



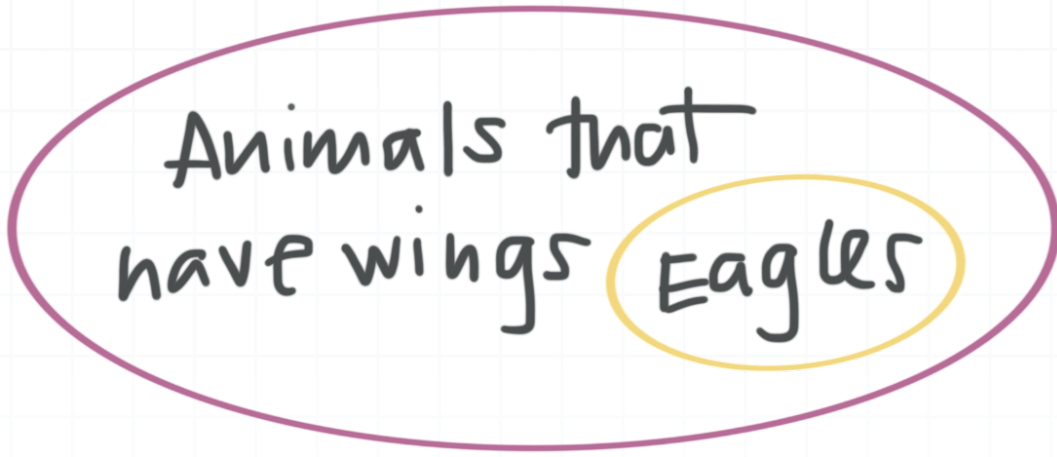
Geometry Workbook Solutions

Logic

krista king
MATH

CONDITIONALS AND EULER DIAGRAMS

- 1. Write the if-then statement that corresponds to the Euler diagram.



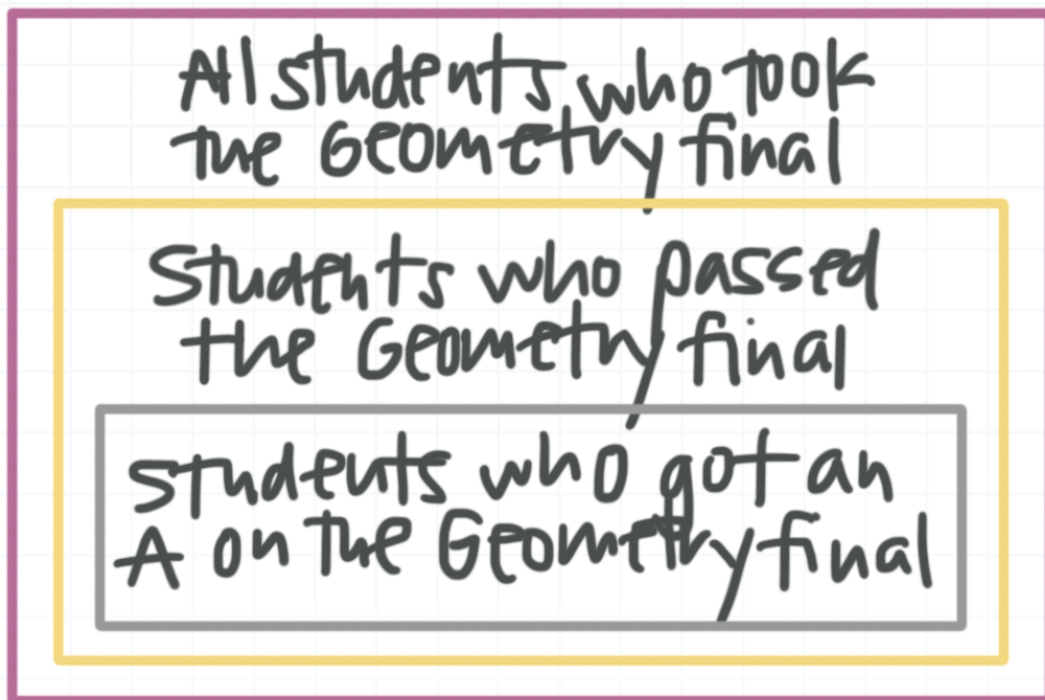
Solution:

“If an animal is an eagle, then it has wings.”

- 2. True or false? The if-then statement is true based on the Euler diagram.

“If a student passed the geometry final, then they got an A.”





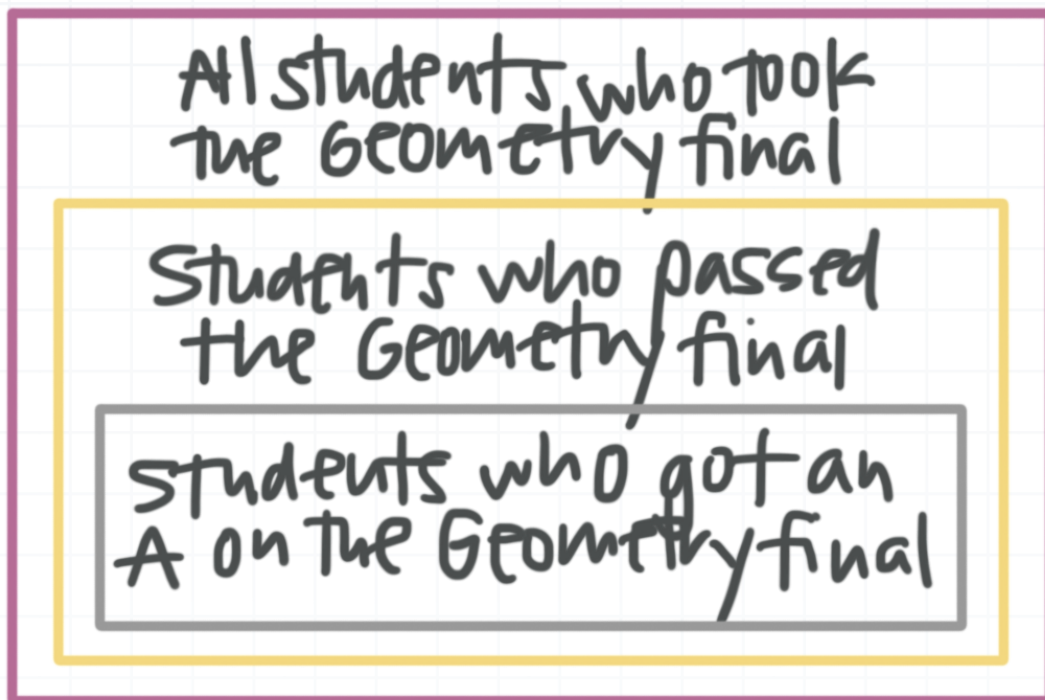
Solution:

False. The correct if-then statement would have been: "If a student got an A on the geometry final, then they passed." A student may have gotten a B and still passed.

■ 3. True or false? The statement is true based on the Euler diagram.

"If a student took the Geometry final exam, then they passed the test."





Solution:

False. People who passed the final exam are a subset of the people who took the final exam. Not all students who took the final exam passed it. The correct if-then statement would have been: If a student passed the Geometry final exam, then they took the exam.

■ 4. Draw a Euler diagram for the statement, “All quadrilaterals are polygons.”

Solution:



All polygons

All quadrilaterals



CONVERSES OF CONDITIONALS

- 1. Write the converse for the if-then statement.

“If M is a midpoint of \overline{AB} , then $AM = MB$.”

Solution:

“If $AM = MB$, then M is a midpoint of \overline{AB} .”

- 2. Write the converse for the if-then statement.

“If a polygon is a triangle, the sum of its angles is 180° .”

Solution:

“If the sum of the angles of a polygon is 180° , then it is a triangle.”

- 3. Write the converse of the if-then statement. Then determine if the converse is always, sometimes, or never true.

“If $\angle 1$ and $\angle 2$ are vertical angles, then they are congruent.”



Solution:

“If $\angle 1$ and $\angle 2$ are congruent, then they are vertical angles.” The converse is sometimes true. $\angle 1$ and $\angle 2$ can be vertical, but they could also form a linear pair in which both angles have a degree measure of 90° and are congruent.

■ 4. Write the converse of the if-then statement. Determine if the converse is true or false. If it’s false, provide a counterexample.

“If an animal is a cow, then it has four legs.”

Solution:

“If an animal has four legs, then it’s a cow.” The converse is fall, because a four-legged animal could be many other kinds of animals, like, for example, a goat.



ARRANGING CONDITIONALS IN A LOGICAL CHAIN

- 1. Fill in the blank with a logical conclusion.

All parallelograms have four sides.

All four-sided figures are quadrilaterals.

All parallelograms _____.

Solution:

“are quadrilaterals.” This follows by the Law of Syllogism.

- 2. If Jane’s alarm does not go off, she will be late to school. If Jane is late to school, she will get in trouble. Jane got in trouble. Can a valid conclusion be drawn? Explain.

Solution:

No valid conclusion can be drawn. We know if Jane’s alarm goes off she will get in trouble. But the converse may not be true. She may have gotten in trouble for another reason.



■ 3. Write the missing statement that will make the conclusion true.

1. If a driver is going 60 mph, he is speeding.

2. _____

Conclusion: If a driver is going 60 mph, he will get a speeding ticket.

Solution:

If a driver is speeding, he will get a speeding ticket.

■ 4. All squares are rectangles. Rewrite this statement in if-then form:

$JKLM$ is a rectangle. Can a valid conclusion be drawn?

Solution:

If a polygon is a square, then it's a rectangle. We're given that $JKLM$ is a rectangle. No valid conclusion can be drawn, because the converse is not always true. We can only draw a valid conclusion if we're given the hypothesis part of the statement.



