

Practice worksheet

Lesson 2 • Quantifiers, converse and contrapositive

Name: _____

Date: _____

Converse and equivalence

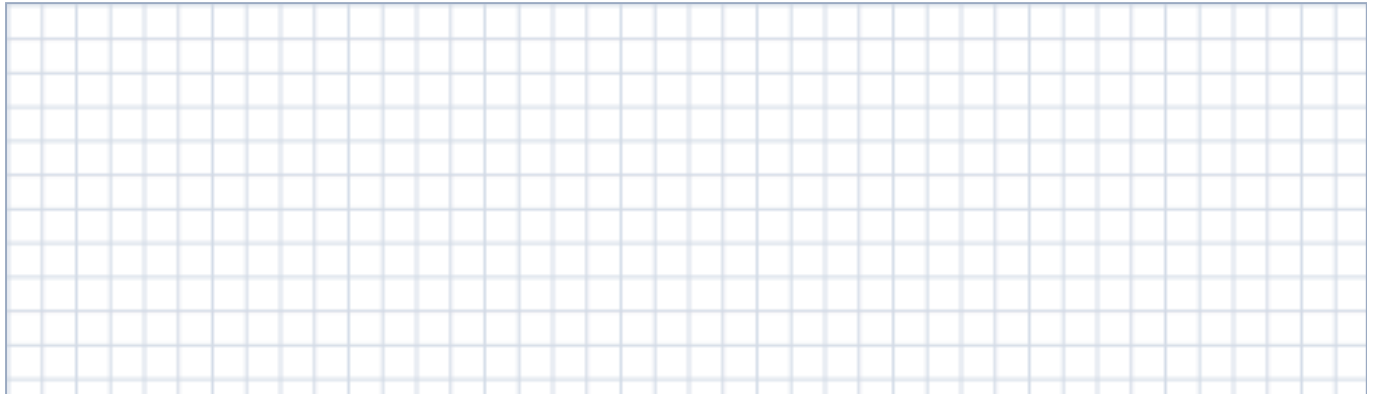
1. Write the converse of each statement. Is it true? If it is, write an iff statement. If not, give a counterexample.

(a) If a number is divisible by 6, then it is divisible by 3.

(b) If $x = 2$, then $x^2 = 4$.

(c) If a triangle is equilateral, then it is isosceles.

(d) If n is odd, then n^2 is odd.



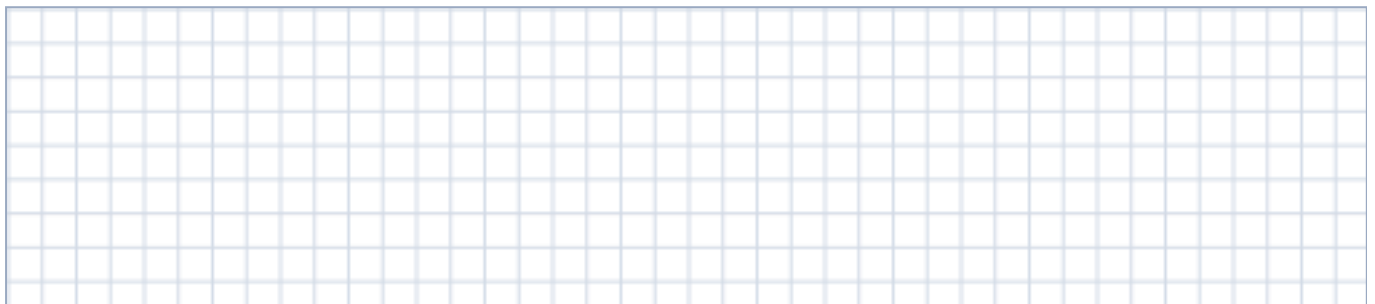
Contrapositive

2. Write the contrapositive of each statement.

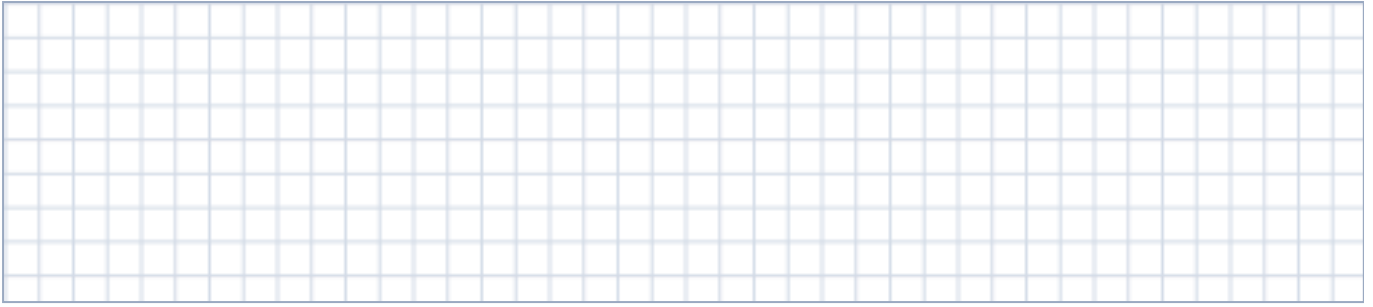
(a) If n is divisible by 4, then n is even.

(b) If $a > 0$ and $b > 0$, then $ab > 0$.

(c) If ab is odd, then a and b are both odd.



3. Show that the converse of “If $x > 3$, then $x^2 > 9$ ” is false, but its contrapositive is true.

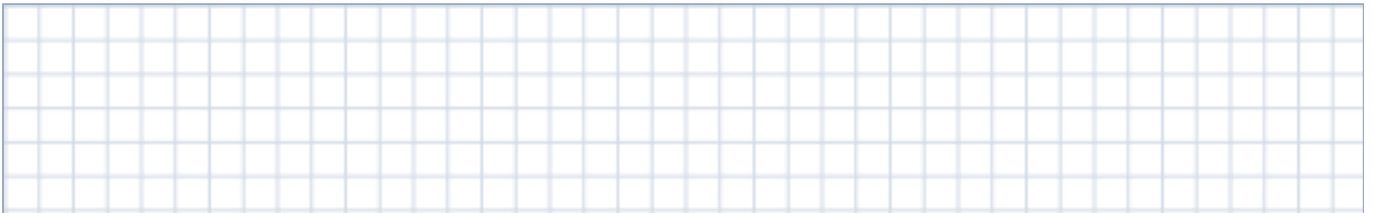


Quantifiers

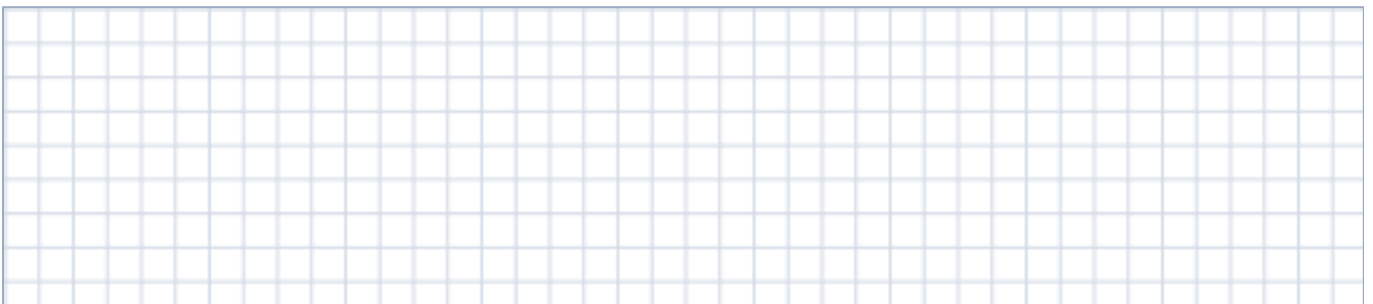
4. Write each statement in symbols, decide whether it is true, and write its negation.
- (a) Every integer is a rational number. (b) Some real number is not equal to its square.
- (c) There is an integer whose square is negative.



5. Use a counterexample to show that the statement $\forall x \in \mathbb{R}, x^2 + x > 0$ is false.

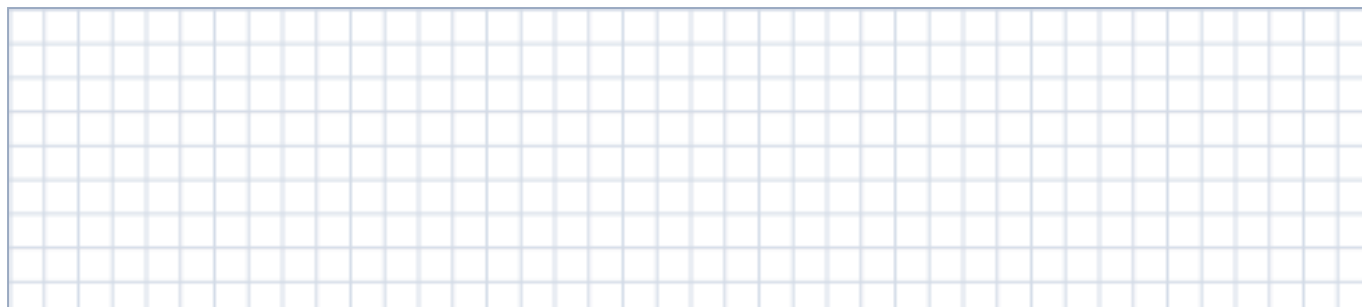


6. Which of these is true? Justify your answer. (a) $\forall x \in \mathbb{R}, \exists y \in \mathbb{R}$ such that $x + y = 0$. (b) $\exists y \in \mathbb{R}$ such that $\forall x \in \mathbb{R}, x + y = 0$.



Sufficient and necessary

7. Consider: "If a quadrilateral is a square, then it is a rectangle." Is the statement true? Name a sufficient condition and a necessary condition. Is the converse true?



Adapted HSC-style

8. **Adapted HSC-style.** Consider the statement: "For all integers n , if n is divisible by 6, then n is divisible by 3." (a) Write the converse. (b) Is the converse true? Justify your answer. (c) Write the negation of the original statement.

