

Exam

Name \_\_\_\_\_

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Decide whether the statement makes sense. Explain your reasoning.

1) Your argument has no fallacies, so your conclusion must be true.

Answer: Does not make sense. By using false assumptions for premises, it is possible to create a solid argument even for a conclusion that is clearly false. (Explanations will vary.)

2) I did not convince my friend that I was right, so I must not have argued logically.

Answer: Does not make sense. Arguing logically may not change the other person's position, but it can help the other person understand you, and vice versa. (Explanations will vary.)

3) I know more of the names of the common fallacies in arguments than my father, so I can recognize fallacies better than he can.

Answer: Does not make sense. Learning the fancy names for the fallacies is far less important than learning to recognize the faulty reasoning. (Explanations will vary.)

The argument contains an example of the fallacy named in parentheses. Explain how the fallacy occurs in the argument.

4) (Hasty Generalization) Isabelle had vegetarian food for lunch every day last week, so she must be a vegetarian.

Answer: Answers may vary. Possible answer: The premise of this argument cites one case in which Isabelle ate vegetarian food. But one case is not enough to establish a pattern, let alone to conclude that Isabelle always eats vegetarian food.

5) (Appeal to Emotion) A television commercial shows a happy, attractive family dining at Ma & Pa's Restaurant.

Answer: Answers may vary. Possible answer: If we can consider this an argument at all, it has the form

Premise: You want your family to be happy and attractive.

Conclusion: You should eat at Ma & Pa's Restaurant.

The argument appeals to emotion, not logic. The advertisers hope that the image of happy and attractive people will evoke positive emotions and make you want to eat at the restaurant. In other cases, the appeal is to negative emotions.

6) (Diversion) We've just remodeled the restaurant, so our food is delicious!

Answer: Answers may vary. Possible answer: The conclusion of this argument (our food is delicious) is not related to the premise (We've just remodeled the restaurant). This argument represents the fallacy of diversion because it attempts to divert attention from the real issue (the taste of the food) by focusing on another issue (the remodeling of the restaurant). The issue to which attention is diverted is sometimes called a red herring.

7) (False Cause) Since I brought my umbrella, it didn't rain.

Answer: Answers may vary. Possible answer: The premises tells us that one thing (bringing the umbrella) happened before another (it didn't rain), but they don't prove any connection between them. That is, we cannot conclude that bringing the umbrella was the cause of the fact that it didn't rain. The fact that one event came before another is not proof that the first event caused the second event.

8) (Straw Man) Mayor Brown opposes a tax increase to build new schools. His opponent in the upcoming election states: Mayor Brown is not concerned with improving the quality of education for our children.

Answer: Answers may vary. Possible answer: Mayor Brown has not said that he is not concerned with improving the quality of children's education, merely that he opposes this particular tax increase to build new schools. (Perhaps he would prefer a tax increase to improve the current schools instead of building new ones, or perhaps he thinks the quality of education can be improved without raising taxes) Mayor Brown's opponent has distorted his views. Any argument based on a distortion of someone else's ideas or beliefs is called a straw man.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

The argument given or described involves some kind of fallacy. Identify the fallacy.

9) Each of my brother's three dogs has fleas. Therefore, all dogs have fleas.

- A) Straw man
- B) Hasty generalization
- C) Circular reasoning
- D) False cause

Answer: B

10) If Proposition Q fails, your children won't have good schools.

- A) Diversion (red herring)
- B) Appeal to ignorance
- C) Appeal to emotion
- D) Hasty generalization

Answer: C

11) One candidate favors eliminating affirmative action programs. The other candidate states: "My opponent doesn't think there's anything wrong with discrimination."

- A) Hasty generalization
- B) Straw man
- C) Personal attack (ad hominem)
- D) Limited choice

Answer: B

12) When confronted with questions from the press about alleged scandals, a congressman replies that the allegations against him should be ignored since his accuser is part of a vast right-wing conspiracy.

- A) Appeal to popularity
- B) Circular reasoning
- C) Limited choice
- D) Personal attack (ad hominem)

Answer: D

13) You should brush your teeth every day because brushing your teeth is very important.

- A) False cause
- B) Diversion (red herring)
- C) Circular reasoning
- D) Hasty generalization

Answer: C

14) A television commercial shows two people who fall in love while wearing a certain brand of blue jeans.

- A) Hasty generalization
- B) Appeal to emotion
- C) Appeal to ignorance
- D) Limited choice

Answer: B

15) We must limit immigration to the United States in order to sustain the prosperous economy. A strong economy is vital to the health and wealth of the American people and the future of our children.

- A) Straw man
- B) Appeal to force
- C) False cause
- D) Diversion (red herring)

Answer: D

- 16) After getting new dishes, I started to sneeze. I must be allergic to the new dishes.
- A) False cause
  - B) Circular reasoning
  - C) Personal attack (ad hominem)
  - D) Hasty generalization

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Decide whether the statement makes sense. Explain your reasoning.

- 17) The propositions "I am hungry" and "I am not hungry" are both true, since sometimes I am hungry and sometimes I am not hungry.

Answer: Does not make sense. The second proposition is the negation of the first proposition. If a proposition is true, then its negation must be false, and vice versa. Thus, the two propositions cannot both be true. But, you argue, I was hungry at 7:00 this morning, but then I ate breakfast and I was not hungry at 8:00. The explanation is that "I was hungry at 7:00 this morning" and "I was hungry at 8:00 this morning" are two different propositions. The first one is true and its negation is false, while the second one is false and its negation is true. (Explanations will vary.)

- 18) If "unconscious" means "not located in the United States," then Florida is not unconscious.

Answer: Makes sense. You might think the statement does not make sense since the definition of "unconscious" is not actually "not located in the United States" and the assertion about Florida does not, on its own, make sense. However, the only question is whether if the definition were correct, the assertion about Florida would be correct. If "unconscious" means "not located in the United States," then "Florida is not unconscious" could be rephrased as "Florida is not not located in the United States" and then, replacing the double negation, "Florida is located in the United States." That assertion is clearly true. (Explanations will vary.)

- 19) If you have \$5, then you will buy a hot dog; and, contrapositively, if you don't have \$5, then you won't buy a hot dog. (Hint: focus on whether the word "contrapositively" is used correctly.)

Answer: Does not make sense. The contrapositive of "If p, then q" is "If not q, then not p." The contrapositive of "If you have \$5, then you will buy a hot dog" is "If you will not buy a hot dog, then you don't have \$5." What is actually given is the inverse. (Explanations will vary.)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the statement is a proposition.

- 20)  $2 + 5 = 8$

A) Proposition

B) Not a proposition

Answer: A

- 21) Not all flowers are roses.

A) Not a proposition

B) Proposition

Answer: B

- 22) Do you like this color?

A) Not a proposition

B) Proposition

Answer: A

- 23)  $0.8 = .08$

A) Proposition

B) Not a proposition

Answer: A

24) Go fly a kite.

A) Not a proposition

Answer: A

B) Proposition

25) One inch is 2.54 meters.

A) Proposition

Answer: A

B) Not a proposition

26) Mary has a cat.

A) Proposition

Answer: A

B) Not a proposition

Write the negation of the proposition.

27) Susie lives in a green house.

A) Susie does not live in a house that is not green.

C) Billy lives in a green house.

Answer: D

B) Susie lives in a blue house.

D) Susie does not live in a green house.

28) Emily has brown eyes.

A) Jason has brown eyes.

C) Emily does not have brown eyes.

Answer: C

B) Emily has green eyes.

D) Emily does not have green eyes.

29) She earns more than me.

A) She earns the same as me.

C) She does not earn more than me.

Answer: C

B) She does not earn less than me.

D) She earns less than me.

30) Not all people like football.

A) Some people do not like football.

C) All people do not like football.

Answer: D

B) Some people like football.

D) All people like football.

31) Everyone is asleep.

A) Everyone is awake.

C) Nobody is asleep.

Answer: B

B) Not everyone is asleep.

D) Nobody is awake.

32) Some athletes are musicians.

A) Not all athletes are musicians.

C) All athletes are musicians.

Answer: D

B) Some athletes are not musicians.

D) No athlete is a musician.

33) No fifth graders play soccer.

A) At least one fifth grader plays soccer.

C) No fifth grader does not play soccer.

Answer: A

B) Not all fifth graders play soccer.

D) All fifth graders play soccer.

34) Some people don't like walking.

A) Nobody likes walking.

C) Everyone likes walking.

B) Some people don't like driving.

D) Some people like walking.

Answer: C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

The statement contains a double or multiple negation. Analyze the statement, explaining what it means.

35) The House of Representatives voted to override the veto of the communications bill.

Answer: Answers may vary. One possibility: This is a double negation. The veto of the bill (presumably by the President) is the first negation. The overriding of the veto is the second negation. The two cancel each other out, and the result is that the communications bill is passed. In general, a double negation (not not p) has the same same truth value as the original proposition p.

36) The councilman does not oppose the anti-pollution measure.

Answer: Answers may vary. One possibility: Since "does not oppose" is a double negation, the councilman supports the measure. The term "anti-pollution" is an additional negation, so in supporting the measure, the councilman is acting against pollution. A triple negation (not not not p) has the opposite truth value as the original proposition p.

37) The state assembly repealed the ban on anti-smoking resolutions.

Answer: Answers may vary. One possibility: The expression "repealed the ban" is a double negation. In repealing the ban on the resolutions in question, the state assembly in effect allowed them. Since the resolutions are "anti-smoking," a third negation is involved. A triple negation (not not not p) has the opposite truth value as the original proposition p. In short, the assembly is now allowing resolutions that prohibit smoking. If one were a lobbyist for the tobacco companies, this might be a setback.

38) "As your Senator, I cannot in good conscience oppose those who are against deregulation."

Answer: Answers may vary. One possibility: There are four negations in that statement: cannot, oppose, those who are against, and deregulation. A quadruple negation (not not not not p) has the same truth value as the original proposition p. In short, the Senator is for regulation of the area in question.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Make a truth table for the given statement. The letters p, q, r, s represent propositions.

39) p or q

A)

p	q	p or q
T	T	T
T	F	F
F	T	F
F	F	F

B)

p	q	p or q
T	T	T
T	F	T
F	T	T
F	F	F

C)

p	q	p or q
T	T	T
T	F	F
F	T	T
F	F	F

D)

p	q	p or q
T	T	F
T	F	F
F	T	F
F	F	T

Answer: B

40) r and not s

A)

r	s	p and not s
T	T	F
T	F	T
F	T	F
F	F	F

B)

r	s	r and not s
T	T	F
T	F	T
F	T	F
F	F	F

C)

r	s	r and not s
T	T	T
T	F	T
F	T	F
F	F	T

D)

r	s	r and not s
T	T	T
T	F	F
F	T	F
F	F	F

Answer: B

41) q and (not r) and s

A)

q	r	s	q and (not r) and s
T	T	T	T
T	T	F	F
T	F	T	F
T	F	F	F
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

B)

q	r	s	q and (not r) and s
T	T	T	F
T	T	F	F
T	F	T	T
T	F	F	F
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

C)

q	r	s	q and (not r) and s
T	T	T	F
T	T	F	T
T	F	T	F
T	F	F	F
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

D)

q	r	s	q and (not r) and s
T	T	T	F
T	T	F	F
T	F	T	T
T	F	F	T
F	T	T	F
F	T	F	F
F	F	T	F
F	F	F	F

Answer: B

42) if q, then not r

A)

q	r	if q, then not r
T	T	F
T	F	T
F	T	T
F	F	T

B)

q	r	if q, then not r
T	T	T
T	F	F
F	T	T
F	F	T

C)

q	r	if q, then not r
T	T	F
T	F	T
F	T	F
F	F	F

D)

q	r	if q, then not r
T	T	T
T	F	F
F	T	F
F	F	F

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

The statement connects two individual propositions with the word and. State whether the entire statement is true or false, and explain why.

43) Springfield is the capital of Illinois and Chicago is the capital of Illinois.

Answer: False. Springfield is the capital of Illinois, but Chicago is not the capital of Illinois. (Even if you don't know the capital of Illinois, you can determine that at least one of the propositions is false.) Since one of the individual propositions is false, the conjunction is false.

44) George Washington was the first president of the United States of America and France is in Europe.

Answer: True. Both individual propositions are true, so the conjunction is true.

45)  $7 + 8 = 15$  and  $5 \times 3 = 20$

Answer: False. The proposition  $7 + 8 = 15$  is true, but the proposition  $5 \times 3 = 20$  is false. Since one of the individual propositions is false, the conjunction is false.

46) There are seven days in a week and there are 24 hours in a day.

Answer: True. Both individual propositions are true, so the conjunction is true.

47) The sun is bigger than the moon and the sun rotates around the earth.

Answer: False. Is is true that the sun is bigger than the moon, but it is not true that the sun rotates around the earth. (The earth rotates around the sun.) Since one of the individual propositions if false, the conjunction is false.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

State whether or is being used in the exclusive or inclusive sense in the given statement.

48) I don't know if I should wear my new skirt or my new dress tonight.

A) Inclusive

B) Exclusive

Answer: B

49) Shaun will win the race if he eats carbohydrates beforehand or if he has slept well.

A) Inclusive

B) Exclusive

Answer: A

50) The insurance policy will not cover misuse or acts of God.

A) Inclusive

B) Exclusive

Answer: A

51) The prize is a new car or \$10,000 cash.

A) Exclusive

B) Inclusive

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

The statement connects two individual propositions with the word or. State whether the entire statement is true or false, and explain why.

52) Cats reads books or dogs bark.

Answer: True. Although cats do not read books, dogs do bark. The disjunction is false only if both individual propositions are false.





- 63) Attending practice is necessary for staying on the team.
- A) If you don't attend practice, then you must stay on the team.
  - B) If you stay on the team, then you must attend practice.
  - C) If you don't stay on the team, then you must not attend practice.
  - D) If you attend practice, then you must stay on the team.

Answer: B

- 64) Showing up at the party is sufficient to get a door prize.
- A) If you show up at the party, then you will get a door prize.
  - B) If you get a door prize, then you don't have to show up at the party.
  - C) If you got a door prize, then you showed up at the party.
  - D) If you don't show up at the party, then you will not get a door prize.

Answer: A

- 65) Cats chase mice.
- A) If a cat is chasing it, then it is a mouse.
  - B) If cats chase, then they chase mice.
  - C) If it is a cat, then it chases mice.
  - D) If cats, then mice.

Answer: C

- 66) All chocolate is good.
- A) If it's good, then it's chocolate.
  - B) If it's chocolate, then it's good.
  - C) If it isn't good, then it's chocolate.
  - D) If it isn't chocolate, then it isn't good.

Answer: B

- 67) Having a computer is necessary for taking this class.
- A) If you take this computer, then you must have a class.
  - B) If don't take this class, then you must not have a computer.
  - C) If you have a computer, then you must take this class.
  - D) If you take this class, then you must have a computer.

Answer: D

- 68) Being in California is sufficient for being in Los Angeles.
- A) If you are in Los Angeles, then you are in California.
  - B) If you are in California, then you are not in Los Angeles.
  - C) If you are in Los Angeles, then you might be in California.
  - D) If you are in California, then you are in Los Angeles.

Answer: D

Write the converse, inverse, or contrapositive off the proposition, as indicated.

- 69) If I pass, then I'll celebrate. (contrapositive)
- A) If I pass, then I won't celebrate.
  - B) If I don't celebrate, then I didn't pass.
  - C) If I celebrate, then I'll pass.
  - D) If I don't pass, then I won't celebrate.

Answer: B

- 70) If the sun shines, they will bask. (inverse)
- A) If they bask, then the sun shines.
  - B) If they do not bask, then the sun shines.
  - C) If they do not bask, then the sun does not shine.
  - D) If the sun does not shine, then they will not bask.

Answer: D

- 71) If the alarm beeps every thirty seconds, then you have to replace the battery. (converse)
- A) If you have to replace the battery, then the alarm does not beep every thirty seconds.
  - B) If you do not have to replace the battery, then the alarm does not beep every thirty seconds.
  - C) If you have to replace the battery, then the alarm beeps every thirty seconds.
  - D) If the alarm does not beep every thirty seconds, then you do not have to replace the battery.

Answer: C

- 72) If the sum of the interior angles of a geometric figure is 180 degrees, then the figure is a triangle. (contrapositive)
- A) If a geometric figure is not a triangle, then the sum of the interior angles is 180 degrees.
  - B) If the sum of the interior angles of a geometric figure is not 180 degrees, then the figure is not a triangle.
  - C) If a geometric figure is a triangle, then the sum of the interior angles is 180 degrees.
  - D) If a geometric figure is not a triangle, then the sum of the interior angles is not 180 degrees.

Answer: D

- 73) If you received a refund of over \$1000, then you cannot make a claim. (inverse)
- A) If you cannot make a claim, then you did not receive a refund of over \$1000.
  - B) If you can make a claim, then you did not receive a refund of over \$1000.
  - C) If you did not receive a refund of over \$1000, then you can make a claim.
  - D) If you can make a claim, then you received a refund of over \$1000.

Answer: C

Two statements are listed in which p, q, and r represent propositions. Are the two statements logically equivalent?

- 74) not (p and q); (not p) and (not q)

A) Yes B) No

Answer: B

- 75) not (p or q); (not p) and (not q)

A) Yes B) No

Answer: A

- 76) not (p and q); (not p) or q

A) Yes B) No

Answer: B

- 77) p or q; not [(not p) and (not q)]

A) Yes B) No

Answer: A

- 78) (p or q) or r; p or (q or r)

A) No B) Yes

Answer: B

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Decide whether the statement makes sense. Explain your reasoning.

- 79) The time I spend studying is a subset of the time I spend playing basketball.

Answer: Does not make sense. For this to be true, all the time you spent studying would have to be time you also spent playing basketball. This could be true if you spend literally no time studying or if you did all your reading while dribbling a basketball, but both possibilities strain credulity. (Explanations will vary.)

80) I drew a Venn diagram for two sets, and I only used one circle.

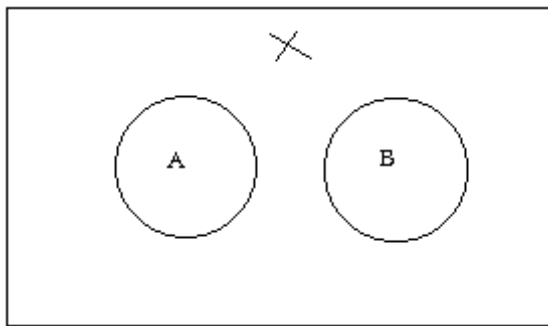
Answer: Makes sense. Generally it takes two circles to draw a Venn diagram for two sets, for example when the sets are overlapping or disjoint. Even when one set is the subset of the other, it generally takes two circles to draw a Venn diagram. However, if the two sets are equal, then they have precisely the same members and the same circle describes both sets. Incidentally, if two sets are equal then they are both subsets of each other. (Explanations will vary.)

81) The answer to the question is a whole number but it is not an integer.

Answer: Does not make sense. The set of integers includes the whole numbers and their negatives, and thus the set of whole numbers is a subset of the set of integers. As such, all members of the set of whole numbers are also members of the set of integers. Therefore, if the answer to the question is a whole number it must also be an integer. (Explanations will vary.)

82) A and B are disjoint sets, so an object is either a member of set A or a member of set B, but not a member of both sets.

Answer: Does not make sense. It is true that if A and B are disjoint sets, then an object cannot be a member of both sets. However, that does not mean it has to be a member of either set. It can also be a member of neither. The X in the following diagram represents an object that is a member of neither set A nor set B. If set A were the set of animals, and set B were the set of vegetables, then the X might represent a mineral. (Explanations will vary.)



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Choose the first set in the list natural numbers, whole numbers, integers, rational numbers, and real numbers that describes the following number.

83) 6.3

- A) Real numbers      B) Rational numbers      C) Natural numbers      D) Integers

Answer: B

84)  $\frac{5}{9}$

- A) Real numbers      B) Rational numbers      C) Integers      D) Natural numbers

Answer: B

85)  $\sqrt{2}$

- A) Real numbers      B) Rational numbers      C) Natural numbers      D) Whole numbers

Answer: A

86) -10

- A) Integers      B) Rational numbers      C) Natural numbers      D) Whole numbers

Answer: A

- 87) 16  
 A) Natural numbers      B) Real numbers      C) Whole numbers      D) Integers  
 Answer: A
- 88)  $-3\pi$   
 A) Rational numbers      B) Real numbers      C) Integers      D) Whole numbers  
 Answer: B
- 89) 0  
 A) Integers      B) Natural numbers      C) Whole numbers      D) Rational numbers  
 Answer: C
- 90) 3146  
 A) Whole numbers      B) Integers      C) Rational numbers      D) Natural numbers  
 Answer: D
- 91)  $-33.2$   
 A) Natural numbers      B) Rational numbers      C) Real numbers      D) Integers  
 Answer: B
- 92)  $-88$   
 A) Integers      B) Whole numbers      C) Real numbers      D) Natural numbers  
 Answer: A

Use braces to write the members of the set, or state that the set has no members.

- 93) The integers between 0 and 4 (not inclusive)  
 A) {1, 2, 3, 4}      B) {1, 2, 3}      C) {0, 1, 2, 3}      D) {0, 1, 2, 3, 4}  
 Answer: B
- 94) The integers from 5 to 9 (inclusive)  
 A) {5, 6, 7, 8}      B) {6, 7, 8, 9}      C) {5, 6, 7, 8, 9}      D) {6, 7, 8}  
 Answer: C
- 95) The whole numbers greater than 3 and less than 7  
 A) {4, 5, 6, 7}      B) {4, 5, 6}      C) {3, 4, 5, 6}      D) {3, 4, 5, 6, 7}  
 Answer: B
- 96) The letters needed to spell the following words: tear, rate, rat, tea  
 A) {a, e, r, t}      B) {r, a, t}  
 C) {tear, rate, rat, tea}      D) {t, e, a, r, r, a, t, e, r, a, t, t, e, a}  
 Answer: A
- 97) The positive-integer powers of 3  
 A) {1, 3, 9, 27, 81, 243, ...}      B) {3, 9, 27, 81, 243, ...}  
 C) {1, 8, 27, 64, 125, ...}      D) {3, 6, 9, 12, 15, ...}  
 Answer: B

98) The days of the week

- A) {Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Sunday}
- B) {Monday, Tuesday, Wednesday, Thursday, Friday}
- C) {Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday}
- D) {Saturday, Sunday}

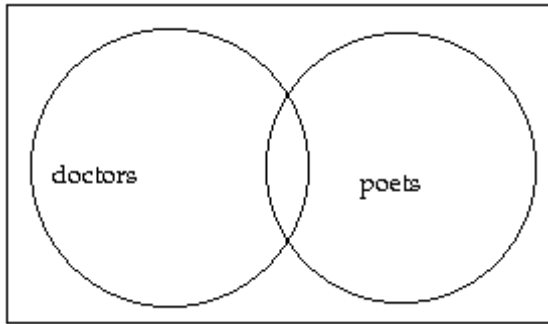
Answer: C

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Draw a Venn diagram for the given sets. In words, explain why you drew one set as a subset of the other, disjoint sets, or overlapping sets.

99) doctors and poets

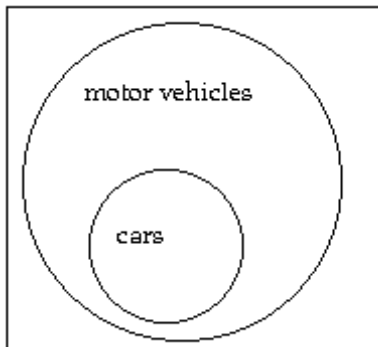
Answer:



The sets are overlapping. It is possible for a person to be both a doctor and a poet, but a doctor is not necessarily a poet and a poet is not necessarily a doctor.

100) motor vehicles and cars

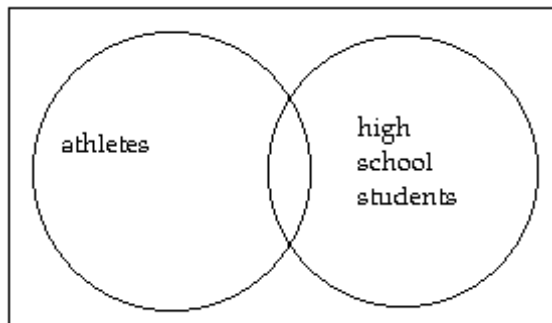
Answer:



The set "cars" is a subset of the set "motor vehicles." Every car is a motor vehicle, but there are some motor vehicles, such as trucks, that are not cars.

101) athletes and high school students

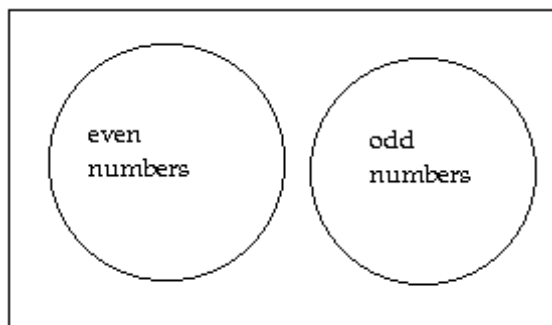
Answer:



The sets are overlapping. It is possible for a person to be both an athlete and a high school student, but not all athletes are high school students and not all high school students are athletes.

102) even numbers and odd numbers

Answer:



The set "even numbers" is disjoint from the set "odd numbers" because the two sets have no members in common. An even number cannot be odd, and an odd number cannot be even.

103) beverages and soft drinks

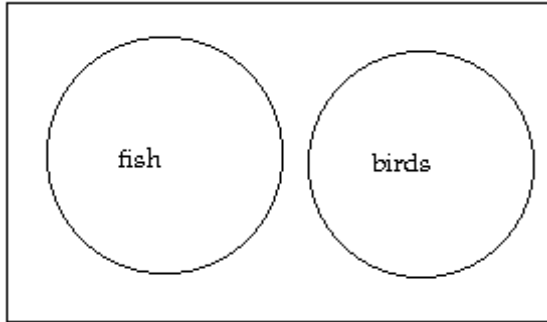
Answer:



The set "soft drinks" is a subset of the set "beverages." All soft drinks are beverages, but some beverages (e.g. water) are not soft drinks.

104) fish and birds

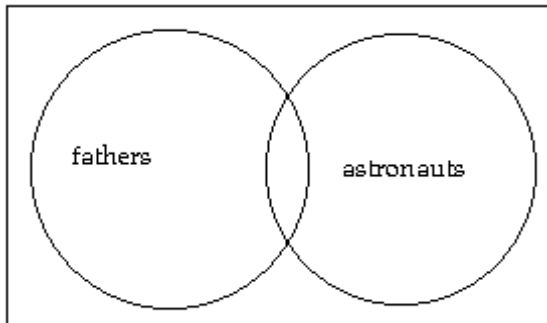
Answer:



The set "fish" is disjoint from the set "birds" because the two sets have no members in common. A fish cannot be a bird, and a bird cannot be a fish.

105) astronauts and fathers

Answer:

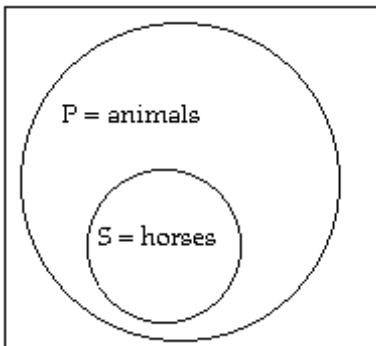


The sets are overlapping. It is possible for a person to be both an astronaut and a father, but not all astronauts are fathers and certainly not all fathers are astronauts.

A categorical proposition is given. If it is not already in standard form, rephrase it. State the subject and predicate sets, and draw a Venn diagram for the proposition. Label all regions of the diagram clearly.

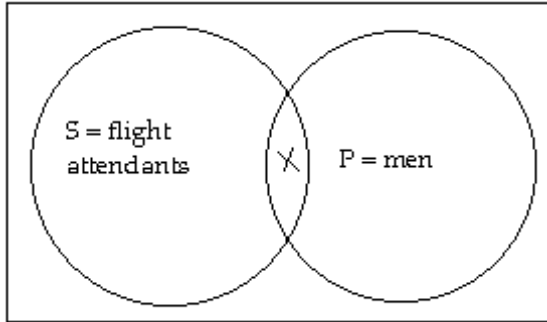
106) All horses are animals.

Answer: The subject set is "horses" and the predicate set is "animals."



107) Some flight attendants are men.

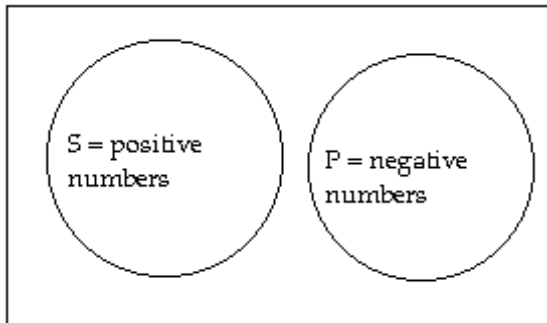
Answer: The subject set is "flight attendants" and the predicate set is "men."



The X indicates that the overlapping region has at least one member. No claim is made about whether other regions also have members.

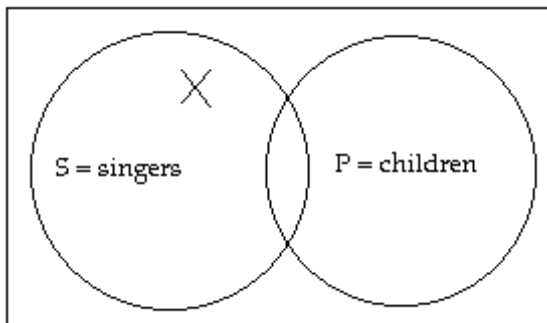
108) No positive numbers are negative numbers.

Answer: The subject set is "positive numbers" and the predicate set is "negative numbers."



109) Some singers are not children.

Answer: The subject set is "singers" and the predicate set is "children."



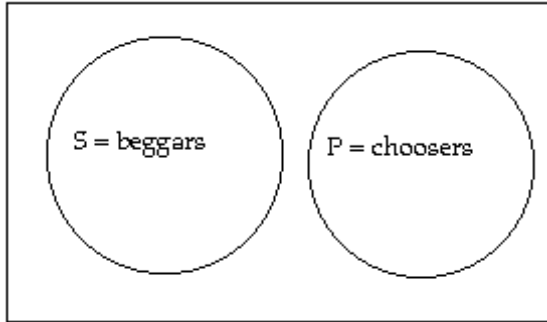
The X indicates that the non-overlapping region of the "singers" circle has at least one member. No claim is made about whether other regions also have members.



110) Beggars can't be choosers.

Answer: In standard form: No beggars are choosers.

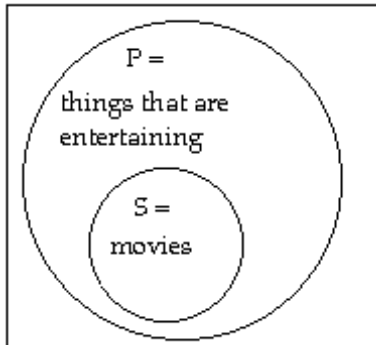
The subject set is "beggars" and the predicate set is "choosers."



111) Movies are entertaining.

Answer: In standard form: All movies are things that are entertaining.

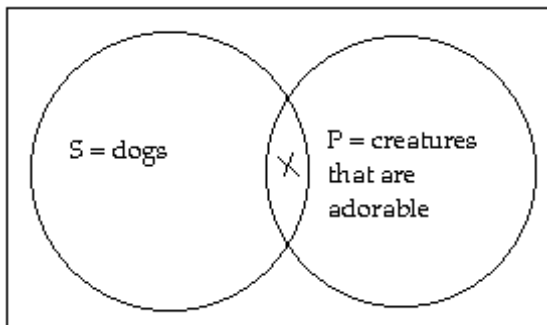
The subject set is "movies" and the predicate set is "things that are entertaining."



112) Some dogs are adorable.

Answer: In standard form: Some dogs are creatures that are adorable.

The subject set is "dogs" and the predicate set is "creatures that are adorable."

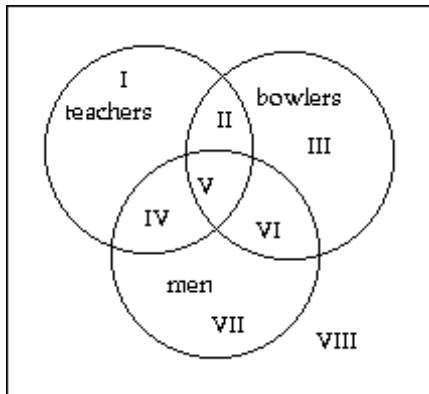


The X indicates that the overlapping region has at least one member. No claim is made about whether other regions also have members.

Draw a Venn diagram with three overlapping circles for the three given sets. Label the contents of every region. If a region has no members, state that fact clearly.

113) teachers, bowlers, and men

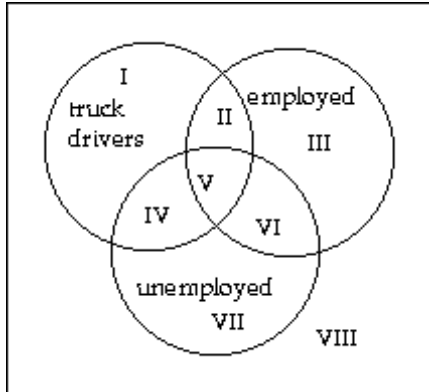
Answer:



- I = female teachers who are not bowlers
- II = female teachers who are bowlers
- III = female bowlers who are not teachers
- IV = male teachers who are not bowlers
- V = male teachers who are bowlers
- VI = male bowlers who are not teachers
- VII = men who are neither teachers nor bowlers
- VIII = women who are neither teachers nor bowlers

114) truck drivers, employed, unemployed

Answer:

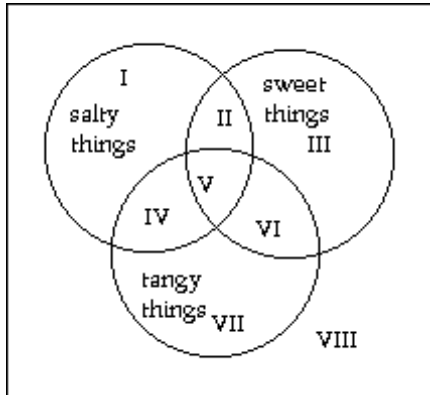


- I\* = truck drivers who are neither employed nor unemployed
- II = employed truck drivers
- III = non-truck drivers who are employed
- IV = unemployed truck drivers
- V\* = truck drivers who are both employed and unemployed
- VI\* = non-truck drivers who are both employed and unemployed
- VII = non-truck drivers who are unemployed
- VIII\* = non-truck drivers who are neither employed nor unemployed

\*This region has no members.

115) salty things, sweet things, tangy things

Answer:

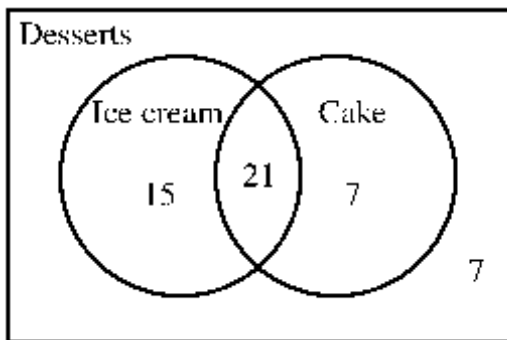


- I = things that are salty, but neither sweet nor tangy
- II = things that are both salty and sweet, but not tangy
- III = things that are sweet, but neither salty nor tangy
- IV = things that are salty and tangy, but not sweet
- V = things that are salty, sweet, and tangy
- VI = things that are sweet and tangy, but not salty
- VII = things that are tangy, but neither sweet nor salty
- VIII = things that are neither salty, sweet, nor tangy

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

116) The following Venn diagram describes the desserts people ordered at a party. Use it to determine how many people ordered cake.



A) 28

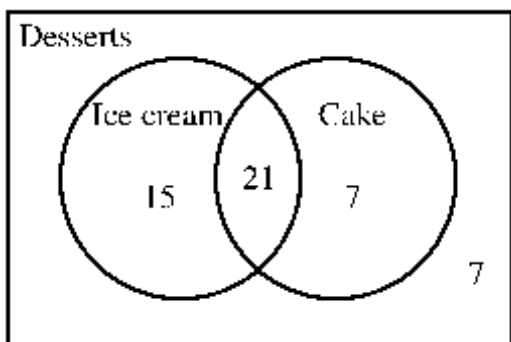
B) 21

C) 43

D) 7

Answer: A

117) The following Venn diagram describes the desserts people ordered at a party. Use it to determine how many people ordered ice cream but not cake.



A) 36

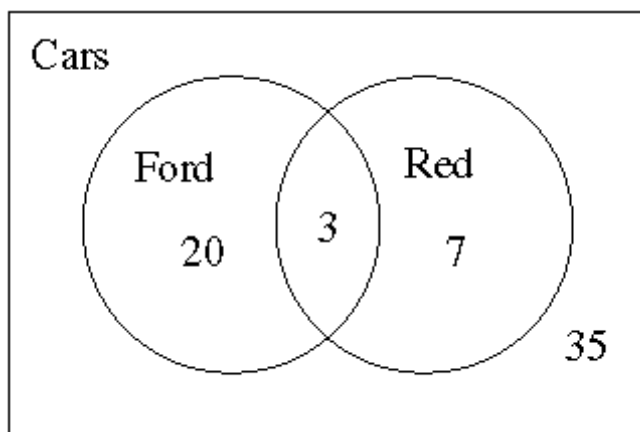
B) 21

C) 15

D) 7

Answer: C

118) The following Venn diagram describes the cars on a used car lot. Use it to determine how many Fords are on the lot.



A) 20

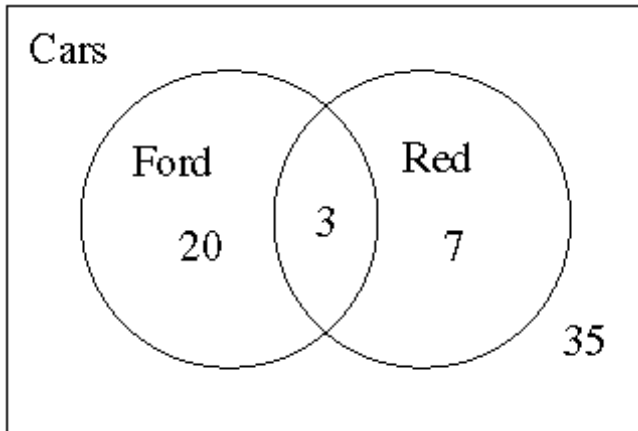
B) 17

C) 30

D) 23

Answer: D

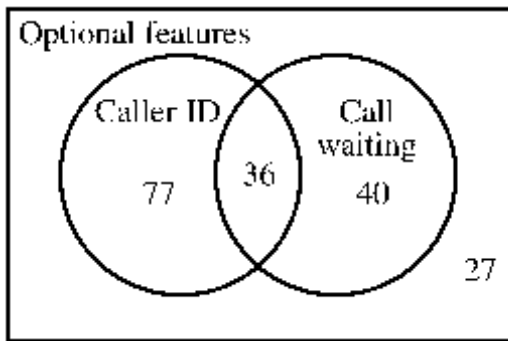
119) The following Venn diagram describes the cars on a used car lot. Use it to determine how many cars on the lot are not red.



- A) 35                                      B) 38                                      C) 55                                      D) 58

Answer: C

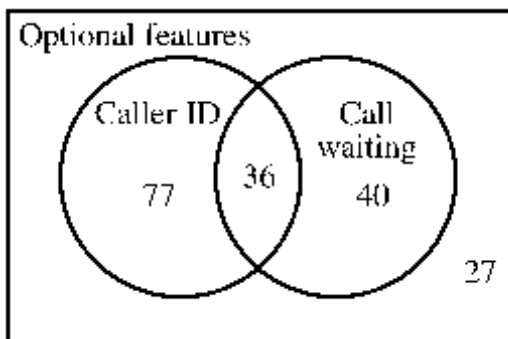
120) The following Venn diagram describes the optional features ordered by new telephone customers in a certain region. Use it to determine how many customers ordered call waiting.



- A) 76                                      B) 36                                      C) 77                                      D) 40

Answer: A

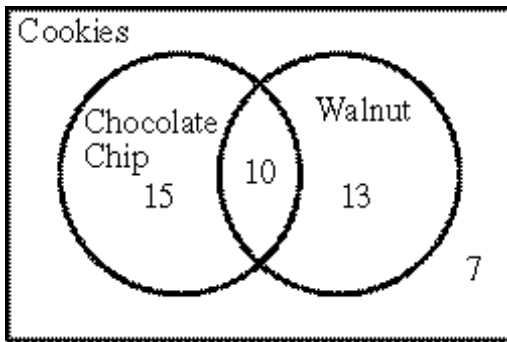
121) The following Venn diagram describes the optional features ordered by new telephone customers in a certain region. Use it to determine how many customers did not order caller ID.



- A) 76                                      B) 103                                      C) 67                                      D) 77

Answer: C

122) The following Venn diagram describes the types of cookies in a bakery. Use it to determine how many chocolate chip cookies do not also have walnuts.



A) 32

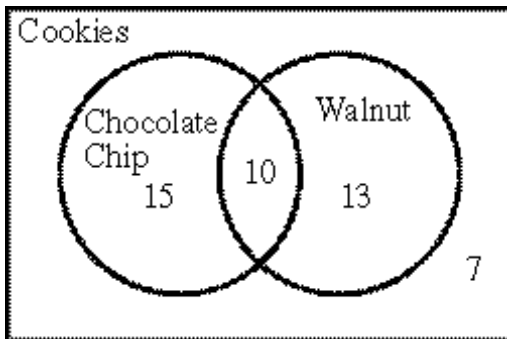
B) 10

C) 25

D) 15

Answer: D

123) The following Venn diagram describes the types of cookies in a bakery. Use it to determine how many cookies have neither chocolate chips nor walnuts.



A) 10

B) 3

C) 17

D) 7

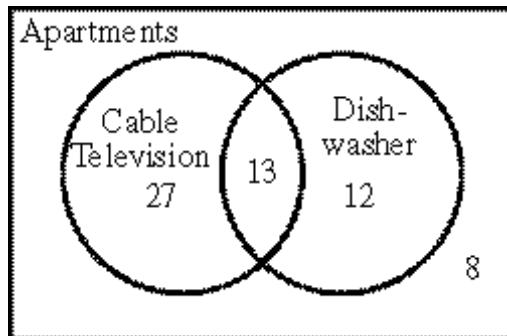
Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Draw a Venn diagram to represent the given information.

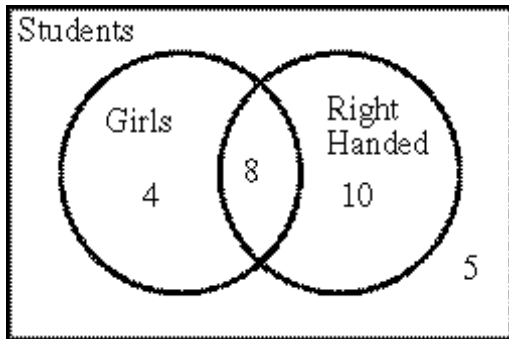
124) In a complex of 60 apartments, 40 apartments have cable television, 25 apartments have a dishwasher, and 13 apartments have both cable television and a dishwasher.

Answer: Answers may vary. Possible answer:



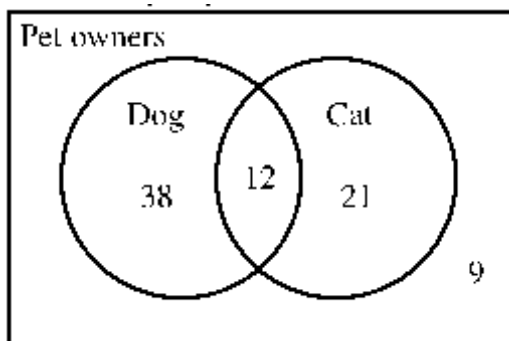
125) There are 12 girls and 15 boys in a kindergarten class. 8 of the girls and 10 of the boys are right handed.

Answer: Answers may vary. Possible answer:



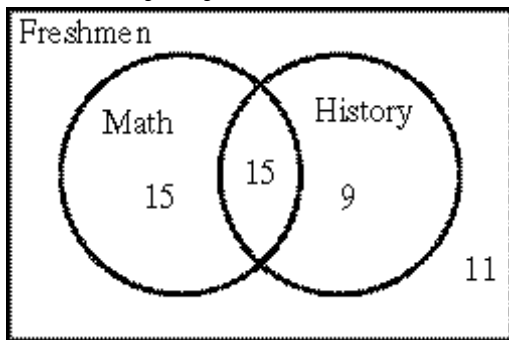
126) In a survey of 80 pet owners, 50 had a dog, 33 had a cat, and 12 had both a cat and a dog.

Answer: Answers may vary. Possible answer:



127) In a freshman class of 50 students, 30 students are taking math, 24 students are taking history, and 15 students are taking both math and history.

Answer: Answers may vary. Possible answer:



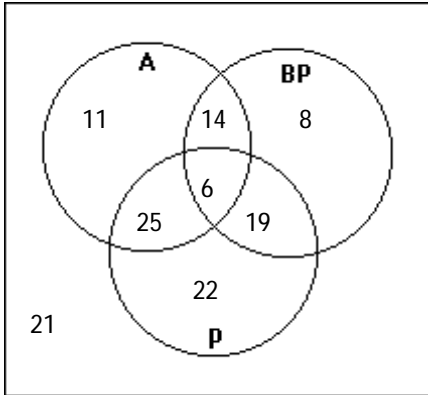
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

128) Patients in a (hypothetical) hospital on a single day were taking antibiotics (A), blood pressure medication (BP), and medication (P) in the following numbers:

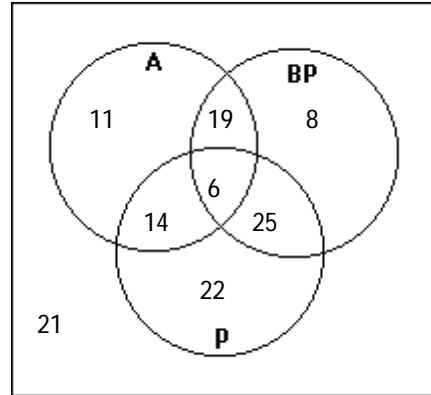
A only	11	A and BP only	14
BP only	8	A and P only	25
P only	22	BP and P only	19
None	6	All three	21

Draw a three-circle Venn diagram that summarizes the results in the table.

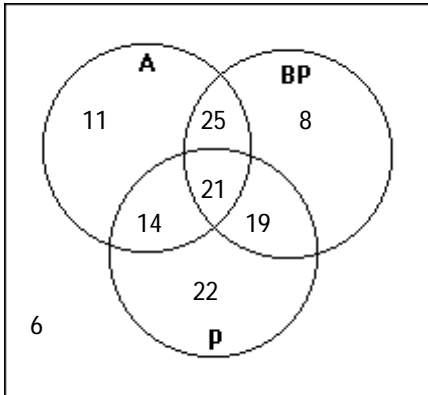
A)



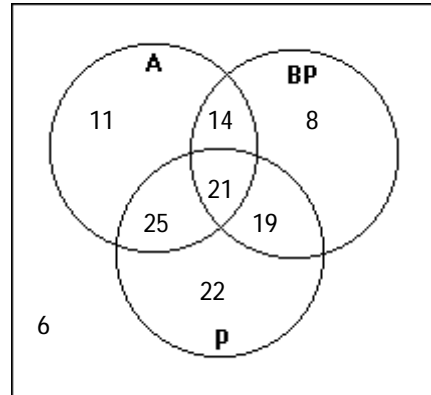
B)



C)



D)



Answer: D

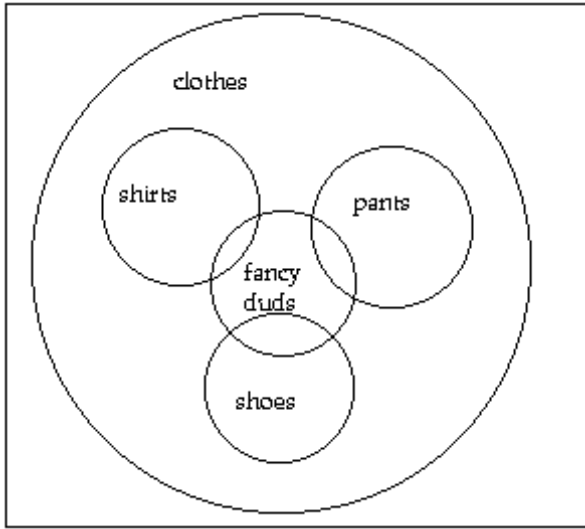


SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use your knowledge of the listed sets to draw a Venn diagram illustrating the relationships among them.

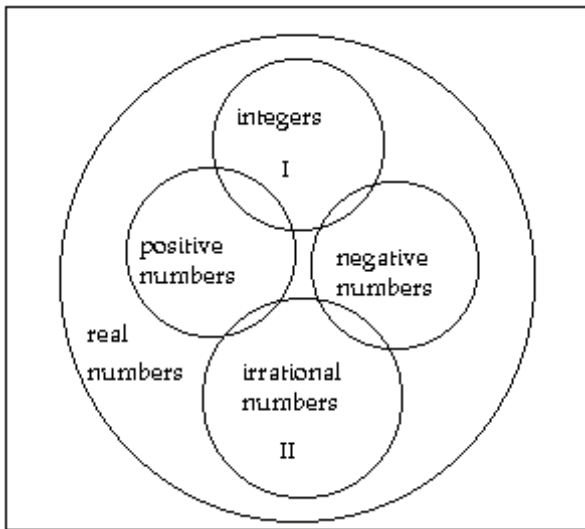
129) clothes, shirts, pants, shoes, fancy duds

Answer: Answers may vary. One possibility:



130) real numbers, integers, positive numbers, negative numbers, irrational numbers

Answer: Answers may vary. One possibility:



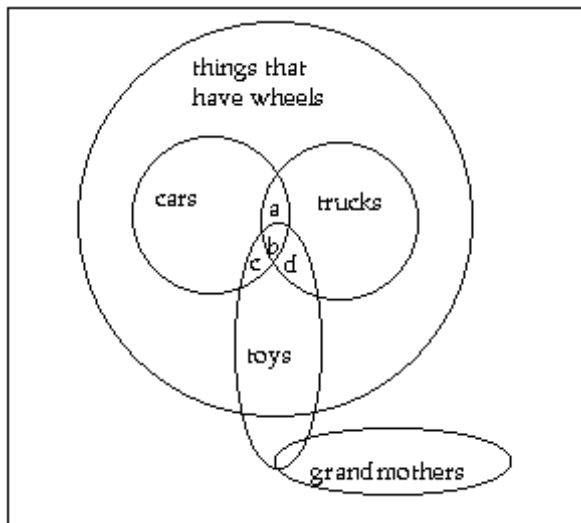
Note that there is exactly one element in region I, since the number 0 is the only integer that is neither negative nor positive. Note also that there are no elements in region II, since each irrational number is either negative or positive.

A set of propositions is listed. Draw a Venn diagram that represents all the information in the propositions and use it (and no other assumptions) to answer the question. Explain your reasoning.

131) All cars have wheels. All trucks have wheels. Some toys have wheels. No grandmothers have wheels.

Question: Could a car be both a truck and a toy?

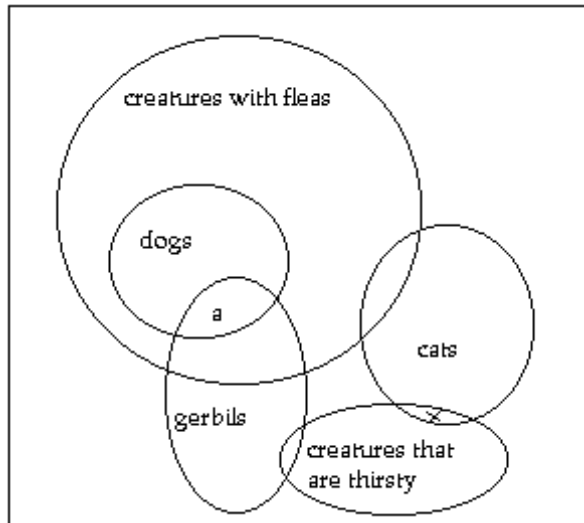
Answer: Answers may vary. One possibility:



Yes, a car could be both a truck and a toy. We know from the first two propositions that the set "cars" and "trucks" are subsets of the set "things that have wheels," but we do not know whether the two subsets are disjoint or overlapping or whether one is a subset of the other. We know from the third proposition that the set "toys" overlaps the set "things that have wheels," but we do not know whether it also overlaps either or both of the sets "cars" and "trucks." Depending on whether or not "cars," "trucks," and "toys" overlap; the regions a, b, c, and d may or may not have any elements. Since region b might have elements, a car could be both a truck and a toy.

132) No dogs are cats. No gerbils are cats. All dogs have fleas. Some cats are thirsty. No thirsty creatures have fleas.  
Question: Could a gerbil be a dog?

Answer: Answers may vary. One possibility:



Yes, a gerbil could be a dog. We know from the first proposition that the set "dogs" is disjoint from the set "cats" and we know from the second proposition that the set "gerbils" is disjoint from the set "cats." However, we do not know the relationship between the sets "dogs" and "gerbils." It is possible that the two sets are not disjoint, so they will overlap in region a. A gerbil who is a dog would necessarily have fleas, since all dogs have fleas. Such a gerbil would not be thirsty, since no thirsty creatures have fleas.

Decide whether the statement makes sense. Explain your reasoning.

133) The argument is weak, so its conclusion must be false.

Answer: Does not make sense. The strength of an inductive argument is not necessarily related to the truth of its conclusion. The argument "The earth rotates around the sun because I said so" is extremely weak, but its conclusion happens to be true. For a long time people found the argument "The sun rotates around the earth" to be quite compelling, but its conclusion turned out to be false. (Explanations will vary.)

134) Your argument is sound, but it isn't valid.

Answer: Does not make sense. An argument is valid if its conclusion follows necessarily from its premises, regardless of the truth of its premises or conclusions. An argument is sound if it is valid and its premises are all true. By definition, if an argument is sound it is also valid. To put it another way, the set of sound arguments is a subset of the set of valid arguments. (Explanations will vary.)

135) Your conditional deductive argument is valid. Therefore, it must be an example of "Affirming the Hypothesis."

Answer: Does not make sense. There are four basic structures for conditional arguments. Two of them, "Affirming the Conclusion" and "Denying the Hypothesis," are invalid. The other two, "Affirming the Hypothesis" and "Denying the Conclusion," are valid. Since it might be an example of "Denying the Conclusion," it is not true that it must be an example of "Affirming the Hypothesis." (Explanations will vary.)

136) The premises are true and the conclusion is true, so the argument must be valid.

Answer: Does not make sense. For an argument to be valid, its conclusion must follow necessarily from its premise because the premises and the conclusion are true does not mean the conclusion follows necessarily from the premises. For example, consider the following argument:

Premise: Dogs bark.

Premise: Cats meow.

Conclusion: Pigs oink.

The premises and the conclusion are all true, but the conclusion has nothing to do with the premises.

(Explanations will vary.)

137) Your argument is valid, but it isn't sound.

Answer: Makes sense. An argument is valid if its conclusion follows necessarily from its premises, regardless of the truth of its premises or conclusions. An argument is sound if it is valid and its premises are all true. Many valid arguments have false premises and are thus not sound. For example:

Premise: When I close my eyes, I become invisible.

Premise: When I am invisible, I can speak Portuguese.

Conclusion: When I close my eyes, I can speak Portuguese.

The argument is valid, but its premises are clearly false so it isn't sound. (Explanations will vary.)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Decide whether the argument is inductive or deductive.

138) His last four at bats were strikeouts. Therefore, the next one will be a strikeout.

A) Inductive

B) Deductive

Answer: A

139) Fresh fruit is expensive in winter. This is January, so these fresh strawberries will be expensive.

A) Deductive

B) Inductive

Answer: A

140) Every coach must know his sport well. Steve Spurrier is a football coach, so Steve Spurrier knows football well.

A) Deductive

B) Inductive

Answer: A

141)  $7 + 17 = 24$ ,  $43 + 17 = 60$ ,  $41 + 13 = 54$ . Therefore, the sum of two prime numbers is even.

A) Inductive

B) Deductive

Answer: A

142) Practice makes perfect. Therefore, if I practice, I'll be perfect.

A) Inductive

B) Deductive

Answer: B

143) All U.S. Presidents have come from the contiguous 48 states. No person from Alaska can be President.

A) Inductive

B) Deductive

Answer: A

144) For any positive number  $p$ ,  $|-p| = p$ . Therefore,  $|-94| = 94$

A) Deductive

B) Inductive

Answer: A

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Determine the truth of the premises, discuss the strength of the argument, and assess the truth of the conclusion.

145) Premise: Monday is one of the days of the week.

Premise: Thursday is one of the days of the week.

Premise: Saturday is one of the days of the week.

Conclusion: All the days of the week have names that end in "day."

Answer: Answers may vary. Possible answer: The premises are true. The strength of the argument is relatively weak, since things aren't always named logically and consistently. (For example, the months September, November, and December all end in "ember", but none of the other nine months do!) The conclusion is true.

146) Premise: Calvin Coolidge was over 35 years old when he became President of the United States.

Premise: Bill Clinton was over 35 years old when he became President of the United States.

Premise: Ronald Reagan was over 35 when he became President of the United States.

Conclusion: Every United States politician is at least 35 years old.

Answer: Answers may vary. Possible answer: The premises are true. The strength of the argument is relatively weak. First, the examples may have been cherry picked from all the presidents (43 and counting). Second, the examples are of presidents, not of United States politicians in general. The conclusion is false. Although one must be at least 35 years old to be President of the United States, one can be younger and still occupy many other positions.

147) Premise: Baseball, football, basketball, golf, hockey, and tennis are all played with a ball.

Conclusion: All sports are played with a ball.

Answer: Answers may vary. Possible answer: The premise is false. Most of the sports listed are played with a ball, but hockey is played with a puck. The argument is weak, and the conclusion is false. Many sports, in addition to hockey, do not involve a ball, including wrestling, swimming, and skiing.

148) Premise:  $8 + 11 = 19$

Premise:  $12 + 7 = 19$

Premise:  $38 + 33 = 71$

Conclusion: Whenever we add an even number and an odd number, the result is an odd number.

Answer: Answers may vary. Possible answer: The premises are true. The argument is relatively strong, and the conclusion is true.

149) Premise: I get lower grades than my best friend in math, chemistry, and English.

Conclusion: My friend is smarter than I am.

Answer: Answers may vary. Possible answer: Since the example is fictitious, there is no way to determine the truth of the premise. The argument is weak. Perhaps my friend studies harder than I do, perhaps my friend cheats in his classes, or perhaps I get higher grades in biology, history, and art. Moreover, academic smarts are only one measure of intelligence. Since the example is fictitious, there is no way to assess the truth of the conclusion.

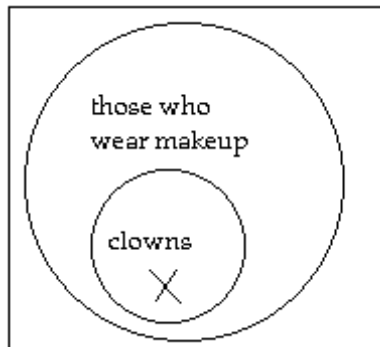
Draw a Venn diagram to determine whether the argument is valid.

150) Premise: All clowns wear makeup.

Premise: Bozo is a clown.

Conclusion: Bozo wears makeup.

Answer:



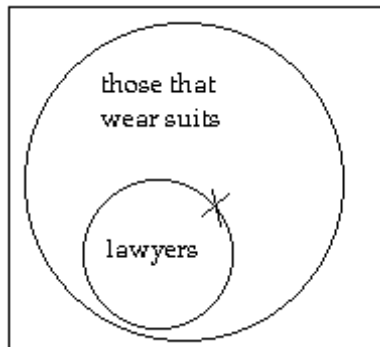
The X represents Bozo. The conclusion follows necessarily from the premises, and the argument is valid.

151) Premise: All lawyers wear suits.

Premise: Jack wears a suit.

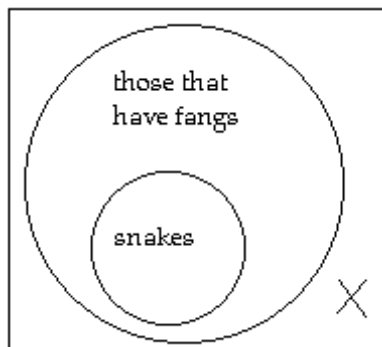
Conclusion: Jack is a lawyer.

Answer:



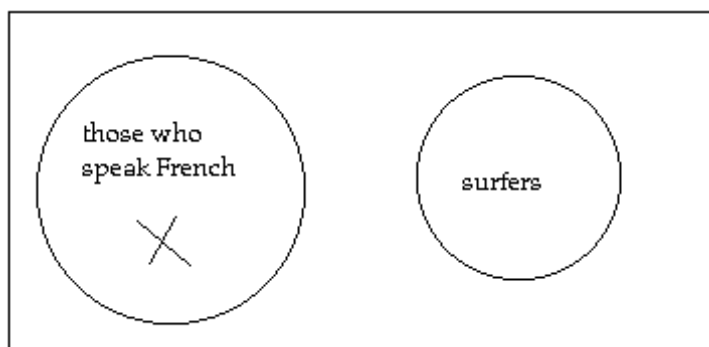
The X represents Jack. We do not have enough information to know whether the X should be inside or out the "lawyers" circle. Therefore, the conclusion does not follow necessarily from the premises, and the argument is invalid.

152) Premise: All snakes have fangs.  
Premise: Teri's pet does not have fangs.  
Conclusion: Teri's pet is not a snake.  
Answer:



The X represents Teri's pet. The conclusion follows necessarily from the premises, and the argument is valid.

153) Premise: No surfers speak French.  
Premise: Pierre speaks French.  
Conclusion: Pierre is not a surfer.  
Answer:



The X represents Pierre. The conclusion follows necessarily from the premises, and the argument is valid.

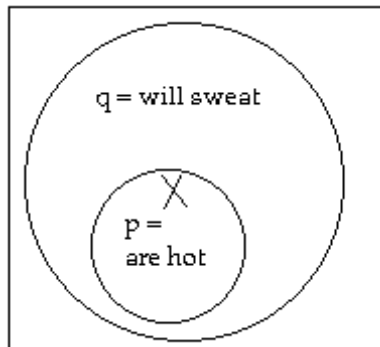
Identify the type of argument and determine its validity with a Venn diagram.

154) Premise: If you are hot, then you will sweat.

Premise: James is hot.

Conclusion: James will sweat.

Answer:



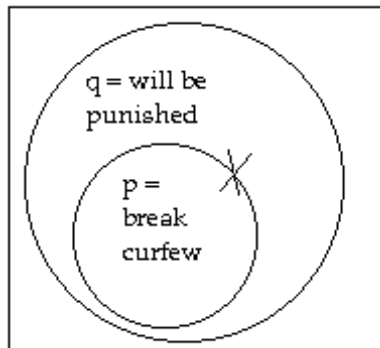
The type of argument is called Affirming the Hypothesis. We have  $p =$  you are hot and  $q =$  you will sweat. The second premise asserts that James is hot, which we show by putting an X in the p circle. Because the X is also in the q circle, q must also be true for James. The Venn diagram shows that the premises lead necessarily to the conclusion, so the argument is valid.

155) Premise: If you break curfew, then you will be punished.

Premise: Thelma was punished.

Conclusion: Thelma broke curfew.

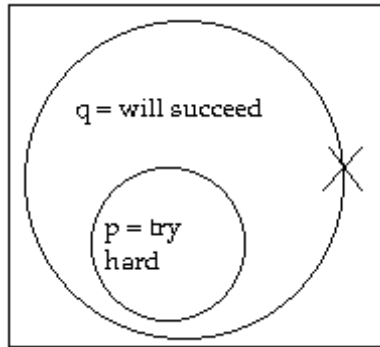
Answer:



The type of argument is called Affirming the Conclusion. We have  $p =$  you break curfew and  $q =$  you will be punished. The second premise asserts that Thelma was punished, which we show by putting an X in the q circle. However, the premise says nothing about whether Thelma broke curfew, so we put the X on the border of the p circle to indicate that we don't know whether the X belongs inside or outside this circle. The Venn diagram shows that the premises do not lead necessarily to the conclusion, so the argument is invalid. Thelma may have been punished for some other reason.

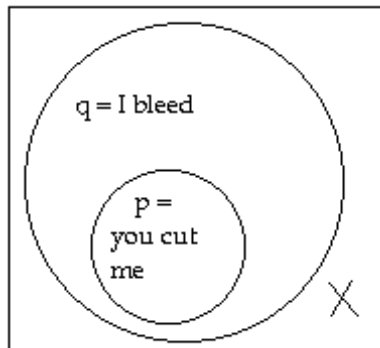


156) Premise: If you try hard, then you will succeed.  
 Premise: You did not try hard.  
 Conclusion: You will not succeed.  
 Answer:



The type of argument is called Denying the Hypothesis. We have  $p$  = you try hard and  $q$  = you will succeed. The second premise asserts that  $p$  is false for you, which we show by putting an X outside the  $p$  circle. However, we do not know whether the X should also be outside the  $q$  circle, because the premise says nothing about whether you succeeded. Thus, we put the X on the border of the  $q$  circle. The Venn diagram shows that the premises do not lead necessarily to the conclusion, so the argument is invalid. It is possible that, despite your not trying hard, you might still succeed.

157) Premise: If you cut me, I bleed.  
 Premise: I do not bleed.  
 Conclusion: You did not cut me.  
 Answer:



The type of argument is called Denying the Conclusion. We have  $p$  = you cut me and  $q$  = I bleed. The second premise asserts that  $q$  is false for me, which we show by putting an X outside the  $q$  circle. Since the  $p$  circle is inside the  $q$  circle, the X is outside the  $p$  circle, too. The Venn diagram shows that the premises lead necessarily to the conclusion, so the argument is valid.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Evaluate the validity of the chain of conditionals.

158) Premise: If I take a shower, I use soap.  
 Premise: If I use soap, my skin becomes dry.  
 Conclusion: If I take a shower, my skin becomes dry.  
 A) Invalid

B) Valid

Answer: B



165) Denying the hypothesis

Answer: Answers will vary. The structure of the argument should be as follows:

Premise: If p, then q.

Premise: p is not true.

Conclusion: q is not true.

The argument is invalid.

Decide whether the statement makes sense. Explain your reasoning.

166) I am very upset because the results of my biopsy were not positive for cancer.

Answer: Does not make sense. In this context, the word "positive" means "indicating the presence of." The fact that the results were not positive for cancer suggests that you don't have cancer. Perhaps there is an unusual explanation for why that would make you upset (e.g., masochism), but in general it does not make sense. (Explanations will vary.)

167) Javier takes a shower to save time. When he gets into the shower at 6:50, he is out by 7:10. When he used to take baths, it would take him a quarter of an hour.

Answer: Does not make sense. A quarter of an hour is 15 minutes, while the time between 6:50 and 7:10 is 20 minutes. It takes him five more minutes to shower, so to do it to save time doesn't make sense. (Explanations will vary.)

168) Insurance policy A costs \$250 and has no deductible. Insurance policy B costs \$275 and has a \$500 yearly deductible. Candace thinks the extra \$25 per month is worth it to get the \$500 deductible, so she buys policy B.

Answer: Does not make sense. Candace is paying an additional \$25 per month (\$300 per year) to get a \$500 deductible. However the deductible (what you pay out of pocket before the insurance kicks in) is a cost, not a benefit! All other things being equal, policy A is clearly the better deal. (Explanations will vary.)

169) Wayne's bank charges a \$1 service charge for every transaction. To save money, he withdraws \$100 cash every other week instead of withdrawing \$50 every week.

Answer: Makes sense. By taking out the same amount of money but reducing the number of withdrawals, he saves money on service charges (\$0.50 per week). What would make even more sense would be to find a bank that doesn't charge a fee for every transaction. (Explanations will vary.)

Provide an appropriate response.

170) Consider the following ballot initiative:

"Shall there be an amendment to the state constitution to prohibit the state legislature from adopting any law which inhibits the freedom of religious expression?"

Explain the meaning of a "no" vote.

Answer: Answers may vary. One possibility: A "no" vote means that you believe that the state legislature should have the authority to restrict religious expression.

171) Consider the following clause in a rental lease:

"Lessee may terminate this lease at the end of the initial term by providing Lessor with at least sixty (60) days prior written notice, to commence upon the first day of the month following the month in which said notice is delivered immediately if delivered on the first day of any month."

If the initial term of the lease ends on March 31 and the Lessee provides the Lessor written notice on April 1, as of what date can the lease be terminated? What if he provides notice on April 2?

Answer: Answers may vary. One possibility: If written notice is provided on April 1, then the lease can be terminated on May 30. If written notice is provided on April 2, then the lease cannot be terminated until June 29. In delaying notice until after the first of the month, the tenant makes himself responsible for another month of rent. That's one expensive day!

- 172) IRS guidelines state that a married person under 65 years of age who can be claimed as a dependent on another person's tax return must file a return if
- (i) unearned income was over \$750; or
  - (ii) earned income was over \$3925; or
  - (iii) total of earned and unearned income was at least \$5 and your spouse files a separate return and itemizes deductions; or
  - (iv) total of earned and unearned income was more than the greater of
    - a) \$750; or
    - b) earned income (up to \$3675) plus \$250.

Kevin is 25 years old and can be claimed as a dependent by his mother. He had earned income of \$3500 and unearned income of \$700. Kevin's wife Linda files a separate return but does not itemize deductions. Must Kevin file a return? Explain.

Answer: Yes, Kevin must file a return. He is a married person under 65 years of age who can be claimed as a dependent on another person's tax return. As such, he must file a return if any of (i)-(iv) apply.

- (i) does not apply since  $\$700 < \$750$ ;
- (ii) does not apply because  $\$3500 < \$3925$ ;
- (iii) does not apply because although his spouse (Linda) files a separate return, she does not itemize;
- (iv) does apply. The total of earned and unearned income ( $\$3500 + \$700 = \$4200$ ) is greater than both (a) \$750 and (b) earned income (up to \$3675) plus \$250 ( $\$3500 + \$250 = \$3750$ ). Thus, Kevin must file a return. (Explanations will vary.)

- 173) IRS guidelines state that a married person under 65 years of age who can be claimed as a dependent on another person's tax return must file a return if
- (i) unearned income was over \$750; or
  - (ii) earned income was over \$3925; or
  - (iii) total of earned and unearned income was at least \$5 and your spouse files a separate return and itemizes deductions; or
  - (iv) total of earned and unearned income was more than the greater of
    - a) \$750; or
    - b) earned income (up to \$3675) plus \$250.

Julia is 45 years old and can be claimed as a dependent by her father. She had earned income of \$3800 and unearned income of \$200. Julia's husband Bret files a separate return but does not itemize deductions. Must Julia file a return? Explain.

Answer: Yes, Julia must file a return. She is a married person under 65 years of age who can be claimed as a dependent on another person's tax return. As such, she must file a return if any of (i)-(iv) apply.

- (i) does not apply since  $\$200 < \$750$ ;
- (ii) does not apply because  $\$3800 < \$3925$ ;
- (iii) does not apply because although her spouse (Bret) files a separate return, he does not itemize;
- (iv) does apply. Part (b) is a little confusing. It says to start with earned income, but only earned income up to \$3675. Since  $\$3800 > \$3675$ , we start with \$3675. Then we add \$250 to get \$3925. The greater of (a) \$750 or (b) \$3925 is clearly \$3925. The total of Julia's earned and unearned income is \$4000 ( $\$3800 + \$200$ ). Since  $\$4000 > \$3925$ , (iv) applies and Julia must file a return. (Explanations will vary.)

174) The members of a union are on strike. They are satisfied with their hourly wage rate and benefits, but they want their overtime wage rate to be increased by 15% in their next contract. The head of management makes the following statement to the head of the union: "If you end the strike today and sign the contract, we will meet your demand and increase the overtime wage rate by 15%." Should the union head accept the offer? Explain.

Answer: Answers may vary. One possibility: The union head should ask for more information. Even though management has apparently agreed to the demand for a 15% increase in the overtime wage rate, it is not clear that the overall deal is a good one. It is entirely possible that management has lowered the hourly wage rate, reduced the benefits, or made other changes to the contract to the detriment of the members of the union. Before making any promises, before giving up leverage by ending the strike, and certainly before signing anything; these issues must be clarified.

175) You mention to an acquaintance that you wish to buy a Rolex watch, but the model you're interested in is too expensive for your budget. He says that his cousin sells watches, and he'll see if he can get you a deal. Sure enough, his cousin offers you the same watch for 50% of the price. Does this sound like a deal worth taking?

Answer: Answers may vary. One possibility: No. There is too much missing information and too many red flags. Why is the cousin of an acquaintance willing to give you such a good deal? Perhaps he's just a generous guy, but there are other possibilities to consider. He claims it's "the same watch," but how do you know it's not counterfeit? Even if it's authentic, how do you know it's not used or broken? Even if it's in mint condition, how do you know it's not stolen? In trying to save money, you might cost yourself money or even end up in jail.

A seemingly simple argument is given. Identify at least two hidden assumptions.

176) All bills should be paid on time because a bad credit report will make it difficult to get a loan.

Answer: Answers may vary. One possibility:  
Paying bills late will result in bad credit.  
It is important to be able to get a loan.

177) It is important to visit the dentist every 6 months to insure healthy teeth and gums.

Answer: Answers may vary. One possibility:  
Healthy teeth are important.  
Healthy gums are important.

178) I should not go outside, because it is raining.

Answer: Answers may vary. One possibility:  
I do not want to get wet.  
It is not raining inside; that is, the roof is keeping the rain outside.

179) The campfire should be extinguished before we go fishing because the park ranger can cite us for illegal activities.

Answer: Answers may vary. One possibility:  
An unattended campfire is illegal.  
Getting a citation from the park ranger would be a bad thing.

180) Cardiovascular exercise is important, because to be healthy you need a strong heart.

Answer: Answers may vary. One possibility:  
Cardiovascular exercise leads to a strong heart.  
Being healthy is important.

181) Jeremy needs a new bike, because the new models have a safer braking system.

Answer: Answers may vary. One possibility:

Safer bikes are better bikes.

Buying a new braking system for Jeremy's old bike is not a reasonable option.

182) We should not vote for the incumbent because he has already been in office for three consecutive terms.

Answer: Answers may vary. One possibility:

Four consecutive terms is too many.

The incumbent is running in the election.

A reason for a particular political position is given. There may be other issues that are left unstated. Identify at least one unstated issue that could be the "real issue" of concern.

183) The dictator of a foreign country has enacted a ban on all firearms, citing prevention of accidental deaths among children as the rationale.

Answer: Answers may vary. One possibility: The dictator may believe that an unarmed populace is easier to control.

184) I think term limits should be enacted for the Senate. A senator should not be allowed to serve more than two consecutive terms, because professional politicians become too focused on getting reelected.

Answer: Answers may vary. One possibility: The person stating this opinion may not like one of his current senators (or may even want the job for himself!). In addition, he may want the balance of power to shift from the legislative branch to the executive branch and may feel that term limits will give senators less overall influence.

185) Smoking should be banned in all public places. Second-hand smoke is harmful, causing lung cancer and heart disease.

Answer: Answers may vary. One possibility: The person stating this opinion may not like the smell of cigarettes and cigars. He may not like the smell getting into his clothes and causing him to spend more money on dry cleaning. In addition, he may find second-hand smoke unpleasant because it irritates his eyes.

Analyze the situation and explain how you would make a decision.

186) Your current cell phone company charges \$30 per month for unlimited minutes. Another company charges \$20 per month for the first 500 minutes plus 5¢ a minute for any additional minutes. Should you keep your current service or switch to the other company?

Answer: Answers may vary. One possibility: The relative cost of the two options depends primarily on how many minutes per month you use. The new company's plan would cost  $\leq \$30$  for up to 700 minutes a month, since  $\$20 + \$0.05(700 - 500) = \$30$ . Therefore, if you expect to use less than 700 minutes a month, you would tend to profit from switching companies. However, there are other factors to consider:

Does one company have more dependable cellular service? Better sound quality? Better customer service? should also look for hidden costs. For example, if you switch companies, you may need to buy a new cell p

187) The costs per day of driving to work are \$5 for gas, \$10 for parking, and \$1 for wear-and-tear on the car. Taking the train to work costs \$6.50 each way, plus \$1.50 per day to park at the train station. Should you drive or take the train?

Answer: Answers may vary. One possibility: Since driving costs \$16 ( $\$5 + \$10 + \$1 = \$16$ ) per day and taking the train costs \$14.50 ( $\$6.50 \times 2 + \$1.50 = \$14.50$ ) per day, it appears that taking the train is a better option. However, you should also consider other factors. If you have a spouse who might need the car during the day, then that's another reason to take the train (that would also save you the \$1.50 parking fee). If you take the train, you might be able to read the newspaper or do work on the way to work. However, if the train tends to be crowded and you prefer being alone, then it might be worth the extra \$1.50 per day to drive.

188) You need a rental car for four days. The daily rate is \$20 per day plus 20¢ per mile. The weekly rate is \$100, and mileage is included. Which is the better option?

Answer: Answers may vary. One possibility: The answer depends on how many miles you drive the car. If you know you will drive less than 100 miles, then the daily rate is a better option, since  $\$20/\text{day} \times 4 \text{ days} + \$0.20/\text{mi} \times 100 \text{ mi} = \$100$ . If you know you will drive more than 100 miles, then the weekly rate is a better option. If you aren't sure, then the weekly rate is probably preferable since the risk is limited. Even if you drove the minimum (zero miles), you would only spend \$20 more by choosing the weekly rate. But for every 100 miles after the first 100, you would save \$20 with the weekly rate. If you drive 500 miles, that's \$80 in savings. You should also consider a hidden factor. If you might end up only needing the car 1-3 days, then the daily rate will tend to be a better option. However, if you might end up needing the car for 5-7 days, then the weekly rate is a better option since those days will not cost you extra.

189) You are flying out on Monday morning and returning home Tuesday night. You need to decide how to get to and from your home airport. Driving each way costs \$2 in gas, and long-term parking costs \$10 per full or partial day. If you take taxis, it will cost \$11 each way. Which option is better?

Answer: Answers may vary. One possibility: Taking taxis will cost you \$22 (2 trips  $\times$  \$11/trip), while driving will cost you \$24 (2 days  $\times$  \$10/day + 2 trips  $\times$  \$2/trip). Driving appears to be a better option. However, before you make your decision, you should consider hidden costs and benefits. What if your trip is extended or your return flight is delayed? Each additional day of long-term parking will cost you \$10. In addition, there is the wear-and-tear on the car and the fact that your car would be left in a public lot, where the risk of theft or vandalism might be greater. Those factors would make taking taxis the better option. On the other hand, if you are on a tight schedule, you might not want to rely on a taxi to pick you up on time.

190) You want a new car but plan to use it for only 2 years. The cost of leasing is \$2,000 down and \$300 per month. The cost of buying is \$20,000, and you can expect to sell it in two years for approximately \$12,000. Which is the better option?

Answer: Answers may vary. One possibility: If you lease the car for two years, it will cost \$9200 ( $\$2000 + 24 \text{ months} \times \$300/\text{month}$ ). If you buy it, it will cost \$8000 ( $\$20,000 - \$12,000$ ). At first glance, it appears that buying is a better option. However, you need to consider other factors before you make your decision. How do you know that you will be able to sell the used car for \$12,000 in two years? If your estimate is off by only 10% (\$1200), then leasing will already be as cost-effective. In addition, you need to consider how the time value of money makes buying a less attractive option. The higher the interest rate, the more it will implicitly cost to buy the car (whether you borrow and pay interest expense or pay cash and forego interest income). Moreover, you should read all the fine print of the lease agreement. Are you locked into the lease for two years? Can you keep it longer if you wish? Are there any additional costs due when you return the car?

191) You are leasing a summer home for twelve weeks and are required to cut the grass every week. You can buy a new power mower for \$340 and sell it at the end of the summer for \$100. You can rent a power mower for \$20 per day. The neighbor's son will charge you \$10 per hour for 2 hours and provide his own equipment. Which is the best option?

Answer: Answers may vary. One possibility:

Option 1 (buying a power mower) will cost you \$240 ( $\$340 - \$100$ ).

Option 2 (renting a power mower) will cost you \$240 ( $12 \times \$20$ ).

Option 3 (hiring the neighbor's son) will cost you \$240 ( $\$10 \times 2 \times 12$ ).

The cost of each of the three options appears to be equal. Let's see if there are hidden factors that might help make a decision. Options 1 and 2 require you to mow the lawn yourself each week. Your time could be spent doing other things (including earning money!), so this is a hidden expense. Then again, you might appreciate opportunity to exercise, get a tan, and meet the neighbors; so depending on your preferences this could actually be a hidden benefit. Option 1 requires you to resell the mower at the end of the summer. Unless there is a buyer in place (e.g., has the owner of the home or the hardware store already offered to buy it back?), you will have to spend time and energy negotiating the sale of the used mower. Option 2 most likely requires you to pick up and drop off the mower each week. When all the costs are considered, Option 3 might end up being the least expensive, but there are some hidden factors there, too. What happens if the neighbor's son does an unsatisfactory job? What if it takes him more than 2 hours to complete the job? Are you obliged to pay him for the additional time?

192) Betty has to go to New Orleans on business. If she flies there and back on the same day her round trip airfare will cost \$700. If she stays overnight, her round trip airfare will cost \$400, her hotel will cost \$100, and three extra meals will cost \$75.

Which is the better option?

Answer: Answers may vary. One possibility: It will cost her \$575 to stay overnight ( $\$400 + \$100 + \$75$ ), and it will cost her \$700 to fly back the same day. It appears that staying overnight is the better option, since it will save her \$125. However, she could consider other factors before making a decision. Will staying overnight force her to miss all or part of a day of work? If so, that could cost her more than \$125. Is it important to her to be home with her family? If so, the potential \$125 savings may be illusory. Then again, she might enjoy having a night to herself and ordering room service.

Describe how the sentence is ambiguous.

193) Two stores with more than 1000 pieces of merchandise will have grand openings at the mall this weekend.

Answer: It is unclear whether the two stores combined have more than 1000 pieces of merchandise or whether each store itself has more than 1000 pieces of merchandise.

194) There was a 15% decrease in donations to the homeless shelter between 1996 and 2000, a year in which \$50,000 was collected.

Answer: It is unclear whether the year in which \$50,000 was collected was 1996 or 2000.

195) Our goal is to increase voter participation from 25% of the eligible voters, or 4000, to 50%.

Answer: It is unclear whether 4000 is the number of eligible voters or 25% of the number of eligible voters (which would make 16,000 the number of eligible voters).