KEY

Geometry (H)

Section 2.2 – 2.5 w/ mixed review from Chapter 1 ~ Review

Write the list of terms that we have defined from chapter 1 and so far from chapter 2.

Write a list of postulates from chapter 1 and chapter 2

Write a list of all theorems we have discussed in chapter 2.

You should have 8 theorems.
You need to know the statements, the givens, the prove statements, and the diagrams, as well as the proofs.

We also studied the properties of equality and congruence. Write the key properties that we have used in our proofs.

Addition Prop
Subtraction Prop.
Multiplication Prop
Division Prop.
Transitive Prop.
Substitution Prop.

KEY

Solve each of the following.

1. The measure of an angle is one-fifth the measure of its complement. Find the angle.

Let x = the measure of complement

$\frac{1}{5}x$ = the measure of angle

$x + \frac{1}{5}x = 90$

$1\frac{1}{5}x = 90$

$x = 90\left(\frac{5}{6}\right)$

$x = 75$

$\boxed{\text{angle} = 15^\circ}$

2. Four times the measure of the complement of an angle is 12 more than twice the difference of the measures of its supplement and its complement. Find the angle.

Let x = the angle (measure)

$90 - x$ = its complement (measure)

$180 - x$ = its supplement (measure)

$4(90-x) = 12 + 2[180 - x - (90-x)]$

$360 - 4x = 12 + 2(90)$

$360 - 4x = 192$

$168 = 4x$

$x = 42^\circ$ $\boxed{\text{Angle} = 42^\circ}$

ck

42,

complement = 48 ✓

supplement = 138 ✓

$4(48) \stackrel{?}{=} 12 + 2(138 - 48)$

$192 \stackrel{\checkmark}{=} 12 + 2(90)$

$= 12 + 180$

3. The ratio of an angle to its supplement is 3 : 7. Find the ratio of the angle to its complement.

$3x : 7x$

Let $3x$ = measure of one ∡

$7x$ = measure of other ∡

$3x + 7x = 180$

$10x = 180$

$x = 18$

54°, 126°

angle, supplement

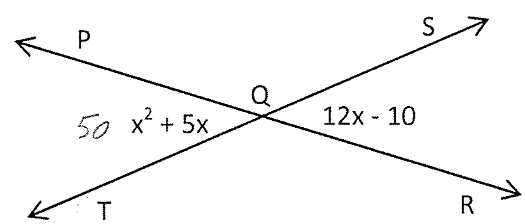
angle : complement

54 : 36

$\boxed{3 : 2}$

ratio of angle : complement

4. Find m∠TQR.



$x^2 + 5x = 12x - 10$

$x^2 - 7x + 10 = 0$

$(x-5)(x-2) = 0$

$x = 5$ $x = 2$

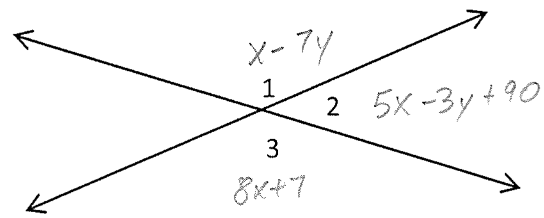
$x = 5$	$x = 2$
$x^2 + 5x$	$x^2 + 5x$
$25 + 25$	$4 + 10$
50	14
$12x - 10$	$12x - 10$
$60 - 10 = 50$	$24 - 10$
	14

If $x = 5$, m∡TQR = 130

If $x = 2$, m∡TQR = 166

5. Solve for x and y, then find m∠1, m∠2 and m∠3.

m∠1 = x – 7y
m∠2 = 5x – 3y + 90
m∠3 = 8x + 7



$x-7y=8x+7$
$x-7y+5x-3y+90=180$

$x-7y=8y+7$
$y=-x-1$

$6x-10y=90$
$6x-10(-x-1)=90$

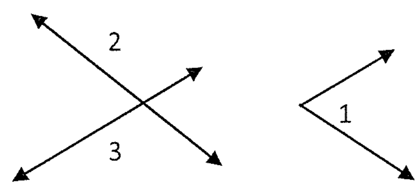
$x=5$ $y=-6$

m∠1 = 47
m∠2 = 133
m∠3 = 47

6. On a separate sheet of paper, write a flow proof for each of the following.

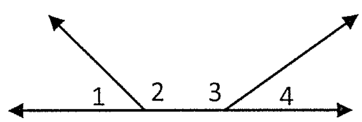
a. Given: ∠1 ≅ ∠2

Prove: ∠1 ≅ ∠3



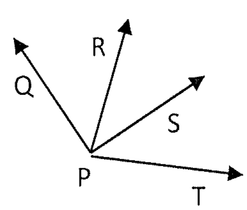
b. Given: ∠1 ≅ ∠4

Prove: ∠2 ≅ ∠3



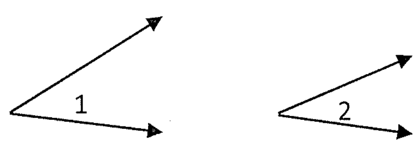
c. Given: $\overline{PR}$ bisects ∠QPS
$\overline{PS}$ bisects ∠RPT

Prove: ∠QPR ≅ ∠SPT



d. Given: ∠1 complement ∠2
m∠1 = 55°

Prove: ∠2 = 35°



PROOFS

* 99% of proofs - begin with "given"

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a)

1 $\angle 1 \cong \angle 2$ → 2 $m\angle 1 = m\angle 2$

3 $\angle 2$ and $\angle 3$ are vertical $\angle$s. (not necessary) → 4 $\angle 2 \cong \angle 3$ → 5 $m\angle 2 = m\angle 3$

→ 6 $m\angle 1 = m\angle 3$ → 7 $\angle 1 \cong \angle 3$

Reasons

1 Given
2 Def. of $\cong$ angles
3 Def. of vertical $\angle$s
4 Vertical $\angle$s $\cong$.
5 Def. of $\cong$ angles
6 Substitution
7 Def. of $\cong$ angles

b)

1 $\angle 1$ & $\angle 2$ form linear pair
$\angle 3$ & $\angle 4$ form linear pair → 2 $\angle 1$ supple. $\angle 2$
$\angle 3$ supple. $\angle 4$
3 $\angle 1 \cong \angle 4$ → 4 $\angle 2 \cong \angle 3$

Reasons

1 Def. of linear pair: 2 adjacent $\angle$s with uncommon sides forming opposite rays.
2 Linear pair postulate: are 2 $\angle$s that're supplementary.
3 Given
4 Congruent supplements theorem: 2 $\angle$s' supple. $\cong$ $\angle$s → 2 $\angle$s $\cong$.

#6 Proofs

c)

① $\overline{PR}$ bisects $\measuredangle QPS$, $\overline{PS}$ bisects $\measuredangle RPT$ → ② $\measuredangle QPR \cong \measuredangle RPS$, $\measuredangle SPT \cong \measuredangle RPS$ → ③ $\measuredangle QPR \cong \measuredangle SPT$

Reasons

① Given

② Def. of angle bisector: a ray that ÷ an $\measuredangle$ into 2 ≅ parts.

③ Transitive Property of Congruence of angles

d)

① $\measuredangle 1$ complements $\measuredangle 2$ → ② $m\measuredangle 1 + m\measuredangle 2 = 90$, ③ $m\measuredangle 1 = 55$ → ④ $55 + m\measuredangle 2 = 90$ → ⑤ $m\measuredangle 2 = 35$

Reasons

① Given

② Def. of complementary $\measuredangle$s: 2 $\measuredangle$s that total 90°

③ Given

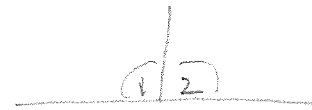
④ Substitution Prop.

⑤ Subtraction Property

7. Write a flow proof for each of the following statements. Provide a given, prove, diagram and flow proof.

If two angles are supplementary and congruent, then they form right angles.

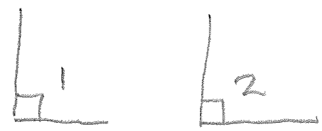
Given: ∡1 supple. ∡2
∡1 ≅ ∡2

Diagram: 

Prove: ∡1 & ∡2 are right angles.

All right angles are congruent. If angles are right, then they are ≅.

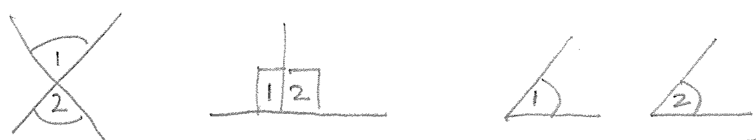
Given: ∡1 and ∡2 are right.

Diagram: 

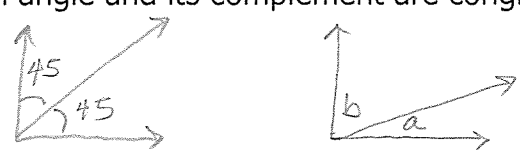
Prove: ∡1 ≅ ∡2

8. Determine if the following statements are sometimes, always or never true. Justify your answer with a diagram/definition or theorem.

a. If m∠1 = m∠2, then ∠1 and ∠2 are vertical angles. Sometimes



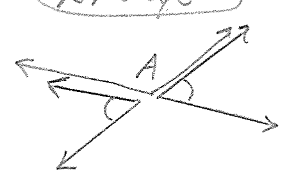
b. An angle and its complement are congruent. Sometimes



∡a = 30 ∡b = 60 ∡a is not ≅ ∡b.

c. Two angles that are each supplementary to ∠A are congruent. Always

Congruent supplements theorem



d. Supplementary angles form a linear pair. Always

Linear Pair Postulate

e. ∠A, ∠B and ∠C are complementary. Never

By definition of complementary angles, only 2 ∡s are complementary, not three.

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TOP

1 $\measuredangle 1$ supple. $\measuredangle 2$ $\rightarrow$ 2 $m\measuredangle 1 + m\measuredangle 2 = 180$

3 $\measuredangle 1 \cong \measuredangle 2$ $\rightarrow$ 4 $m\measuredangle 1 = m\measuredangle 2$

$\rightarrow$ 5 $m\measuredangle 1 + m\measuredangle 1 = 180$, $m\measuredangle 2 + m\measuredangle 2 = 180$

$\rightarrow$ 6 $2m\measuredangle 1 = 180$, $2m\measuredangle 2 = 180$ $\rightarrow$ 7 $m\measuredangle 1 = 90$, $m\measuredangle 2 = 90$ $\rightarrow$ 8 $\measuredangle 1$ & $\measuredangle 2$ are Right angles.

Reasons

1 Given
2 Def. of supple. $\measuredangle$s
3 Given
4 Def of $\cong$ angles.
5 Substitution
6 Distributive Property / Simplificatio
7 Division property
8 Def. of right angles

BOTTOM If angles are right, then they are $\cong$.

1 $\measuredangle 1$ and $\measuredangle 2$ are right angles. $\rightarrow$ 2 $m\measuredangle 1 = 90$, $m\measuredangle 2 = 90$ $\rightarrow$ 3 $m\measuredangle 1 = m\measuredangle 2$ $\rightarrow$ 4 $\measuredangle 1 \cong \measuredangle 2$

Reasons

1 Given
2 Def. of right $\measuredangle$s.
3 Substitution
4 Def. of $\cong$ angles.