

2-4 Deductive Reasoning

CCSS CRITIQUE Determine whether the stated conclusion is valid based on the given information. If not, write invalid. Explain your reasoning.

16. **Given:** Right angles are congruent. $\angle 1$ and $\angle 2$ are right angles.

Conclusion: $\angle 1 \cong \angle 2$

ANSWER:

valid; Law of Detachment

17. **Given:** If a figure is a square, it has four right angles. Figure $ABCD$ has four right angles.

Conclusion: Figure $ABCD$ is a square.

ANSWER:

Invalid; the figure could be a rectangle.

18. **Given:** An angle bisector divides an angle into two congruent angles.

\overline{KM} is an angle bisector of $\angle JKL$.

Conclusion: $\angle JKM \cong \angle MKL$

ANSWER:

valid; Law of Detachment

19. **Given:** If you leave your lights on while your car is off, your battery will die. Your battery is dead.

Conclusion: You left your lights on while the car was off.

ANSWER:

Invalid; your battery could be dead because it was old.

20. **Given:** If Dante obtains a part-time job, he can afford a car payment.

Dante can afford a car payment.

Conclusion: Dante obtained a part-time job.

ANSWER:

Invalid; Dante could afford a car payment because he paid off his other bills.

21. **Given:** If 75% of the prom tickets are sold, the prom will be conducted at the country club. 75% of the prom tickets were sold.

Conclusion: The prom will be held at the country club.

ANSWER:

valid; Law of Detachment

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Game Ratings	
Rating	Age
EC	3 and older
E	6 and older
E10+	10 and older
T	13 and older
M	17 and older

22. **COMPUTER GAMES** Refer to the game ratings. Determine whether the stated conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning.

Given: If a title is rated E, then it has content that may be suitable for ages 6 and older. Cesar buys a computer game that he believes is suitable for his little sister, who is 7.

Conclusion: The game Cesar purchased has a rating of E.

ANSWER:

Invalid; the game could be rated EC (Early Childhood), which is suitable for ages 3 and up.

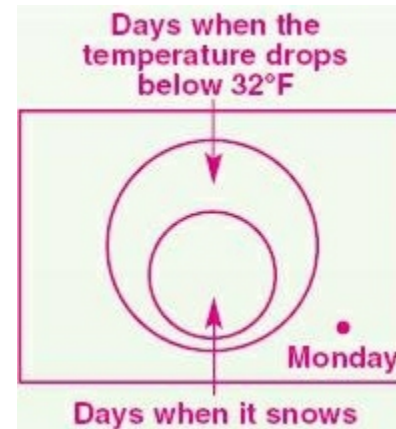
Determine whether the stated conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning using a Venn diagram.

23. **Given:** If the temperature drops below 32°F, it may snow. The temperature did not drop below 32°F on Monday.

Conclusion: It did not snow on Monday.

ANSWER:

Valid; Monday is outside of the days when the temperature drops below 32°F, so it cannot be inside the days when it snows circle either, so the conclusion is valid.



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24. **Given:** If a person is a Missouri resident, he or she does not live by a beach. Michelle does not live by the beach.

Conclusion: Michelle is a Missouri resident.

ANSWER:

Invalid; Michelle could be inside the Missouri circle or inside the People who do not live by the beach circle and outside the Missouri Circle.



25. **Given:** Some nurses wear blue uniforms. Sabrina is a nurse.

Conclusion: Sabrina wears a blue uniform.

ANSWER:

Invalid; Sabrina could be inside just the nurses' circle or inside the intersection of the circles, so the conclusion is invalid.

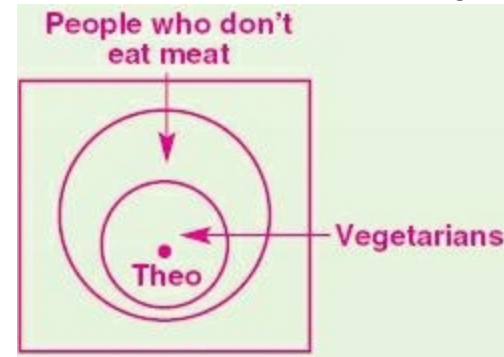


26. **Given:** All vegetarians do not eat meat. Theo is a vegetarian.

Conclusion: Theo does not eat meat.

ANSWER:

Valid; Theo is inside the small and large circle, so the conclusion is valid.



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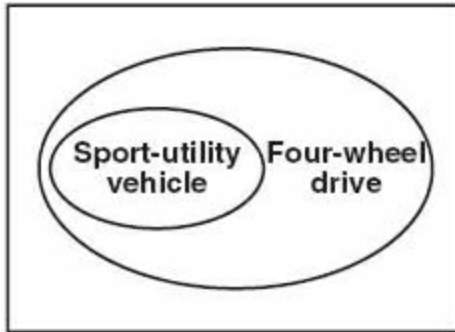
27. **TRANSPORTATION** There are many types of vehicles and they are classified using different sets of criteria. Determine whether the stated conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning using a Venn diagram.

Given: If a vehicle is a sport-utility vehicle, then it is a four-wheel-drive car built on a truck chassis. Ms. Rodriguez has just purchased a vehicle that has four-wheel drive.

Conclusion: Ms. Rodriguez has just purchased a sport-utility vehicle.

ANSWER:

Invalid; Ms. Rodriguez's car might be a four wheel drive vehicle that is not a sport-utility vehicle section.



28. **GOLF** Zach Johnson won the Masters Tournament in 2007. Use the Law of Syllogism to draw a valid conclusion from each set of statements, if possible. If no valid conclusion can be drawn, write *no valid conclusion* and explain your reasoning.

- (1) If Zach Johnson's score is lower than the other golfers at the end of the tournament, then he wins the tournament.
(2) If a golfer wins the Masters Tournament, then he gets a green jacket.

ANSWER:

If Zach Johnson's score is lower than the other golfers at the end of the tournament, then he gets a green jacket.

CCSS ARGUMENTS Use the Law of Syllogism to draw a valid conclusion from each set of statements, if possible. If no valid conclusion can be drawn, write no valid conclusion and explain you're reasoning.

29. If you interview for a job, then you wear a suit.
If you interview for a job, then you will update your resume.

ANSWER:

no valid conclusion

30. If Tina has a grade point average of 3.0 or greater, she will be on the honor roll.
If Tina is on the honor roll, then she will have her name in the school paper.

ANSWER:

If Tina has a grade point average of 3.0 or greater, then she will have her name in the school paper.

31. If two lines are perpendicular, then they intersect to form right angles.
Lines r and s form right angles.

ANSWER:

no valid conclusion

32. If the measure of an angle is between 90 and 180, then it is obtuse.
If an angle is obtuse, then it is not acute.

ANSWER:

If the measure of an angle is between 90 and 180, then it is not acute.

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33. If two lines in a plane are not parallel, then they intersect.

If two lines intersect, then they intersect in a point.

ANSWER:

If two lines in a plane are not parallel, then they intersect in a point.

34. If a number ends in 0, then it is divisible by 2.

If a number ends in 4, then it is divisible by 2.

ANSWER:

no valid conclusion