

Show all work on your own paper.

For #1 – 3, write each statement as a conditional statement, and identify the hypothesis and conclusion.

- 1) All straight angles have a measure of 180 degrees.
- 2) Adin gets \$5 for his allowance if he completes all of his chores.
- 3) Every shark skeleton is made up of cartilage.

For #4 – 7, use the statement “If a two angles are complementary, then they are both acute” in order to identify each statement as the converse, inverse, contrapositive, or biconditional statement. Also, identify each statement as TRUE or FALSE.

- 4) If two angles are not both acute, then they are not complementary.
- 5) If two angles are both acute, then they are both complementary.
- 6) Two angles are complementary if and only if they are both acute.
- 7) If two angles are not complementary, then they are both not acute.

For #8 – 10, use the statement “If Gary did not fail any classes, then he is eligible to play sports” in order to identify each statement as the converse, inverse, contrapositive, or biconditional statement.

- 8) If Gary did fail a class, then he is not eligible to play sports.
- 9) If Gary is not eligible to play sports, then he did fail a class.
- 10) If Gary is eligible to play sports, then he did not fail any classes.

11) Is the following conditional statement true or false? If false, provide a counter-example. **“If a number is odd, then it is divisible by 3.”**

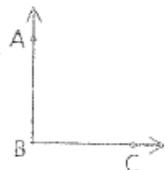
For #12 – 15, use the statement “A right angle has a measure of 90 degrees” in order to identify each statement as the converse, inverse, contrapositive, or biconditional statement. Also, identify each statement as TRUE or FALSE.

- 12) If an angle has a measure of 90 degrees, then it is a right angle.
- 13) If an angle does not have a measure of 90 degrees, then it is not a right angle.
- 14) If an angle is not a right angle, then it does not have a measure of 90 degrees.
- 15) An angle is a right angle if and only if it has a measure of 90 degrees.

16) Is the following biconditional statement true? Explain your reasoning. ***Two angles are complementary if and only if they are both acute angles.***

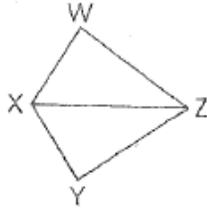
For #17 – 19, write a two-column proof, supplying your own correct conclusion and reason. (Hint: These should only be 2-step proofs.)

- 17) Given: $\overrightarrow{AB} \perp \overrightarrow{BC}$
Conclusion: ?

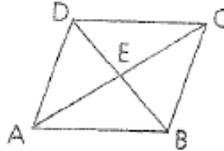


Show all work on your own paper.

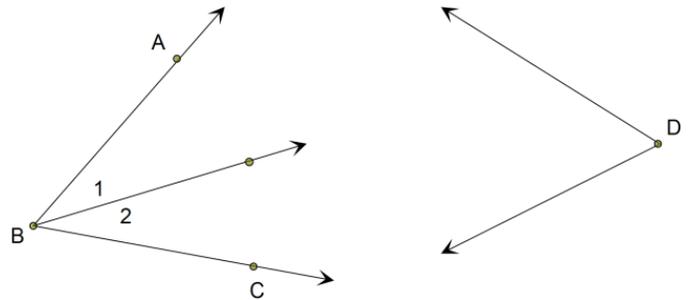
- 18) Given: $\angle WXZ \cong \angle YXZ$
 Conclusion:



- 19) Given: E is the midpoint of \overline{AC} .
 Conclusion:

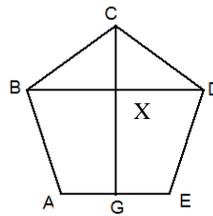


- 20) Given: $\angle 1 = (x + 7)^\circ$, $\angle 2 = (2x - 3)^\circ$, $\angle ABC = (x^2)^\circ$, and $\angle D = (5x - 4)^\circ$. Show that $\angle ABC \cong \angle D$.
 (Hint: Find x .) This is NOT a proof!



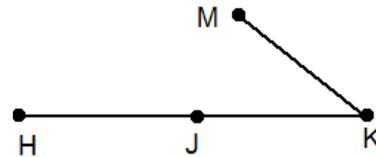
- 21) Given: \overline{CG} bisects \overline{BD} .

Prove: $\overline{BX} \cong \overline{XD}$

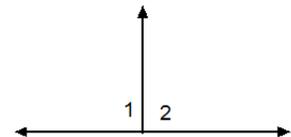


- 22) Given: $\overline{KJ} \cong \overline{JH}$

Prove: J is the midpoint of \overline{HK} .



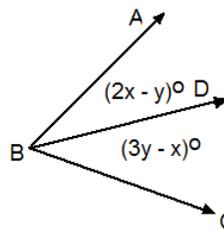
- 23) Write a paragraph proof: If $\angle 1 \cong \angle 2$, then they are both right angles.



- 24) Q is between P and R. $PQ = x^2 + 3$, $QR = 4 + 2x$, and $PR = 15$. Is Q the midpoint of \overline{PR} ? Justify your conclusions with work.

Show all work on your own paper.

- 25) \overline{BD} bisects $\angle ABC$, and $m\angle ABC = 25$. Solve for x and y .



For #26 – 29, determine whether each statement is *sometimes*, *always*, or *never* true. Justify your conclusion with an explanation or diagrams.

- 26) There is only one plane that contains three noncollinear points A, B, and C.

- 27) If points M, N, and P lie in plane X, then they are collinear.

- 28) Points A, B, and C determine exactly one plane.

- 29) Three coplanar lines have two points of intersection.

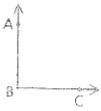
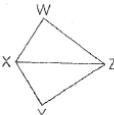
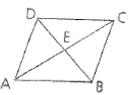
- 30) Solve: $3x^2 - 5x + 1 = 0$.

- A) $\frac{5 \pm \sqrt{13}}{6}$
 B) $\frac{-5 \pm \sqrt{13}}{6}$
 C) $\frac{5 \pm \sqrt{13}}{12}$
 D) $\frac{-5 \pm \sqrt{13}}{12}$

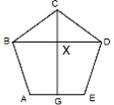
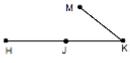
Answers:

- 1) Conditional: If an angle is a straight angle, then it has a measure of 180 degrees. Hypothesis: An angle is a straight angle.
 Conclusion: It has a measure of 180 degrees.
- 2) Conditional: If Adin completes all of his chores, then he gets \$5 for his allowance. Hypothesis: Adin completes all of his chores.
 Conclusion: He gets \$5 for his allowance.
- 3) Conditional: If an animal is a shark, then its skeleton is made of cartilage. Hypothesis: An animal is a shark. Conclusion: Its skeleton is made up of cartilage.
- 4) contrapositive, T 5) converse, F 6) biconditional, F 7) inverse, F 8) inverse
- 9) contrapositive 10) converse
- 11) False. Sample counter example: 7 is odd but is not divisible by 3.
- 12) converse, T 13) contrapositive, T 14) inverse, T 15) biconditional, T
- 16) No, because the converse is not a true statement. Both the converse and the conditional statement must be true.

Show all work on your own paper.

17) Given: $\overleftrightarrow{AB} \perp \overleftrightarrow{BC}$ Conclusion: $\underline{\hspace{1cm}}$?	
1) $\overline{AB} \perp \overline{BC}$.	1) Given
2) $\angle ABC$ is a right \angle	2) If 2 segments are \perp , then they intersect to create right \angle 's
18) Given: $\angle WXZ \cong \angle YXZ$ Conclusion: $\underline{\hspace{1cm}}$?	
1) $\angle WXZ \cong \angle YXZ$.	1) Given
2) \overline{XZ} bisects $\angle WXY$	2) If a ray divides an \angle into 2 $\cong \angle$'s, then it bisects the \angle .
19) Given: E is the midpoint of \overline{AC} . Conclusion: $\underline{\hspace{1cm}}$?	
1) E is the midpoint of \overline{AC}	1) Given
2) $AE = CE$	2) If a point is a midpoint, then it is equidistant from the endpoints of a segment.

20) Because $x = 4$ (reject $x = -1$), both angles have a measure of 16 degrees when you use substitution, thus they are congruent.

21) Given: \overline{CG} bisects \overline{BD} . Prove: $\overline{BX} \cong \overline{XD}$	
1) \overline{CG} bisects \overline{BD} .	1) Given
2) $\overline{BX} \cong \overline{XD}$	2) If a segment is a bisector, then it creates two congruent segments.
22) Given: $\overline{KJ} \cong \overline{JH}$ Prove: J is the midpoint of \overline{HK} .	
1) $\overline{KJ} \cong \overline{JH}$	1) Given
2) J is the midpoint of \overline{HK} .	2) If a point creates two congruent segments, then it is a midpoint
23) Write a paragraph proof: If $\angle 1 \cong \angle 2$, then they are both right angles.	
Given that $\angle 1$ and $\angle 2$ are congruent, and since $\angle 1$ and $\angle 2$ are a linear pair, they add up to 180 degrees. If the angles are the same measure, then we can divide by two in order to find the measure of each angle. Each angle then measures 90 degrees, and so they are right angles.	

24) No, work must be shown.

25) $x = 10$; $y = 7.5$

26) Always; this is a postulate

27) Sometimes; diagram or explanation needed

28) Sometimes; diagram or explanation needed

29) Sometimes; diagram or explanation needed

30) A