

3.1 Exercises

✓ CONCEPT CHECK

1. A _____ is a statement that contradicts itself.
2. Negations of a statement has the _____ truth value as the original statement.
3. Conjunctions are compound statements that use the connective word _____, while disjunctions are compound statements that use the connective word _____.
4. True or False: Questions are considered mathematical statements.
5. True or False: The sentence “this statement is false” is an example of a paradox.

💡 PRACTICE

Decide if each sentence is a mathematical statement.

6. My computer is fast.
7. The car in front of me is turning around.
8. Who are you voting for in the election?
9. I always lie.
10. Running is fun.
11. Are you cold today?
12. I received 35 e-mails today, half of which ended up in my spam folder.
13. Get out of my room!
14. This computer’s processor is at least 1.8 GHz.
15. Either we are going to the beach or the mountains for vacation this year.
16. No one goes to that mall anymore; it’s too crowded.
17. I will go to the concert if and only if I can get front row seats.

Negate each statement.

18. Kelsey’s website had more than 50,000 visits yesterday.
19. Three hundred twenty-nine people applied for the same job I did.

20. I did not get the job.
21. Austin slept until 8:00 a.m. this morning.
22. None of the Christmas tree lights are not working.
23. Every student is volunteering at the food pantry this year.

Using the letters given to represent simple statements and the proper logic connectives, express each compound statement in symbolic form.

24. It is not true that Miranda likes both art and history.

m: Miranda likes art.

n: Miranda likes history.

25. Miranda does not like art or Miranda does not like history.

m: Miranda likes art.

n: Miranda likes history.

26. If I don't eat meat, then I don't get sick.

a: I don't eat meat.

b: I get sick.

27. I don't get sick or I don't eat meat.

a: I don't eat meat.

b: I get sick.

28. I will bake cookies if and only if I can give them all away.

a: I will bake cookies.

b: I can give all the cookies away.

29. If Mrs. Walker is a teacher, then she is not a rocket scientist.

t: Mrs. Walker is a teacher.

r: Mrs. Walker is a rocket scientist.

30. If Mrs. Walker is not a rocket scientist, then she is a teacher.

t: Mrs. Walker is a teacher.

r: Mrs. Walker is a rocket scientist.

31. Right angles are formed by the lines if the lines are perpendicular.

w: The lines are perpendicular.

z: Right angles are formed by the lines.

32. The lines are not perpendicular or right angles are formed by the lines.

w : The lines are perpendicular.

z : Right angles are formed by the lines.

33. I will not adopt a puppy if and only if I have to move next month.

a : I will adopt a puppy.

b : I have to move next month.

Use the given simple statements to write each compound statement in words.

a : Driving makes me smile.

b : I grill more often than I bake.

c : It is sunny.

34. $b \wedge a$

35. $a \vee c$

36. $c \wedge \sim b$

37. $c \Rightarrow b$

38. $\sim a \Leftrightarrow c$

39. $\sim c \Rightarrow \sim b$

Use the given simple statements to write each compound statement in words.

p : My video reached 1000 views on YouTube.

q : I have 1000 Facebook friends.

r : The home page of my website has a bounce rate of less than 20%.

40. $p \wedge q$

41. $\sim q \Rightarrow \sim r$

42. $q \vee p$

43. $\sim r \Leftrightarrow \sim p$

Use the given statements to write each compound statement in words.

p : The moon is full.

q : I don't know if it's cloudy or bright outside.

r : I've lost my glasses.

44. $p \wedge r$

45. $(\sim p) \vee q$

46. $\sim(q \wedge r)$

47. $p \Leftrightarrow \sim q$

48. $r \Rightarrow q$

49. $\sim r \Rightarrow \sim q$