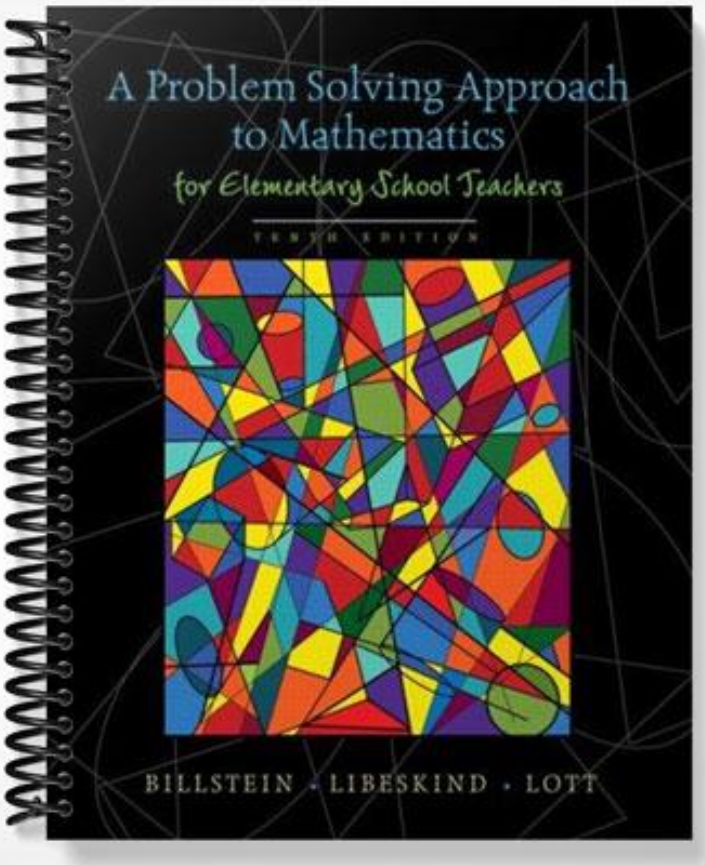
TEST BANK


A Problem Solving Approach
to Mathematics
for Elementary School Teachers
BILLSTEIN · LIBESKIND · LOTT

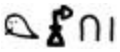
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.
For the following, write an equivalent numeral in the Hindu-Arabic system.

1)  1) _____
A) 8 B) 13 C) 780 D) 78

2)  2) _____
A) 722 B) 23 C) 3613 D) 4262

3)  3) _____
A) 111 B) 1011 C) 1101 D) 1100

4)  4) _____
A) 3607 B) 3670 C) 3067 D) 367

5)  5) _____
A) 101,011 B) 110,011 C) 1111 D) 11,011

6) MCMLX I 6) _____
A) 1961 B) 2141 C) 2161 D) 1941

7) XL V 7) _____
A) 44 B) 45 C) 65 D) 64

8) MMMCCX 8) _____
A) 32,100 B) 3210 C) 321 D) 321,000

9) 9) _____

A) 1066 B) 2742 C) 2662 D) 2502

10) 10) _____

A) 88,160 B) 83,479 C) 79,378 D) 88,360

For the given Hindu-Arabic numeral, write an equivalent numeral in the indicated system.

11) 210; Babylonian 11) _____
A)  B)  C)  D) 

12) 16; Babylonian 12) _____
A) 
B)
C) 
D)

13) 1100; Egyptian 13) _____
A)  B) C) D)

14) 3067; Egyptian 14) _____

A)  B) 

C)  D) 

15) 367; Egyptian 15) _____

A)  B) 

C)  D) 

16) 2022; Roman 16) _____

A) CCXXII B) MMXXII C) MMCCXX D) MMCCII

17) 842; Roman 17) _____

A) DCCCLXII B) DCCCXLII C) CCMXLII D) CMMXLII

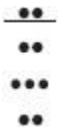
18) 999; Roman 18) _____

A) MCXCIX B) IXM C) CMXCIX D) IM

19) 100; Mayan 19) _____

A)  B)  C)  D) 

20) 72,302; Mayan 20) _____

A)  B)  C)  D) 

Write the place value of the underlined numeral.

21) $806,\underline{7}68$ 21) _____

A) Tens B) Thousands

C) Hundreds D) Hundred thousands

22) $23,82\underline{3}$ 22) _____

A) Tens B) Thousands C) Hundreds D) Units

23) $27,5\underline{6}4$ 23) _____

A) Thousands B) Tens C) Units D) Hundreds

24) $\underline{4},907$ 24) _____

A) Thousands B) Units C) Hundreds D) Tens

25) $13\underline{3},253$ 25) _____

A) Hundreds B) Tens C) Units D) Thousands

26) $\underline{1}14,150$ 26) _____

A) Hundreds B) Ten thousands

C) Hundred thousands D) Thousands

Write the following as a base-ten numeral.

27) $6 \cdot 10^2 + 8$ 27) _____

A) 508 B) 600
C) 608 D) None of the above

28) $5 \cdot 10^3 + 5 \cdot 10^5$ 28) _____

A) 500,500 B) 505,000 C) 105,000 D) 55,000

29) $6 \cdot 10^2 + 6 \cdot 10^4 + 3$ 29) _____

A) 10,603 B) 60,600 C) 60,603 D) 60,103

30) $4 \cdot 10 + 2$ 30) _____

A) 60 B) 42
C) 402 D) None of the above

31) $7 \cdot 10^2 + 3 \cdot 10 + 6$ 31) _____

A) 709 B) 790 C) 1006 D) 736

32) $3 \cdot 10^0$ 32) _____

A) 3 B) 0
C) 300 D) None of the above

Convert the base-ten number to a number in the indicated base.

33) 12 to base six 33) _____

A) 8_{six} B) 20_{six} C) 24_{six} D) 36_{six}

34) 329 to base six 34) _____

A) 1350_{six} B) 1530_{six} C) 135_{six} D) 1305_{six}

35) 46 to base twelve 35) _____

A) $4E_{twelve}$ B) $3T_{twelve}$ C) $4L_{twelve}$ D) $2E_{twelve}$

36) 396 to base twelve 36) _____

A) $25E_{twelve}$ B) $11T_{twelve}$ C) 290_{twelve} D) $32E_{twelve}$

37) 68 to base eight 37) _____

A) 102_{eight} B) 140_{eight} C) 120_{eight} D) 104_{eight}

38) 503 to base eight 38) _____

A) 767_{eight} B) 656_{eight} C) 565_{eight} D) 676_{eight}

39) 2,874 to base five 39) _____

A) $42{,}444_{five}$ B) $42{,}424_{five}$ C) $42{,}222_{five}$ D) $42{,}422_{five}$

40) 2,874 to base eight 40) _____

A) 4527_{eight} B) 5472_{eight} C) 5427_{eight} D) 4572_{eight}

41) 503 to base five 41) _____

A) 4003_{five} B) 4030_{five} C) 3040_{five} D) 3004_{five}

42) 13,562 to base eight 42) _____

A) $32,327_{eight}$ B) $32,372_{eight}$ C) $23,272_{eight}$ D) $23,227_{eight}$

Write the numeral in base ten.

43) 42_{five} 43) _____

A) 22 B) 27 C) 47 D) 42

44) 130_{five} 44) _____

A) 640 B) 40 C) 60 D) 650

45) 200_{six} 45) _____

A) 144 B) 120 C) 72 D) 108

46) 555_{six} 46) _____

A) 82 B) 1000 C) 110 D) 215

47) 42_{twelve} 47) _____

A) 29 B) 70 C) 92 D) 50

48) $E9_{twelve}$ (E = 11_{ten}) 48) _____

A) 313 B) 141 C) 131 D) 414

49) 25_{eight} 49) _____

A) 21 B) 165 C) 33 D) 133

50) 436_{eight} 50) _____

A) 286 B) 269 C) 268 D) 296

51) $7,001_{eight}$ 51) _____

A) 4828 B) 56,080 C) 54,290 D) 3585

Convert the following.

52) 75 days to weeks and days 52) _____

A) 9 weeks and 5 days B) 10 weeks and 4 days

C) 10 weeks and 5 days D) 14 weeks and 6 days

53) 1059 minutes to hours and minutes 53) _____

A) 17 hr and 49 min B) 17 hr and 29 min

C) 17 hr and 43 min D) 17 hr and 39 min

54) 631 seconds to minutes and seconds 54) _____

A) 13 min and 31 sec B) 11 min and 31 sec

C) 12 min and 31 sec D) 10 min and 31 sec

55) 382 centimeters to meters and centimeters 55) _____

A) 3 m and 82 cm B) 3 m and 32 cm

C) 13 m and 82 cm D) 103 m and 82 cm

56) 230 ounces to pounds and ounces 56) _____

A) 14 lb and 7 oz B) 16 lb and 6 oz C) 14 lb and 6 oz D) 15 lb and 6 oz

57) 45 months to years and months 57) _____

A) 4 yr and 9 mo B) 3 yr and 9 mo C) 5 yr and 9 mo D) 3 yr and 10 mo

58) 104 hours to days and hours 58) _____

A) 5 days and 8 hours B) 4 days and 8 hours

C) 6 days and 8 hours D) 4 days and 9 hours

59) 56 inches to feet and inches 59) _____

A) 6 ft and 8 in. B) 4 ft and 8 in. C) 4 ft and 9 in. D) 5 ft and 8 in.

Solve the problem.

60) The sum of the digits of a 3-digit number is 12. The units digit is one less than the tens digit and the tens digit is one less than the hundreds. What is the number? 60) _____

A) 654 B) 643

C) 543 D) None of the above

61) Pat withdrew $675 from an ATM. If the ATM gives $100, $20, and $5 bills such that the total number of bills is the least, then how many of each type of bill did Pat get? 61) _____

A) 5 $100-bills, 8 $20-bills, and 3 $5-bills B) 6 $100-bills, 3 $20-bills, and 3 $5-bills

C) 7 $100-bills, zero $20-bills, and 3 $5-bills D) 6 $100-bills, 2 $20-bills, and 7 $5-bills

62) You have two times as many dimes as quarters and the same number of quarters and nickels in your pocket. If there are 2 quarters in your pocket, what is the maximum number of single dollar bills you can get in exchange for your loose change? Would you have any change left over? 62) _____

A) 1, No B) 2, Yes C) 1, Yes D) 2, No

63) You work 4 hours each weekday, and sometimes you work 8 hours on Saturday. What is the maximum number of hours you might work during any given week? 63) _____

A) 20 B) 40 C) 28 D) 36

64) Two different 3-digit numbers contain the same digits. These digits are consecutive digits. What is the greatest difference possible between the two numbers? 64) _____

A) 198 B) 197 C) 200 D) 199

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question. Provide an appropriate response.

65) Given that ⠁ ⠉ represents the number 1 and ⠉ ⠁ represents the number 2, what does ⠛ ⠛ represent? 65) _____

66) Given that ⠁ ⠛ represents the number 1 and ⠛ ⠁ represents the number 3, what does ⠉ ⠛ represent? 66) _____

67) Given that the counting frame

•	•	•
4	2	1

represents the number 7, where the value of each dot is represented by the number in the box below the dot, what does the counting frame

•		•
4	2	1

represent? 67) _____

68) Given that the counting frame

•	•	•
4	2	1

represents the number 7, where the value of each dot is represented by the number in the box below the dot, what does the counting frame

••	•	•
25	5	1

represent? 68) _____

69) Is it possible to have 8_{seven}? If not, how should you write this number? 69) _____

70) Is it possible to have 5_{two}? If not, how should you write this number? 70) _____

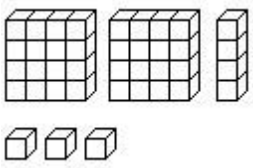
71) What is the largest 3-digit number in base five if you can use any digit only once? 71) _____

72) What is the smallest 3-digit number in base seven? 72) _____

73) If $56_{ten} = b_{five}$ then what is b? 73) _____

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

74) Write the base-four numeral for the base-four blocks shown. 74) _____



A) 2013_{four} B) 312_{four} C) 3120_{four} D) 213_{four}

Write the set as indicated.

75) List the whole numbers between 4 and 8. 75) _____

A) { 4, 5, 6, 7, 8} B) { 5, 6, 7} C) { 5, 6, 7, 8} D) { 4, 5, 6, 7}

76) List the set of all whole numbers greater than 3 and less than 7. 76) _____

A) { 3, 4, 5, 6} B) { 4, 5, 6, 7} C) { 4, 5, 6} D) { 3, 4, 5, 6, 7}

77) List the counting numbers that are multiples of 3. 77) _____

A) ∅ B) { 6, 9, 12, . . .} C) { 3, 6, 9, . . .} D) {0, 3, 6, 9, . . .}

78) List the set of states that border California. 78) _____

A) { Oregon, Nevada, Arizona} B) { Nevada, Utah}
C) { Washington, Utah, Arizona} D) { Oregon, Nevada, Utah}

79) Write { 7} using set-builder notation. 79) _____

A) {x|x is the natural number 7} B) {x is a constant}
C) {x} D) {x|x is all natural numbers}

80) Write {2, 4, 6, 8} using set-builder notation. 80) _____

A) {x|x is an even natural number less than 10}
B) {x|x is any natural number}
C) {x|x is any even natural number}

D) {2, 4, 6, 8}

81) Write { 18, 19, 20, 21} using set-builder notation. 81) _____

A) {x|x is a natural number less than 22}
B) {x|x is a natural number between 18 and 21}
C) {x|x is a natural number between 17 and 22}
D) { 18, 19, 20, 21}

82) Write { 8, 12, 16, 20, ... 48} using set-builder notation. 82) _____

A) {x|x is a multiple of 4 between 8 and 48}
B) {x|x is a multiple of 4 between 4 and 52}
C) {x|x is a multiple of 4}
D) {x|x is a multiple of 4 greater than 8}

83) Write the odd natural numbers less than 37 using set-builder notation. 83) _____

A) {x ∈ N|x ≤ 37 and x is odd}
B) {x ∈ N|x ≤ 35 and x is odd}
C) {x ∈ N|x < 37}
D) {x ∈ N|x < 36}

Rewrite the statement using mathematical symbols.

84) P is the set of even numbers less than 70 and more than 60. 84) _____

A) P = { 62, 64, 66, 68}
B) P = {60, 62, 64, 66, 68}
C) Q = { 62, 64, 66, 68, 70}
D) Q = { 60, 62, 64, 66, 68, 70}

85) The set P is a proper subset of the set Q. 85) _____

A) P ⊂ Q
B) P ⊆ Q
C) P = Q
D) P ∈ Q

86) The set A with elements Illinois and Minnesota is not equal to the set B with elements Kansas and Virginia. 86) _____

A) A = { Illinois, Arizona} , B = { Kansas, Virginia} , A ≠ B
B) A = { Illinois, Minnesota} , B = { Kansas, Virginia} , A ⊄ B
C) A = { Illinois, Minnesota} , B = { Kansas, Virginia} , A ≠ B
D) B = { Illinois, Minnesota} , A = { Kansas, Virginia} , B ≠ A

87) Q is equal to the set of letters in the word dew. 87) _____

A) Q = {w, e, e, d}
B) Q = {w, e, d}
C) Q ∈ {w, e, d}
D) Q ⊂ {w, e, d}

88) The set A is the set containing only the element 4. 88) _____

A) A = { }
B) A = { 4}
C) A ⊂ {4}
D) A ∈ { 5, 4}

89) The set consisting of the elements m and x is a proper subset of $\{m, b, f, x, v\}$. 89) _____

A) $\{m, x\} \subset \{m, b, f, x, v\}$
B) $\{m, x\} \in \{m, b, f, x, v\}$
C) $\{m, x\} \subseteq \{m, b, f, x, v\}$
D) $\{m, x\} \sim \{m, b, f, x, v\}$

90) The set consisting of the elements k and y is not a proper subset of $\{c, e, y, u\}$. 90) _____

A) $\{k, y\} \subseteq \{c, e, y, u\}$
B) $\{k, y\} \not\subset \{c, e, y, u\}$
C) $\{k, y\} \sim \{c, e, y, u\}$
D) $\{k, y\} \in \{c, e, y, u\}$

91) c is an element of $\{n, c, e, z, u\}$. 91) _____

A) $\{c\} \subseteq \{n, c, e, z, u\}$
B) $c \subset \{n, c, e, z, u\}$
C) $\{c\} \in \{n, c, e, z, u\}$
D) $c \in \{n, c, e, z, u\}$

Provide an appropriate response.

92) Is it possible or not possible to set up a one-to-one correspondence between { 4, 1, 7, 6} and { -4, 1, -7, 6}? 92) _____

A) Possible B) Not possible

93) Is it possible or not possible to set up a one-to-one correspondence between {0, 9, 12, 17} and { 9, 12, 17}? 93) _____

A) Possible B) Not possible

94) Is it possible or not possible to set up a one-to-one correspondence between {Mon, Tue, Wed} and {Oct, Nov, Dec}? 94) _____

A) Possible B) Not possible

95) Is it possible or not possible to set up a one-to-one correspondence between {a, b, c, d} and {A, B, C, D}? 95) _____

A) Possible B) Not possible

96) Is it possible or not possible to set up a one-to-one correspondence between {0} and { 922}? 96) _____

A) Not possible B) Possible

97) Is it possible or not possible to set up a one-to-one correspondence between ∅ and $\{23\}$? 97) _____

A) Not possible B) Possible

98) How many one-to-one correspondences are there between two sets with 6 elements each? 98) _____

A) 24 B) 720 C) 120 D) None

99) How many one-to-one correspondences are there between the sets $\{x, y, z, u, v\}$ and $\{2, 3, 6, 7, 10\}$ if in each correspondence x must correspond to 7 and z to 5? 99) _____

A) 6 B) 22 C) 15 D) 120

Write a statement that represents the relationship between the following.

100) $A = \{x \mid x \text{ is a letter from the word "garage'}$ and $B = \{y \mid y \text{ is a letter from the word"rage"}\}$ 100) _____

A) A = B B) A ⊂ B C) A ∈ B D) A ≠ B

101) $P = \{7, 9, 11, 13, 15\}$ and $Q = \{2, 4, 6, 8, 10\}$ 101) _____

A) P = Q B) P ≠ Q C) P ∉ Q D) P ∈ Q

102) M = ∅ and N = { } 102) _____

A) M = N B) N ∈ M C) M ⊂ N D) M ≠ N

103) A = {b, f, z, t, e, r} and r 103) _____

A) r ⊂ A B) r = A C) r ⊆ A D) r ∈ A

104) $C = \{x \mid x \text{ is a letter of the alphabe}\}$ and $D = \{x \mid x \text{ is a letter in the wordmath}\}$ 104) _____

A) C ⊈ D B) D ⊂ C C) D ⊄ C D) D = C

105) A = { 7, 8, 9} and $B = \{x \mid 7 \le x \le 9, x \in N\}$ 105) _____

A) B ⊂ A B) A ⊈ B C) A ⊂ B D) A ⊆ B

106) ∅ and B = {a, b, c, d, e} 106) _____

A) ∅ ⊄ B B) ∅ = B C) ∅ ⊂ B D) ∅ ∈ B

107) $A = \{x | 3 < x < 7, x \in N\}$ and 3 107) _____
A) 3 = A B) 3 ⊂ A C) 3 ∉ A D) 3 ∈ A

108) A = {a, e, i, o, u} and B = {e, o, i, u, a} 108) _____
A) a = A B) e ⊆ B C) A = B D) A ⊂ B

Find n(A) for the set A.

109) A = { 4, 6, 8, 10, 12} 109) _____
A) n(A) = 4 B) n(A) = 5 C) n(A) = 2 D) n(A) = 12

110) A = { 800, 801, 802, . . ., 8000} 110) _____
A) n(A) = 8000 B) n(A) = 4 C) n(A) = 7201 D) n(A) = 7200

111) A = {x|x is a month in the year} 111) _____
A) n(A) = 24 B) n(A) = 1 C) n(A) = 12 D) n(A) = 52

112) A = {x|x is a number on a clock face} 112) _____
A) n(A) = 12 B) n(A) = 3 C) n(A) = 6 D) n(A) = 24

113) A = {x|x is a second in a minute} 113) _____
A) n(A) = 120 B) n(A) = 12 C) n(A) = 60 D) n(A) = Infinite

114) A = { 1, 1, 2, 2, . . ., 5, 5} 114) _____
A) n(A) = 3 B) n(A) = 10 C) n(A) = 6 D) n(A) = 5

115) A = {x|x ∈ N and 14 ≤ x ≤ 22} 115) _____
A) 37 B) 9 C) 36 D) 7

Indicate which symbol, ∈ or ∉, makes the statement true.

116) 0 ___ ∅ 116) _____
A) ∈ B) ∉

117) ∅ ___ ∅ 117) _____
A) ∈ B) ∉

118) 5 ___ {1, 2, 3, ..., 10} 118) _____
A) ∈ B) ∉

119) { 4} ___ {1, 2, 3, ..., 10} 119) _____
A) ∈ B) ∉

120) 27 ___ $\{x \mid x = 3^n \text{ and } n \in N\}$ 120) _____
A) ∈ B) ∉

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question. Provide an appropriate response.

121) A is the set of all the letters of the alphabet and B is the set of vowels. What kind of relationship exists between the two sets? Also, if C is the set of consonants what is the relationship between B and C? 121) _____

122) Given that n(P) = 10 and P ⊂ Q , what is the least number of elements that set Q can have? Is there a maximum limit on the number of elements that set Q can have? 122) _____

123) If $P \subseteq Q$ and $Q \subseteq P$, then what can be said about the equality of the two sets? 123) _____

124) U is the universal set and B is a proper subset of U. Write a relationship between the cardinal numbers of U, B and $\overline{B}$. 124) _____

125) Is the set of good software packages in the market well-defined? 125) _____

126) Is the set of multiples of 5 between 1 and 100 well-defined? 126) _____

127) A is the set of all even natural numbers, and B is the set of all odd natural numbers. Describe a universal set for A and B. Also, with respect to this universal set, give a relationship between A and B. 127) _____

128) $P = \{a, b, c, d, e, f\}$. How many subsets of the set P can be made? 128) _____

129) There are five seats available for a show. Ten people are in the line for the tickets to these seats. Illustrate the utility of one-to-one correspondence with this example. 129) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question. Determine whether the following is true or false.

130) $A \cup \overline{A}$ is equal to the universal set U. 130) _____
A) False B) True

131) $n(A \cup B) \neq n(A) + n(B) - n(A \cap B)$ 131) _____
A) False B) True

132) $A - B = (A \cup B) - B$ 132) _____
A) False B) True

133) $A \cup \emptyset = A \cap \emptyset$ 133) _____
A) False B) True

134) $A \cap (B \cap C) = (A \cap B) \cap C$ 134) _____
A) True B) False

135) $(A - B) \cup A = B$ 135) _____
A) False B) True

136) $(A \cap B) \cup (A \cap C) = (A \cap B) \cup (B \cap C)$ 136) _____
A) True B) False

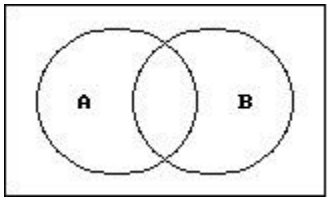
137) $A \cap \overline{B} = A - B$ 137) _____
A) False B) True

138) $\overline{A \cup B} = \overline{A} \cap \overline{B}$ 138) _____
A) False B) True

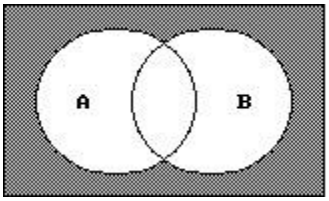
139) $\overline{A \cap B} = A \cup B$ 139) _____
A) False B) True

Shade the portion of the diagram that represents the given set.

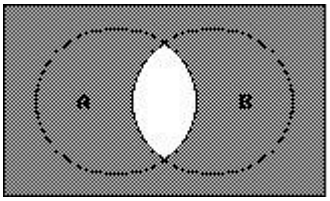
140) $\overline{A} \cap \overline{B}$ 140) _____



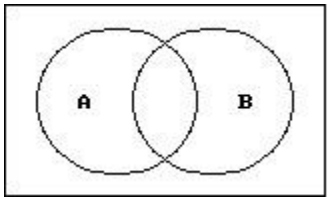
A)



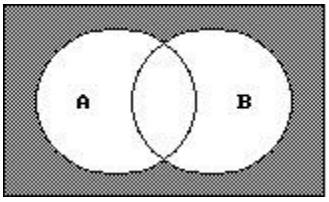
B)



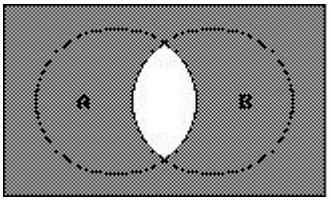
141) $\overline{A} \cup \overline{B}$ 141) _____



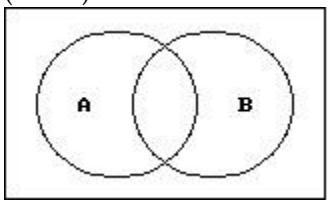
A)



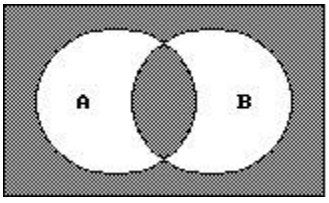
B)



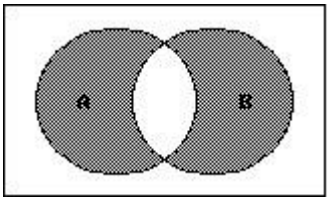
142) $(A \cup B) \cap \overline{(A \cap B)}$ 142) _____



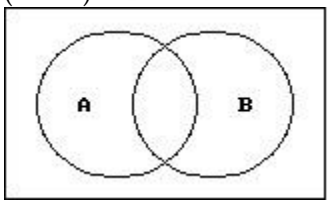
A)



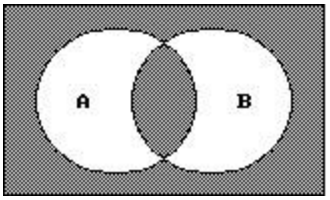
B)



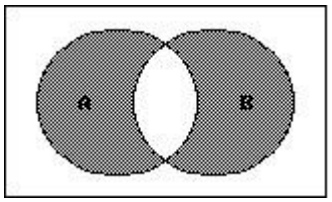
143) $(A \cap B) \cup \overline{(A \cup B)}$ 143) _____



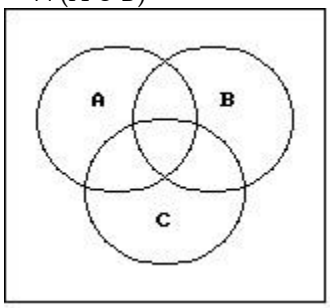
A)



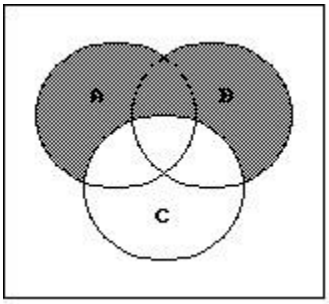
B)



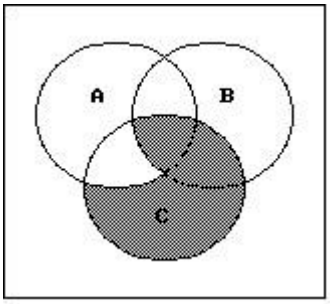
144) $\overline{C} \cap (A \cup B)$ 144) _____



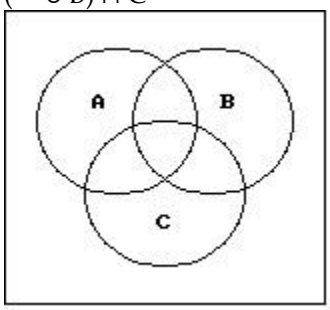
A)



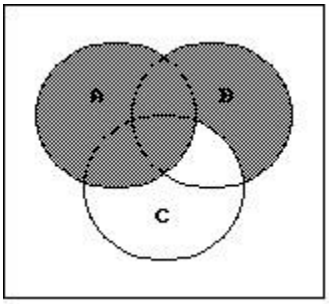
B)



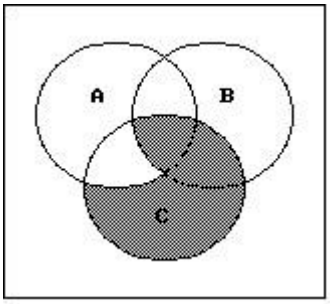
145) $(\overline{A} \cup B) \cap C$ 145) _____



A)

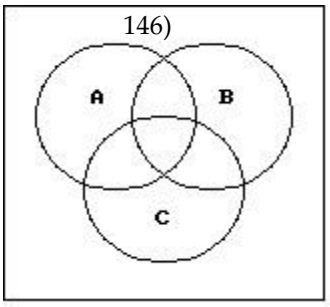


B)



146) $A \cup (B \cap \overline{C})$

146)



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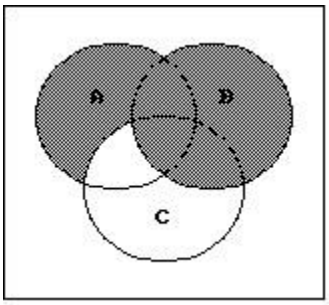
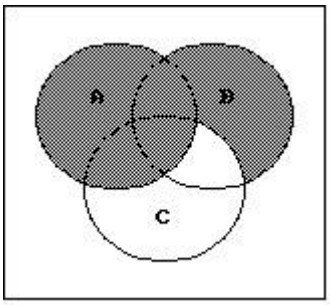
A)

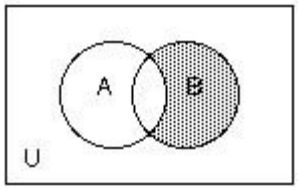


B)



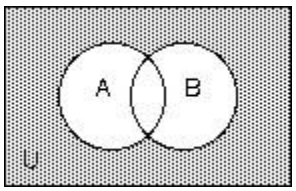
Use set notation to identify the shaded region.

147) 147) _____



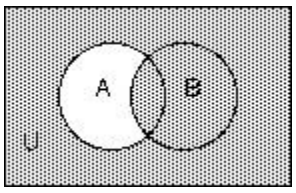
A) $B - \overline{A}$ B) $B \cap \overline{A}$ C) $A \cap \overline{B}$ D) A - B

148) 148) _____



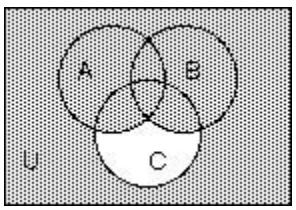
A) $A \cup B$ B) A - B C) $\overline{A \cap B}$ D) $\overline{A} \cap \overline{B}$

149) 149) _____

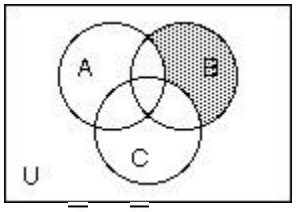


A) B - A B) $\overline{A} \cap B$ C) $\overline{A} \cup B$ D) $\overline{A \cap B}$

150) 150) _____

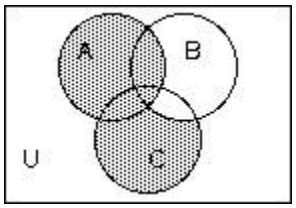


A) $\overline{A \cup B \cup C}$ B) $A \cup B \cap \overline{C}$ C) $(A \cap B) \cup \overline{C}$ D) $(A \cup B) \cup \overline{C}$

151) 

151) _____

A) $\overline{A} \cap \overline{C} \cap B$ B) B - (A ∩ C) C) $B \cap \overline{A \cap C}$ D) $\overline{B}$ - (A ∪ B)

152) 

152) _____

A) A ∪ C - B B) $\overline{B} \cap A \cup C$ C) A ∪ C D) $C \cap \overline{B} \cup A$

Use sets to solve the problem.

153) Results of a survey of fifty students indicate that 30 like red jelly beans, 29 like green jelly beans, and 17 like both red and green jelly beans. How many of the students surveyed like only green jelly beans? 153) _____

A) 17 B) 29 C) 37 D) 12

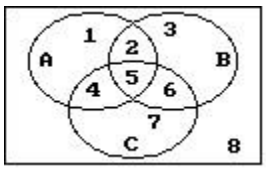
154) Mrs. Bollo's second grade class of thirty students conducted a pet ownership survey. Results of the survey indicate that 8 students own a cat, 15 students own a dog, and 5 students own both a cat and a dog. How many of the students surveyed own no dogs? 154) _____

A) 3 B) 15 C) 8 D) 20

155) Monticello residents were surveyed concerning their preferences for candidates Moore and Allen in an upcoming election. Of the 800 respondents, 300 support neither Moore nor Allen, 100 support both Moore and Allen, and 250 support only Moore. How many residents support Allen? 155) _____

A) 400 B) 250 C) 150 D) 100

156) The circles in the Venn diagram represent customers who prefer products A, B, and C, respectively. Which of the regions numbered one through eight describe customers who prefer product A? 156) _____



A) 1,2 B) 1 C) 1,2,4,5 D) 1,4

157) A local television station sent out questionnaires to determine if viewers would rather see a documentary, an interview show, or reruns of a game show. There were 800 responses with the following results:

240 were interested in an interview show and a documentary, but not reruns.

32 were interested in an interview show and reruns, but not a documentary.

reruns but not a documentary. of show? 157) _____

112 were interested in reruns but not an interview show.

192 were interested in an interview show but not a documentary.

80 were interested in a documentary and reruns.

48 were interested in an interview show and reruns.

64 were interested in none of the three.

How many are interested in exactly one kind

A) 384 B) 374 C) 364 D) 394

158) A survey of 160 families showed that 158) _____

59 had a dog;
46 had a cat;
19 had a dog and a cat;
63 had neither a cat nor a dog nor a parakeet;
3 had a cat and dog and a parakeet.

How many had a parakeet only?
A) 16 B) 26 C) 11 D) 21

159) A survey of a group of 114 tourists was taken in St. Louis. The survey showed the following: 159) _____

65 of the tourists plan to visit Gateway Arch;

48 plan to visit the zoo;

10 plan to visit the Art Museum and the zoo, but not the Gateway Arch;

13 plan to visit the Art Museum and the Gateway Arch, but not the zoo;

17 plan to visit the Gateway Arch and the zoo, but not the Art Museum;

9 plan to visit the Art Museum, the zoo and the Gateway Arch;

15 plan to visit none of the three places.

How many plan to visit the Art Museum only?
A) 12 B) 48 C) 36 D) 99

Find the Cartesian product or cardinal number as requested.

160) A = { 2, 4, 6} 160) _____
B = { 14, 3}
Find A × B.
A) {(2, 14), (2, 3), (4, 14), (4, 3), (6, 14), (6, 3)}
B) {(14, 2), (14, 4), (14, 6), (3, 2), (3, 4), (3, 6)}
C) {(2, 14), (4, 6), (6, 14)}
D) {(2, 14), (4, 3)}

161) A = {i, a} 161) _____
B = {t, d, m}
Find A × B.
A) {(i, t), (i, d), (i, m), (a, t), (a, d), (a, m)}
B) {(i, t), (a, t), (i, d), (a, d)}
C) {(t, i), (t, a), (d, i), (d, a), (m, i), (m, a)}
D) {(i, t), (t, a), (i, d), (d, a), (i, m), (m, a)}

162) A = {0} 162) _____
B = { 14, 24, 34}
Find B × A.
A) {(14, 0), (24, 0), (34, 0)}
B) {0}
C) {0, 0, 0}
D) {(0, 14), (0, 24), (0, 34)}

163) A = { 2, 4, 6, 9} 163) _____
B = {0, 1}
Find B × A.
A) {0, 1, 2, 4, 6, 9}
B) {(2, 0), (2, 1), (4, 0), (4, 1)}
C) {(2, 0), (4, 0), (6, 0), (9, 0), (2, 1), (4, 1), (6, 1), (9, 1)}
D) {(0, 2), (0, 4), (0, 6), (0, 9), (1, 2), (1, 4), (1, 6), (1, 9)}

164) Write {(k, 3), (k, 4), (j, 3), (j, 4)} as a Cartesian product. 164) _____
A) { k, j} × { 3, 4}
B) { 3, 4} × { k, j}
C) { k, j, 3, 4} × {1}
D) { k, 3} × { j, 4}

165) A = { 4, 3, 13} 165) _____
B = { 3, 14}
Find n(A × B).
A) 6 B) 12 C) 5 D) 9

166) n(A) = 25 166) _____
n(B) = 7
Find n(A × B).
A) 39 B) 175 C) 32 D) 18

167) n(A × B) = 42 167) _____
n(A) = 6
Find n(B).
A) 48 B) 6 C) 7 D) 36

168) n(A × B) = 54 168) _____
n(B) = 6
Find n(A).
A) 48 B) 6 C) 60 D) 9

169) n(A) = 2 169) _____
n(B) = 7
n(C) = 3
n(A × B × C) = ?
A) 9 B) 3 C) 12 D) 42

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question. Provide an appropriate response.

170) Is it true that if A ⊂ B, then n(A) < n(B)? If n(A) < n(B), then A ⊂ B? 170) _____

171) Is A - B a subset of B? Explain. Is it a subset of A? 171) _____

172) Given A has x elements, B has y elements, and B ⊂ A, what is the least number of elements in A ∪ B and in A ∩ B? 172) _____

173) If n(A) = 6, n(B) = 2, n(C) = 8, B ⊂ A, and A ⊂ C, what is the number of elements in a) A ∪ B ∪ C, b) A ∩ B ∩ C, and c) A ∩ C? 173) _____

174) If $\overline{A} = \{4, 6, 8, 10, 12\}$ and $\overline{B} = \{8, 9, 10, 11, 12\}$, find $\overline{A \cup B}$. 174) _____

175) If $\overline{A} = \{10, 12, 14, 16, 18\}$ and $\overline{B} = \{14, 15, 16, 17, 18\}$, find $\overline{A \cap B}$. 175) _____

176) If B is the set of students who play basketball and H is the set of students who play hockey, how would you describe $B \cap H$ and $B \cup H$? 176) _____

177) If $p \in \overline{A} \cap \overline{B}$, is it true that $p \in A$? Explain. 177) _____

178) The Cartesian product $A \times B$ is given by $\{(a, p), (a, q), (a, r), (b, p), (b, q), (b, r)\}$. Write down the sets A and B. 178) _____

1) B
2) D
3) A
4) C
5) A
6) A
7) B
8) B
9) D
10) C
11) D
12) B
13) D
14) A
15) D
16) B
17) B
18) C
19) A
20) D
21) C
22) D
23) B
24) A
25) D
26) C
27) C
28) B
29) C
30) B
31) D
32) A
33) B
34) D
35) B
36) C
37) D
38) A
39) A
40) B
41) A
42) B
43) A
44) B
45) C
46) D
47) D
48) B
49) A
50) A
51) D

52) C
53) D
54) D
55) A
56) C
57) B
58) B
59) B
60) C
61) B
62) A
63) C
64) A
65) 33
66) 23
67) 5
68) 56
69) No, 11_{seven}
70) No, 101_{two}
71) 432_{five}
72) 100
73) 211
74) D
75) B
76) C
77) C
78) A
79) A
80) A
81) C
82) B
83) B
84) A
85) A
86) C
87) B
88) B
89) A
90) B
91) D
92) A
93) B
94) A
95) A
96) B
97) A
98) B
99) A
100) A
101) B
102) A
103) D

104) B
105) D
106) C
107) C
108) C
109) B
110) C
111) C
112) A
113) C
114) D
115) B
116) B
117) B
118) A
119) B
120) A
121) $B \subset A$, $C = \overline{B}$
122) 11, No
123) P = Q
124) $n(U) = n(B) + n(\overline{B})$
125) No, since "good" is a subjective term.
126) Yes, you can list the elements.
127) The universal set is the set of all natural numbers. Also, $A = \overline{B}$ and $B = \overline{A}$.
128) 64
129) Each seat corresponds to one person who can take the seat. Thus, only five people should be given tickets for the show. If more than five tickets are issued, then some people will be without seats.
130) B
131) A
132) B
133) A
134) A
135) A
136) B
137) B
138) B
139) A
140) A
141) B
142) B
143) A
144) A
145) B
146) B
147) B
148) D
149) C
150) D
151) A
152) D
153) D

154) B
155) B
156) C
157) A
158) C
159) A
160) A
161) A
162) A
163) D
164) A
165) A
166) B
167) C
168) D
169) D
170) Let B = {1, 2, 3, 4, 5} and A = {1, 2}. Then $A \subset B$ and n(A) < n(B), that is, 2 < 5. Now, let B = {a, b, c, d, e} and A = {1, 2}. Even though n(A) < n(B), it is not true that $A \subset B$.
171) No, since A - B is the set of elements that belong to A but not to B. For example, if A = $\{a, b, c, d, e\}$ and B = $\{c, d, e, f\}$, then A - B = $\{a, b\}$. Here, A - B is not a subset of B. However, A - B is a subset of A.
172) x, ∅
173) 8, 2, 6
174) By DeMorgan's Law, $\overline{A \cup B} = \overline{A} \cap \overline{B}$. Therefore, $\overline{A \cup B} = \{8, 10, 12\}$.
175) By DeMorgan's Law, $\overline{A \cap B} = \overline{A} \cup \overline{B}$. Therefore, $\overline{A \cap B} = \{10, 12, 14, 15, 16, 17, 18\}$.
176) B ∩ H is the set of students who play both basketball and hockey. B ∪ H is the set of students who play either basketball or hockey or both.
177) No. p is an element of the set that is the complement of A and therefore cannot be an element of A.
178) A = $\{a, b\}$ and B = $\{p, q, r\}$