Name _____   Date _____

In addition to <u>ALL</u> of the definitions, properties, postulates, and theorems from Geometry, we will be incorporating the following algebraic properties into our work.

Algebraic Properties of Equality

Let a, b, and c be real numbers.

Addition Property of Equality	If $a = b$, then $a + c = b + c$.
Subtraction Property of Equality	If $a = b$, then $a - c = b - c$.
Multiplication Property of Equality	If $a = b$, then $a \bullet c = b \bullet c$, $c \neq 0$.
Division Property of Equality	If $a = b$, then $\dfrac{a}{c} = \dfrac{b}{c}$, $c \neq 0$.
Distributive Property	$a(b + c) = ab + ac$
Substitution Property of Equality	If $a = b$, then a can be substituted for b (or b for a) in any equation or expression.

Reflexive, Symmetric, and Transitive Properties of Equality

	Real Numbers	**Segment Lengths**	**Angle Measures**
Reflexive Property	$a = a$	$AB = AB$	$m\angle A = m\angle A$
Symmetric Property	If $a = b$, then $b = a$.	If $AB = CD$, then $CD = AB$.	If $m\angle A = m\angle B$, then $m\angle B = m\angle A$.
Transitive Property	If $a = b$ and $b = c$, then $a = c$.	If $AB = CD$ and $CD = EF$, then $AB = EF$.	If $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then $m\angle A = m\angle C$.

For each statement and its conclusion, state the definition, postulate, theorem, or property that justifies it.

1. Given: $\overline{AM} \cong \overline{WU}$
Conclusion: $AM = WU$

Why: **Def of ≅ segments**

2. Given: E is the midpoint of $\overline{BD}$
Conclusion: $\overline{BE} \cong \overline{ED}$

Why: **Midpoint Thm**

3. Given: A bisects $\overline{CT}$
Conclusion: $\overline{CA} \cong \overline{AT}$

Why: **Def. of a bisector**

4. Given: CO = OL
Conclusion: $\overline{CO} \cong \overline{OL}$

Why: **Def of ≅ segments**

5. Given: $\angle DAY$ and $\angle YAK$ are a linear pair.
Conclusion: $\angle DAY$ & $\angle YAK$ are supplementary

Why: **Linear pairs are supp.**

6. Given: $\angle TOM$ is the supplement of $\angle SUE$
Conclusion: $m\angle TOM + m\angle SUE = 180°$

Why: **Def of supp. ∠'s**

7. Given: A and B lie in Plane JOG
Conclusion: A and B are collinear

Why: **Def. of collinear pts**

8. Given: A is in the interior of $\angle GLD$
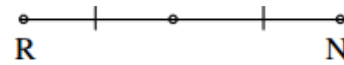Conclusion: $m\angle GLA + m\angle ALD = m\angle GLD$

Why: **Angle Addition Post**

9. Given: $\angle 1$ is the complement to $\angle 3$
Conclusion: $m\angle 1 + m\angle 3 = 90°$

Why: **Def. of comp. ∠'s**

10. Given: $\angle HAM$ is vertical to $\angle EAT$
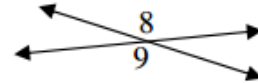Conclusion: $\angle HAM \cong \angle EAT$

Why: **vert. ∠'s thm**

R   N

11. Given:
Conclusion: U is the midpoint of $\overline{RN}$

Why: **Midpoint Thm**

8
9

12. Given:
Conclusion: $\angle 8$ and $\angle 9$ are vertical

Why: **Def of vert. ∠'s**

13. Given: $m\angle NAT + m\angle WED = 90°$
Conclusion: $\angle NAT$ & $\angle WED$ are complementary

Why: **Def of comp. ∠'s**

14. Given: $\overline{FA} \cong \overline{RM}$
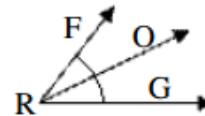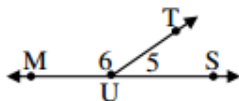Conclusion: $FA = RM$

Why: **Def of ≅ segments**

15. Given: MA = TH
Conclusion: $\overline{MA} \cong \overline{TH}$

Why: **Def of ≅ segments**

16. Given: $m\angle AFD + m\angle BAT = 180°$
Conclusion: $\angle AFD$ & $\angle BAT$ are supplementary

Why: **Def of supp. ∠'s**

F   O
R   G

17. Given:
Conclusion: $\angle FRO \cong \angle ORG$

Why: **Def of Angle Bisector**

18. Given: $m\angle 2 = m\angle 6$
Conclusion: $\angle 2 \cong \angle 6$

Why: **Def of ≅ ∠'s**

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1. Given: $\overline{TO} \cong \overline{AN}$

   Conclusion: TO = AN

   Justification: Def of ≅ seg

2. Given: E is the midpoint of $\overline{BD}$

   Conclusion: $\overline{BE} \cong \overline{ED}$ | BE = ED

   Justification: Midpt. Thm | Def of Midpt

3. Given: A bisects $\overline{CT}$

   Conclusion: CA = AT

   Justification: Def of bisector

4. Given: CO = OL

   Conclusion: $\overline{CO} \cong \overline{OL}$

   Justification: Def of ≅ seg.

5. Given: $\angle DAY$ and $\angle YAK$ are a linear pair

   Conclusion: ∠DAY, ∠YAK are supp.

   Justification: Linear pairs are supp

6. Given: $\angle TOM$ is the supplement of $\angle SUE$
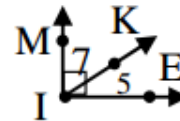
   Conclusion: m∠TOM + m∠SUE = 180

   Justification: Def of supp. ∠s

7. Given:

   M 6 5 S
   U   T

   Conclusion: m∠6 + m∠5 = 180

   Justification: linear pairs are supp.

8. Given:

   M K
   7 E
   I 5

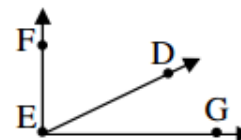   Conclusion: m∠7 + m∠5 = 90

   Justification: Def of comp. ∠s

9. Given:

   E   F   G
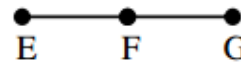
   Conclusion: EF + FG = EG

   Justification: Seg. Add. Post.

10. Given:

   F
   D
   E   G

   Conclusion: m∠FED + m∠DEG = m∠FEG

   Justification: Angle Add. Post

11. Given: $m\angle ABC = m\angle HIJ$

   Conclusion: ∠ABC ≅ ∠HIJ

   Justification: Def of ≅ ∠s

12. Given: $\angle CAT$ and $\angle RAP$ are vertical angles.

   Conclusion: ∠CAT ≅ ∠RAP

   Justification: Vert ∠s Thm

13. Given: $\angle SAT \cong \angle ACT$

   Conclusion: m∠SAT = m∠ACT

   Justification: Def of ≅ ∠s

14. Given: A is in the interior of $\angle GLD$

   Conclusion: m∠GLA + m∠ALD = m∠GLD
   Angle Add. Post.

   Justification: _____

15. Given: $\overline{FA} \cong \overline{RM}$

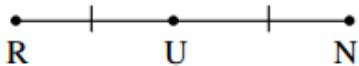Conclusion: FA = RM

Justification: Def of ≅ seg

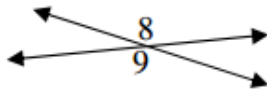16. Given: $\angle HAM$ is vertical to $\angle EAT$

Conclusion: ∠HAM ≅ ∠EAT

Justification: vert. ∠'s thm

17. Given:

R ——|—— U ——|—— N

Conclusion: $\overline{RU} \cong \overline{UN}$ | RU = UN

Justification: MP thm | def of mp.

18. Given;

∠8 ∠9 (crossing lines)

Conclusion: ∠8 ≅ ∠9
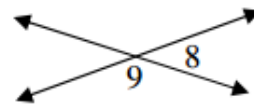
Justification: Vert. ∠'s thm

19. Given: $m\angle NAT + m\angle WED = 90°$

Conclusion: ∠NAt, ∠WED are comp.

Justification: Def of comp. ∠'s

20. Given: $\overline{UB}$ bisects $\angle RUY$

Conclusion: ∠RUB ≅ ∠BUY

Justification: Def of angle bisector

21. Given:

9 8 (crossing lines)

Conclusion: ∠8 and ∠9 are supp.

Justification: Linear pairs are supp.

22. Given:

M L K I (angle diagram)
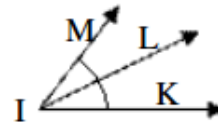
Conclusion: m∠MIL + m∠LIK = m∠MIK

Justification: Angle Add. Post.

23. Given: $\angle PAI$ and $\angle IAR$ are a linear pair

Conclusion: ∠PAI and ∠IAR are supp.

Justification: linear pairs are supp.

24. Given: $\angle CAT$ and $\angle RAP$ are complementary angles.

Conclusion: m∠CAT + m∠RAP = 90

Justification: Def of comp ∠'s

25. Given: $m\angle NAT + m\angle WED = 180°$

Conclusion: ∠NAT, ∠WED are supp.

Justification: Def of supp.

26. Given: A is between J and M

Conclusion: JA + AM = JM

Justification: Seg. Add. Post

J ——— A ——— M