Warm-up

$2x-5+3x+5=90$

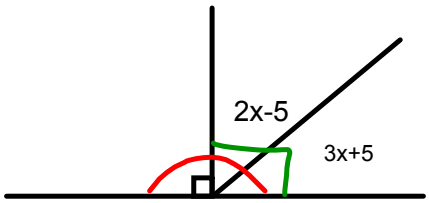
Write an equation and solve for x

$90+2x-5+3x+5=180$

$-90 \quad -90$

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

$x = 18$



Key

Geometry Homework: Intro Geo Proofs - 3

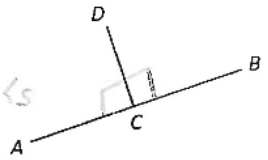
Rewrite each definition in the form of two conditionals:

1. Perpendicular lines form right angles.
   a. If two lines are ⊥, then they form right angles
   b. If two lines form right angles, then they are ⊥

2. An angle bisector is a line (or segment) that divides an angle into two congruent parts.
   a. If a line (or segment) is an angle bisector, then it divides an ∠ into 2 ≅ parts
   b. If a line (or segment) divides an ∠ into 2 ≅ parts, then it is an angle bisector

In problems #3 - 12, for each given, state a valid conclusion ***and a reason*** based on the definitions we have covered. (Note: some of these have more than one correct answer.)

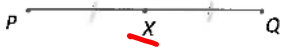
3. Given: $\overline{AB} \perp \overline{CD}$



   Conclusion: ∠ACD and ∠DCB are right ∠s

   Reason: ⊥ lines meet to form right ∠s

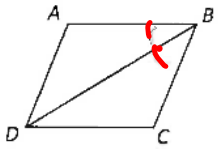
4. Given: X is the midpoint of $\overline{PQ}$.



   Conclusion: $\overline{PX} \cong \overline{XQ}$

   Reason: A midpt cuts a segment into 2 ≅ segments

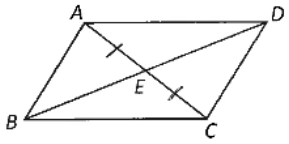
5. Given: $\overline{BD}$ bisects $\angle ABC$.



   Conclusion: ∠ABD ≅ ∠CBD

   Reason: A bisector cuts an angle into 2 ≅ angles

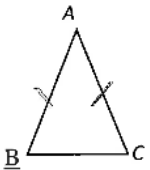
6. Given: $\overline{BD}$ bisects $\overline{AC}$ at E.



Conclusion: $\overline{AE} \cong \overline{EC}$

Reason: A bisector cuts a segment into $\cong$ segments

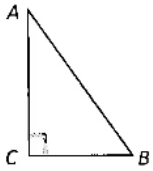
7. Given: $\overline{AB} \cong \overline{AC}$



Conclusion: $\triangle ABC$ is isosceles

Reason: Isosceles $\triangle$s have $\cong$ sides

8. Given: $\overline{AC} \perp \overline{BC}$.



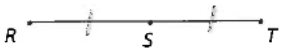
1st Conclusion: $\angle C$ is a Right $\angle$

Reason: $\perp$ lines must to form right $\angle$s

2nd Conclusion: $\triangle ACB$ is a right $\triangle$

Reason: A $\triangle$ is a right $\triangle$ if it has a right $\angle$

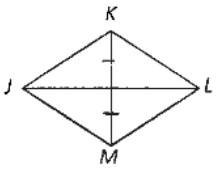
9. Given: $\overline{RST}$ and $\overline{RS} \cong \overline{ST}$.



Conclusion: S is the midpt of $\overline{RST}$

Reason: S divides $\overline{RT}$ into $\cong$ parts

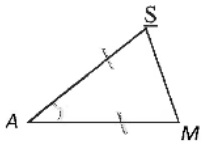
10. Given: $\overline{JL}$ divides $\overline{KM}$ into two congruent parts.



Conclusion: $\overline{JL}$ bisects $\overline{KM}$ b/c it cuts it into 2 ≅ parts

Reason:

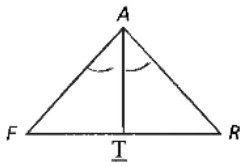
11. Given: *A* is the vertex of isosceles triangle *SAM*



Conclusion: $\overline{AS} \cong \overline{AM}$

Reason: Legs of an isosceles △ are ≅

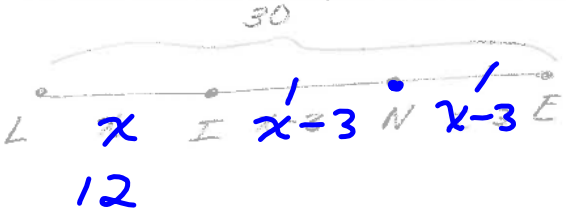
12. Given: $\angle FAT \cong \angle RAT$



Conclusion: $\overline{AT}$ bisects ∠FAR

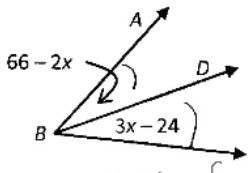
Reason: $\overline{AT}$ divides ∠FAR into 2 ≅ parts

13. Given $\overline{LINE}$, N is the midpoint of $\overline{IE}$, *LE* = 30 and *NE* is three less than *LI*. Find the numerical length of *LI*.



$3x - 6 = 30$
$+6 \quad +6$
$\frac{3}{3}x = \frac{36}{3}$
$x = 12$

14. In the diagram at right, $\overline{BD}$ bisects ∠*ABC*, *m*∠*ABD* = 66 − 2*x* and *m*∠*CBD* = 3*x* − 24. Find the numerical value (a number, not just an algebraic expression) of *m*∠*ABC*.



$66 - 2x = 3x - 24$
$+2x \quad +2x$
$66 = 5x - 24$
$+24 \quad +24$
$\frac{90}{5} = \frac{5x}{5}$
$x = 18$

$3(18) - 24$
$54 - 24$
30
$30 + 30$
$m\angle ABC = 60$

Name:_____ **Date:**_____

Geometry Notes Intro to Geo Proofs - 4: Basic Postulates

Postulates (aka Axioms)

A **postulate** (also called an **axiom**) is a statement (not a definition) that is accepted *without proof.*

A **theorem** is a statement that has been *proven* using definitions, postulates and previously proven theorems.

Basic Postulates

1. Reflexive Postulate: When something is $\cong$ to itself

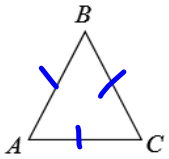
$\overline{BD} \cong \overline{BD}$

2. Transitive Postulate: If two things both equal the same (third) thing, then they equal each other.

Ex: If $a = c$ and $b = c$ then $a = b$

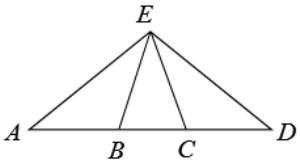
Ex: If $\overline{AB} \cong \overline{BC}$ and $\overline{BC} \cong \overline{CA}$ then

$\overline{AB} \cong \overline{CA}$



Ex: Given: $\angle AEB \cong \angle BEC$, $\angle CED \cong \angle BEC$

Conclusion: $\angle AEB \cong \angle CED$



3. Substitution Postulate: Equal quantities may be substituted for each other in any expression.

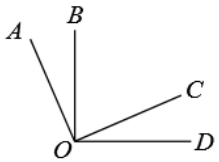
Ex: $2x + y = 6$
$y = 3x + 1$

$2x + (3x + 1) = 6$

Take something out put something of equal value in

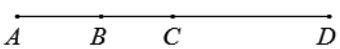
Ex: Given: $m\angle AOB + m\angle BOC = 90°$
$m\angle AOB = m\angle COD$

Conclusion: $\angle COD + \angle BOC = 90°$



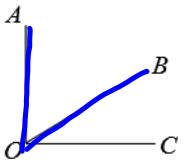
4. Partition Postulate: The whole equals the sum of the parts

Ex:



$\overline{AD} = \overline{AB} + \overline{BC} + \overline{CD}$

Ex:



$\angle AOC = \angle AOB + \angle BOC$

Ex: For each of the following, name the postulate illustrated.

a. Amy is the same height at Bob. Bob is the same height as Chris. So Amy is the same height as Chris.

b. Amy, Bob, Chris, Don, Emma and Fred are a hockey team. Fred is the goalie. George is another goalie. So Amy, Bob, Chris, Don, Emma and George are a hockey team.

c. Amy, Bob, Chris, Don, Emma and Fred are a hockey team. Fred is the goalie. Herb is baseball pitcher. So Amy, Bob, Chris, Don, Emma and Herb are a hockey team.

d. A soccer team is made up three forwards, four midfielders, three fullbacks and a goalkeeper.

e. A basketball team is made up a center, two forwards, two guards and a goalkeeper.

Ex: Which of the following is an example of the reflexive postulate?
(1) Amy looks in the mirror.
(2) Amy is the same height as Amy.
(3) Amy is the same height as Bob.
(4) Amy is taller than Bob. Bob is taller than Chris. So Amy is taller Chris.
(5) None of these.

Ex: Equality is transitive: If $a = b$ and $b = c$ then $a = c$. Which of the following are also transitive?

a. not equal to ($\neq$)

b. greater than ($>$)

c. parallel ($\parallel$)

d. perpendicular ($\perp$)

e. "lives in the same town as"

f. "lives next door to"

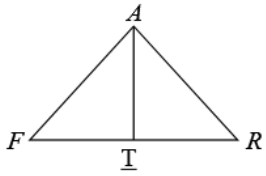
g. "goes to the same school as"

h. "is related to (by blood)"

Name _____

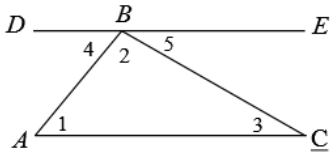
Geometry HW: Intro Geo Proofs – 4 Basic Postulates

For #1 - 4, name the postulate that justifies the conclusion.



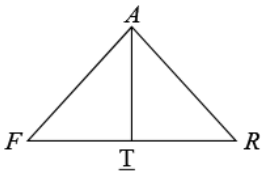
1. Given: $\overline{FT} \cong \overline{AT}$, $\overline{AT} \cong \overline{RT}$
   Conclusion: $\overline{FT} \cong \overline{RT}$

   Reason: _____



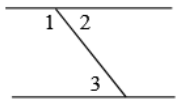
2. Given: (Diagram at right)
   Conclusion: $m\angle DBE = m\angle 4 + m\angle 2 + m\angle 5$

   Reason: _____



3. Given: (Diagram at right)
   Conclusion: $\overline{AT} \cong \overline{AT}$

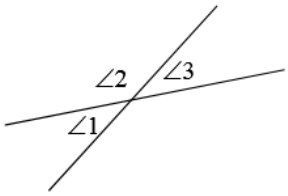
   Reason: _____



4. Given: $m\angle 1 + m\angle 2 = 180°$, $m\angle 2 = m\angle 3$ (Diagram at right)
   Conclusion: $m\angle 1 + m\angle 3 = 180$

   Reason: _____

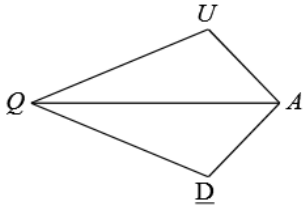
For the following, give a valid conclusion and a reason.



5. Given: $m\angle 1 + m\angle 2 = 180$; $m\angle 3 = m\angle 1$.

   Conclusion: _____

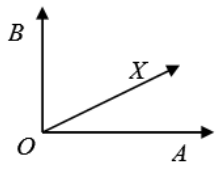
   Reason: _____



6. Given: $\overline{QA}$ bisects $\angle UAD$.

   Conclusion: _____

   Reason: _____



7. Given: $m\angle AOB = 90$.
   Statement: $m\angle AOB = m\angle AOX + m\angle XOB$

   Conclusion: _____

   Reason: _____

   Conclusion: _____

   Reason: _____

You should already know the following from previous assignments but read it anyway.

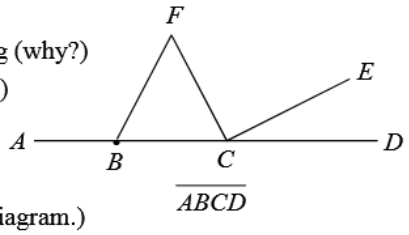
If two line segments are added or subtracted, the result is another line segment. (See diagram below.)

Ex: a. $\overline{AC}+\overline{CD}=\overline{AD}$ b. $\overline{AC}-\overline{AB}=\overline{BC}$

c. $\overline{AB}+\overline{CD}=$ nothing (why?) d. $\overline{BC}-\overline{AB}=$ nothing (why?)

e. $\overline{AC}+\overline{BD}=$ nothing (why?) f. $\overline{BD}+\overline{AC}=$ nothing (why?)

g. $\overline{AC}+\overline{CE}=$ nothing (why?)



If two angles are added or subtracted, the result is another angle. (Same diagram.)

Ex: a. $\angle FCE+\angle ECD=\angle FCD$ b. $\angle ABF+\angle DCF=$ nothing (why?)

c. $\angle BCE-\angle FCE=\angle BCF$ d. $\angle ABF-\angle FBC=$ nothing (why?)

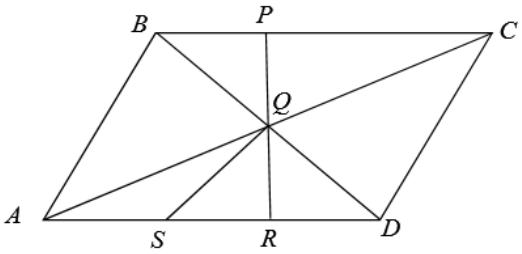
8. Use the diagram at right to answer the following:

a. $\overline{BP}+\overline{PC}=$ _____ b. $\overline{AS}+\overline{SD}=$ _____ .

c. $\overline{AS}+\overline{RD}=$ _____ d. $\overline{AQ}+\overline{QD}=$ _____ .

e. $\overline{BD}-\overline{BQ}=$ _____ f. $\overline{AD}-\overline{AS}=$ _____ .

g. $\overline{AD}-\overline{SR}=$ _____ h. $\overline{AR}-\overline{RD}=$ _____ .



9. Use the same diagram to answer the following:

a. $\angle ABD+\angle DBC=$ _____ .

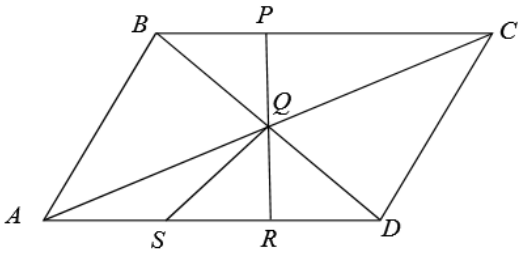
b. $\angle AQR+\angle DQR=$ _____ .

c. $\angle RDQ+\angle RSQ=$ _____ .

d. $\angle BQC-\angle BQP=$ _____ .

e. $\angle CQS-\angle CQD=$ _____ .

f. $\angle DCQ-\angle PCQ=$ _____ .



10. If M is the midpoint of $\overline{AY}$, $AM=x+8$ and $AY=3x^2$, find the numerical length of $\overline{AY}$.

11. If $\overline{HOT}$ is the perpendicular bisector of $\overline{DOG}$, $HO=2x+1$, $OT=3x-2$, $DO=4x-5$, and $OG=2x+3$, find the numerical length of $\overline{HOT}$.