>m</i> ∠ =	
The information is:			
By the <u>theorem</u> , the three angles of a triangle will always add to equal <u></u> :			
Use to replace the angle names with the measures that they equal:			
the equation by combining the like terms (adding the numbers) on the left side of the equation:			
Use the Property of to			
subtract a number from both sides of the equal sign:			
3. On $\triangle KLM$, $m \angle L = 142^{\circ} \& m \angle M = 25^{\circ}$. Determine the		Angles	Opposite Sides
information to fill in the table on the right.	Small	<i>m</i> ∠ =	
	Medium	<i>m</i> ∠ =	
	Large	<i>m</i> ∠ =	
The information is:			
By the theorem, the three angles of a triangle will always add to equal:			
Use to replace the angle names with the measures that they equal:			
the equation by combining the like terms (adding the numbers) on the left side of the equation:			
Use the Property of to			
subtract a number from both sides of the equal sign:			
4. On $\triangle NPO$, $m \angle N = 56^{\circ} \& m \angle O = 56^{\circ}$. Determine the	•	Angles	Opposite Sides
measure of $\angle P$, and use your solution and the given	Small	$m \angle =$	
information to fill in the table on the right.	Medium	$m \neq m$	
	Large	$m_{\ell} =$	
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5. On $\triangle RST$, $m \angle R = 122^{\circ} \& m \angle T = 17^{\circ}$. Determine the		Angles	Opposite Sides
measure of $\angle S$, and use your solution and the given information to fill in the table on the right.	Small	<i>m</i> ∠ =	
	Medium	<i>m</i> ∠ =	
	Large	<i>m</i> ∠ =	
:			
:			
:			
<u>.</u>			

A shorter way to explain your work is using something called a "Two-column Proof," where you write the names (instead of long definitions) what you did to reach each step.

6. On $\triangle VWY$, $m \angle V = 60^\circ \& m \angle W = 90^\circ$. Determine the			Angles	Opposite Sides
measure of $\angle Y$, and use your solution and the given information to fill in the table on the right	Small	m∠	=	
information to fill in the table on the right.	Medium	m∠	=	
	Large	m∠	=	

Statements (the steps to solve)	Reasons (the explanations for each step)
	<u>Given</u>
	Triangle Sum Theorem
	Substitution
	<u>Simplify</u>
	Subtraction Property of Equality

7. On $\triangle BCD$, $m \angle C = 100^{\circ} \& m \angle B = 35^{\circ}$. Determine the
measure of $\angle D$, and use your solution and the given
information to fill in the table on the right.AnglesOpposite SidesMedium $m \angle =$ Image $m \angle =$ ImageImageImageImage

Statements (the steps to solve)	Reasons (the explanations for each step)

	Nan	ne:	
8. On $\triangle EFG$, $m \angle E = 63^\circ \& m \angle F = 41^\circ$. Determine the	l	Angles	Opposite Sides
measure of $\angle G$, and use your solution and the given information to fill in the table on the right.	Small	<i>m</i> ∠ =	
	Medium	<i>m</i> ∠ =	
	Large	<i>m</i> ∠ =	
Statements (the steps to solve)	Reason	ns (the explanations	for each step)
9. On $\triangle HJK$, $m \angle H = 43^{\circ} \& m \angle K = 99^{\circ}$. Determine the		Angles	Opposite Sides
measure of $\angle J$, and use your solution and the given	Small	<i>m</i> ∠ =	
information to hill in the table on the right.	Medium	<i>m</i> ∠ =	
	Large	<i>m</i> ∠ =	
Statements (the steps to solve)	Reason	is (the explanations	for each step)
10. On $\triangle LMN$, $m \angle M = 45^{\circ} \& m \angle N = 45^{\circ}$. Determine the measure of $\angle L$ and use your solution and the given		Angles	Opposite Sides
information to fill in the table on the right.	Small	<i>m</i> ∠ =	
	Medium	<i>m</i> ∠ =	
	Large	<i>m</i> ∠ =	
Statements (the steps to solve)	Reason	s (the explanations	for each step)

Triangle Sum Theorem Part 1 Answers

1.	2.	3.	4.	5.
$m \angle D = 10^{\circ} \overline{EF}$	$m \angle I = 13^{\circ} \overline{GH}$	$m \angle K = 13^{\circ}$ \overline{LM}	$m \angle N = 56^{\circ} \overline{QP}$	$m \angle T = 17^{\circ}$ \overline{RS}
$m \angle F = 81^{\circ} \overline{DE}$	$m \angle H = 71^{\circ} \overline{GI}$	$m \angle M = 25^{\circ} \overline{KM}$	$m \angle Q = 56^{\circ} \overline{NP}$	$m \angle S = 41^{\circ}$ \overline{RT}
$m \angle E = 89^{\circ} \overline{DF}$	$m \angle G = 96^{\circ}$ \overline{HI}	$m \angle L = 142^{\circ}$ \overline{KL}	$m \angle P = 68^{\circ} \overline{PQ}$	$m \angle R = 122^{\circ} \overline{ST}$
6.	7.	8.	9.	10.
$m \angle Y = 30^{\circ} \overline{VW}$	$m \angle B = 35^{\circ} \overline{CD}$	$m \angle F = 41^{\circ} \overline{EG}$	$m \angle J = 38^{\circ} \overline{HK}$	$m \angle M = 45^{\circ}$ \overline{LN}
$m \angle V = 60^{\circ} \overline{WY}$	$m \angle D = \overline{45^{\circ}} \overline{BC}$	$m \angle E = 63^{\circ} \overline{FG}$	$m \angle H = 43^{\circ} \overline{JK}$	$m \angle N = \overline{45^{\circ}} \overline{LM}$
$m \angle W = 90^{\circ} \overline{VY}$	$m \angle C = 100^{\circ} \overline{CD}$	$m \angle G = 76^{\circ} \overline{EF}$	$m \angle K = 99^{\circ}$ \overline{HJ}	$m \angle L = 90^{\circ} \overline{MN}$

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$6.$ $m \angle Y = 30^{\circ} \overline{VW}$ $m \angle V = 60^{\circ} \overline{WY}$	7. $\boxed{m \angle B = 35^{\circ} \overline{CD}}{m \angle D = 45^{\circ} \overline{BC}}$	8. $ \begin{array}{c c} m \angle F = 41^{\circ} & \overline{EG} \\ m \angle E = 63^{\circ} & \overline{FG} \end{array} $	9. $m \angle J = 38^{\circ} \overline{HK}$ $m \angle H = 43^{\circ} \overline{JK}$	10. $m \angle M = 45^{\circ}$ \overline{LN} $m \angle N = 45^{\circ}$ \overline{LM}

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	$m + C = 1000 \overline{CD}$	$m (C - 76^{\circ}) \overline{EE}$	$m \langle V = 0.0^{\circ} \overline{III}$	$m (I - 00^{\circ}) \overline{MN}$

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