Geometry PreAP Review Sheet Rev 2013 Mathematician: Key
Test 1-3: Logic and Proofs Date: _____ Period _____

You will need to write your answers on a separate sheet of paper.

1) Define the following words:

Biconditional statement	Conclusion	Conditional Statement
Conjecture	Contrapositive	Converse
Counterexample	Deductive Reasoning	Hypothesis
Inductive Reasoning	Inverse	Negation

paper

2) Make a conjecture of each pattern. Then, write the next two items: 

3) The sum of an even number and an odd number is odd.

Determine if each conjecture is true. If not, write a counterexample.

4) If C is the midpoint of $\overline{AB}$, then $\overline{AC} \cong \overline{BC}$ True
5) If $2x + 3 = 15$, then $x = 6$ True
6) There are 28 days in February. False, Leap Year

Identify whether each statement is inductive or deductive reasoning.

7) The United States Census Bureau collects data on the earnings of American citizens. Using data for the three years from 2001 to 2003, the bureau concluded that the national average income for a four-person family was $43,527. Inductive Reasoning

8) A sign in the cafeteria says that a car wash is being held on the last Saturday of May. Tomorrow is the last Saturday of May, so Justin concludes that the car wash is tomorrow. Deductive Reasoning

9) Marcus learns in Social Studies that a presidential election happens every four years. He knows that the last presidential election was in 2004, so he concludes that the next presidential election will be in 2008. Inductive Reasoning

10) At KPHS, students must take Biology before they take Chemistry. Sam is in Chemistry, so Marcia concludes that he has taken Biology. Deductive Reasoning

Determine the converse, inverse, and contrapositive statement of each conditional statement. Then, determine the validity of each statement.

11) If $\angle X$ is a right angle, then $m\angle X = 90^\circ$
12) If x is a whole number, then $x = 2$.

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Use the information to determine whether the statements below are true or false.

13) Sue is a member of the swim team. When the team practices, Sue swims. The team begins practice when the pool opens. The pool opens at 8 a.m. on weekdays and 12 noon on Saturdays.
   a) The swim team practices on weekdays only. False
   b) Sue swims on Saturdays. True
   c) Swim team practices start at the same time every day. False

Write a biconditional statement if the statement is valid. If the statement is invalid, provide a counterexample.

14) If $x < 0$, then the value of x^4 is positive. x^4 is positive iff & $x<0$.
15) If the measure of one angle of a triangle is 90°, then the triangle is a right angle. ~~Bad~~

Complete the conjecture.

~~If one angle is 90° then~~ The triangle is a right & iff the measure is 90°.

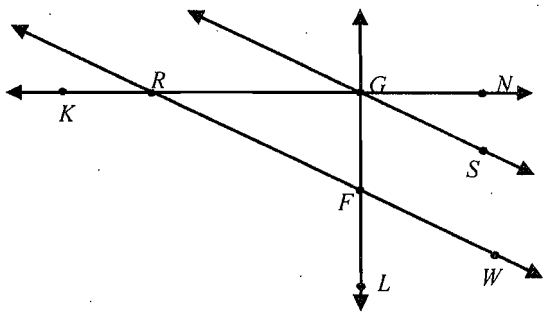
16) If you are a clown, then you wear big shoes. If you wear big shoes, then your feet hurt.

Conjecture: If you are a clown, then Your feet hurt.
Is the Law of Detachment of Law of Syllogism?

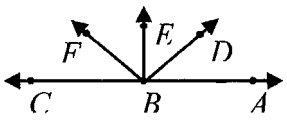
17) If a person sees penguins, then the person is in Antarctica. Carlos sees penguins.
Conjecture: If Carlos sees penguins, then Carlos in Antarctica.
Is the Law of Detachment of Law of Syllogism?

Based on the picture alone, determine if each statement is true or false.

False 18) $\overleftrightarrow{KN} \perp \overleftrightarrow{LG}$
True 19) $\angle LFR$ and $\angle GFR$ are a linear pair.
False 20) F is the midpoint of $\overline{GL}$
False 21) $\angle SGN$ and $\angle FGS$ are complementary.
False 22) $\overleftrightarrow{GS} \parallel \overleftrightarrow{RW}$
True 23) $\angle RGF$ and $\angle FGS$ are adjacent.
False 24) F and S are collinear.

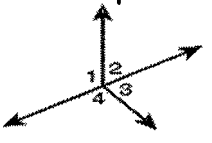


25) **Given:** $m\measuredangle ABE = m\measuredangle CBE$
Prove: $\measuredangle ABD$ and $\measuredangle DBE$ are complementary



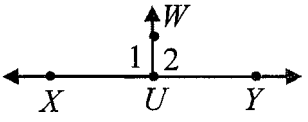
	Statement	Reason
1.	$m\measuredangle ABE = m\measuredangle CBE$	Given
2.	$\measuredangle ABE$ & $\measuredangle CBE$ are a linear pair	Picture
3.	$\angle ABE + \angle CBE$ are Supplementary	Linear Pair Theorem
4.	$m\measuredangle ABE + m\measuredangle CBE = 180°$	Def'n of Supplementary
5	$m\angle ABE + m\angle ABE = 180°$	Substitution from step 1 into step 4
6.	$2(m\measuredangle ABE) = 180°$	Simplify
7.	$m\angle ABE = 90°$	Division Property of Equality
8.	$m\measuredangle ABD + m\measuredangle DBE = m\measuredangle ABE$	Angle Addition Postulate
9.	$m\measuredangle ABD + m\measuredangle DBE = 90°$	Substitution - Steps 7 & 8
10.	$\angle ABE + \angle DBE$ are complementary	Definition of complementary

Write a proof based on the given plan.



26) **Given:** $\measuredangle 1$ and $\measuredangle 2$ form a linear pair, and $\measuredangle 3$ and $\measuredangle 4$ form a linear pair.
Prove: $m\measuredangle 1 + m\measuredangle 2 + m\measuredangle 3 + m\measuredangle 4 = 360°$
Plan: The Linear Pair Theorem shows that $\measuredangle 1$ and $\measuredangle 2$ are supplementary and $\measuredangle 3$ and $\measuredangle 4$ are supplementary. The definition of supplementary says that $m\measuredangle 1 + m\measuredangle 2 = 180°$ and $m\measuredangle 3 + m\measuredangle 4 = 180°$. Use the Addition Property of Equality to make the conclusion.
Paper

27) **Given:** $m\measuredangle 1 = 90°$
Prove: $m\measuredangle 2 = 90°$
Paper



Test 1-3 Review Key Rev 2013

1) **Biconditional statement**: a statement that can be written in the form "*p* if and only if *q*" or iff.

Conclusion: The part of a conditional statement following the word then.

Conditional statement: a statement that can be written in the form "if-then."

Conjecture: A statement that is believed to be true

Contrapositive: Statement formed by both exchanging and negating the hypothesis and conclusion of the conditional statement

Converse: Statement formed by exchanging the hypothesis and conclusion

Counterexample: Proves that a conjecture or statement is false

Deductive Reasoning: The process of using logic to draw conclusions

Hypothesis: The part of a conditional statement following the word if.

Inductive Reasoning: The process of reasoning that a rule/statement is true because specific cases are true.

Inverse: Statement formed by negating the hypothesis and conclusion of conditional statement.

Negation: "Not p" not statement.

2) The rightmost triangle is duplicated rotated 180° and shifted to the right.

11) Converse: If $m\angle X = 90°$ then $\angle X$ is a right triangle – True;

Inverse: If not $\angle X$ is a right triangle, then $m\angle X \neq 90°$ - True;

Contrapositive: If $\angle X$ is not a right triangle then $m\angle X \neq 90°$ - True

12) Converse: If x = 2 then x is a whole number – True;

Inverse: If x is not a whole number, then x is not equal to 2. - True;

Contrapositive: If x does not equal to 2, then it is not a whole number – False

26)

Statements	Reasons
1. $\angle 1$ and $\angle 2$ form a linear pair, and $\angle 3$ and $\angle 4$ form a linear pair.	1. **a.** Given
2. $\angle 1$ and $\angle 2$ are supplementary, and $\angle 3$ and $\angle 4$ are supplementary.	2. **b.** Linear Pair Thm.
3. **c.** $m\angle 1 + m\angle 2 = 180°$, and $m\angle 3 + m\angle 4 = 180°$	3. Def. of supp. $\triangleq$
4. $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360°$	4. **d.** Add. Prop. of =

27)

1.	$m\angle 1 = 90°$	Given
2.	$\angle 1$ & $\angle 2$ are a lin. pair	Picture, def of lin. pair
3.	$\angle 1$ & $\angle 2$ are supplementary	Linear Pair Theorem
4.	$m\angle 1 + m\angle 2 = 180°$	Def of supplementary
5.	$90° + m\angle 2 = 180°$	Substitution, steps 1 & 4
6.	$m\angle 2 = 90°$	Subtraction p.o.e.