

**Test Bank for Problem Solving Approach to Mathematics for Elementary  
School Teachers 11th Edition Billstein Libeskind Lott 0321756665  
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# TEST BANK


FOR


Problem Solving Approach to  
Mathematics for Elementary  
School Teachers

11th Edition  
By Billstein  
ISBN13-9780321756664

**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) 78 D) 780

2)  2) \_\_\_\_\_  
 A) 23 B) 3613 C) 4262 D) 722

3)  3) \_\_\_\_\_  
 A) 1100 B) 111 C) 1101 D) 1011

4) \_\_\_\_\_ 4) \_\_\_\_\_  
 A) 3603 B) 363 C) 3063 D) 3630

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

6) MCMLXVI 6) \_\_\_\_\_  
 A) 1946 B) 2146 C) 1966 D) 2166

7) XLI 7) \_\_\_\_\_  
 A) 41 B) 44 C) 61 D) 64

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

9) \_\_\_\_\_ 9) \_\_\_\_\_

\_\_\_\_\_ 10) \_\_\_\_\_  
 A) 2502 B) 2662 C) 1066 D) 2742

10)  10) \_\_\_\_\_

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

**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) 3063; Egyptian

- A)
- C)

- B)
- D)

14) \_\_\_\_\_

15) 363; Egyptian

- A)
- C)

- B)
- D)

15) \_\_\_\_\_

16) 2022; Roman

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

16) \_\_\_\_\_

17) 842; Roman

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

17) \_\_\_\_\_

18) 999; Roman

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

18) \_\_\_\_\_

19) 100; Mayan

- A)
- B)
- C)
- D)

19) \_\_\_\_\_

20) 72,302; Mayan

- A)
- B)
- C)
- D)

20) \_\_\_\_\_

**Write the place value of the underlined numeral.**

21) 803,70

- A) Thousands
- B) Tens
- C) Hundreds
- D) Hundred thousands

21) \_\_\_\_\_

22) 23,84

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

22) \_\_\_\_\_

23) 28,63

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

23) \_\_\_\_\_

24) 2,908

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

24) \_\_\_\_\_

25) 14,253

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

25) \_\_\_\_\_

26) 2,10,152

- A) Ten thousands
- B) Thousands
- C) Hundred thousands
- D) Hundreds

26) \_\_\_\_\_

Write the following as a base-ten numeral.

- 27)  $8 \cdot 10^2 + 3$  27) \_\_\_\_\_  
 A) 703 B) 803 C) 800 D) None of these
- 28)  $8 \cdot 10^3 + 9 \cdot 10^4$  28) \_\_\_\_\_  
 A) 90,800 B) 18,000 C) 17,000 D) 98,000
- 29)  $6 \cdot 10^3 + 8 \cdot 10^2 + 4$  29) \_\_\_\_\_  
 A) 6800 B) 6104 C) 6804 D) 1804
- 30)  $3 \cdot 10 + 3$  30) \_\_\_\_\_  
 A) 60 B) 303 C) 33 D) None of these
- 31)  $7 \cdot 10^2 + 3 \cdot 10 + 5$  31) \_\_\_\_\_  
 A) 780 B) 1005 C) 708 D) 735
- 32)  $8 \cdot 10^0$  32) \_\_\_\_\_  
 A) 800 B) 8 C) 0 D) None of these

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

- 33) 12 to base six 33) \_\_\_\_\_  
 A)  $36_{\text{six}}$  B)  $20_{\text{six}}$  C)  $24_{\text{six}}$  D)  $8_{\text{six}}$
- 34) 329 to base six 34) \_\_\_\_\_  
 A)  $135_{\text{six}}$  B)  $1305_{\text{six}}$  C)  $1350_{\text{six}}$  D)  $1530_{\text{six}}$
- 35) 46 to base twelve 35) \_\_\_\_\_  
 A)  $3T_{\text{twelve}}$  B)  $2E_{\text{twelve}}$  C)  $4L_{\text{twelve}}$  D)  $4E_{\text{twelve}}$
- 36) 396 to base twelve 36) \_\_\_\_\_  
 A)  $11T_{\text{twelve}}$  B)  $32E_{\text{twelve}}$  C)  $25E_{\text{twelve}}$  D)  $290_{\text{twelve}}$
- 37) 68 to base eight 37) \_\_\_\_\_  
 A)  $102_{\text{eight}}$  B)  $120_{\text{eight}}$  C)  $140_{\text{eight}}$  D)  $104_{\text{eight}}$
- 38) 503 to base eight 38) \_\_\_\_\_  
 A)  $767_{\text{eight}}$  B)  $656_{\text{eight}}$  C)  $676_{\text{eight}}$  D)  $565_{\text{eight}}$
- 39) 2,874 to base five 39) \_\_\_\_\_  
 A)  $42,424_{\text{five}}$  B)  $42,444_{\text{five}}$  C)  $42,222_{\text{five}}$  D)  $42,422_{\text{five}}$
- 40) 2,874 to base eight 40) \_\_\_\_\_  
 A)  $4527_{\text{eight}}$  B)  $4572_{\text{eight}}$  C)  $5472_{\text{eight}}$  D)  $5427_{\text{eight}}$
- 41) 503 to base five 41) \_\_\_\_\_  
 A)  $3004_{\text{five}}$  B)  $4030_{\text{five}}$  C)  $4003_{\text{five}}$  D)  $3040_{\text{five}}$

42) 13,562 to base eight

A)  $23,272_{\text{eight}}$

B)  $23,227_{\text{eight}}$

C)  $32,327_{\text{eight}}$

D)  $32,372_{\text{eight}}$

42) \_\_\_\_\_

**Write the numeral in base ten.**

- 43)  $42_{\text{five}}$   
 A) 22                      B) 47                      C) 42                      D) 27
- 44)  $130_{\text{five}}$   
 A) 40                      B) 60                      C) 650                      D) 640
- 45)  $200_{\text{six}}$   
 A) 72                      B) 144                      C) 108                      D) 120
- 46)  $555_{\text{six}}$   
 A) 215                      B) 1000                      C) 110                      D) 82
- 47)  $42_{\text{twelve}}$   
 A) 92                      B) 50                      C) 70                      D) 29
- 48)  $E9_{\text{twelve}}$  ( $E = 11_{\text{ten}}$ )  
 A) 131                      B) 313                      C) 141                      D) 414
- 49)  $25_{\text{eight}}$   
 A) 165                      B) 133                      C) 21                      D) 33
- 50)  $436_{\text{eight}}$   
 A) 269                      B) 296                      C) 286                      D) 268
- 51)  $7,001_{\text{eight}}$   
 A) 4828                      B) 54,290                      C) 3585                      D) 56,080

**Convert the following.**

- 52) 74 days to weeks and days  
 A) 14 weeks and 5 days                      B) 9 weeks and 4 days                      D) 10 weeks and 3 days                      52) \_\_\_\_\_  
 C) 10 weeks and 4 days
- 53) 998 minutes to hours and minutes  
 A) 16 hr and 28 min                      B) 16 hr and 38 min                      53) \_\_\_\_\_  
 C) 16 hr and 48 min                      D) 16 hr and 42 min
- 54) 632 seconds to minutes and seconds  
 A) 11 min and 32 sec                      B) 12 min and 32 sec                      54) \_\_\_\_\_  
 C) 10 min and 32 sec                      D) 13 min and 32 sec
- 55) 480 centimeters to meters and centimeters  
 A) 104 m and 80 cm                      B) 4 m and 30 cm                      55) \_\_\_\_\_  
 C) 14 m and 80 cm                      D) 4 m and 80 cm
- 56) 232 ounces to pounds and ounces  
 A) 14 lb and 9 oz                      B) 16 lb and 8 oz                      C) 14 lb and 8 oz                      D) 15 lb and 8 oz                      56) \_\_\_\_\_
- 57) 45 months to years and months  
 A) 4 yr and 9 mo                      B) 3 yr and 10 mo                      C) 5 yr and 9 mo                      D) 3 yr and 9 mo                      57) \_\_\_\_\_

- 58) 105 hours to days and hours 58) \_\_\_\_\_  
 A) 4 days and 9 hr B) 6 days and 9 hr  
 C) 4 days and 10 hr D) 5 days and 9 hr
- 59) 44 inches to feet and inches 59) \_\_\_\_\_  
 A) 4 ft and 8 in. B) 3 ft and 9 in. C) 3 ft and 8 in. D) 5 ft and 8 in.

**Solve the problem.**

- 60) The sum of the digits of a 3-digit number is 18. 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) 865 B) 876 C) 765 D) None of these
- 61) Pat withdrew \$495 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, zero \$20-bills, and 3 \$5-bills B) 3 \$100-bills, 9 \$20-bills, and 3 \$5-bills  
 C) 4 \$100-bills, 3 \$20-bills, and 7 \$5-bills D) 4 \$100-bills, 4 \$20-bills, and 3 \$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 4 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) 2, No B) 3, Yes C) 3, No D) 2, Yes
- 63) You work 2 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) 18 B) 10 C) 26 D) 40
- 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) 197 B) 199 C) 200 D) 198

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

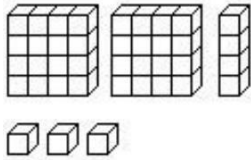
**Provide an appropriate response.**

- 65) Given that  $\cdot \cdot$  represents the number 1 and  $\cdot \cdot \cdot$  represents the number 2, what does  $\cdot \cdot \cdot \cdot \cdot$  represent? 65) \_\_\_\_\_
- 66) Given that  $\cdot \cdot \cdot$  represents the number 1 and  $\cdot \cdot \cdot \cdot$  represents the number 3, what does  $\cdot \cdot \cdot \cdot \cdot$  represent? 66) \_\_\_\_\_
- 67) 
$$\begin{array}{|c|c|c|} \hline \cdot & \cdot & \cdot \\ \hline 4 & 2 & 1 \\ \hline \end{array}$$
 Given that the counting frame 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 
$$\begin{array}{|c|c|c|} \hline \cdot & \cdot & \cdot \\ \hline 4 & 2 & 1 \\ \hline \end{array}$$
 represent? 67) \_\_\_\_\_
- 68) 
$$\begin{array}{|c|c|c|} \hline \cdot & \cdot & \cdot \\ \hline 4 & 2 & 1 \\ \hline \end{array}$$
 Given that the counting frame 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 
$$\begin{array}{|c|c|c|} \hline \cdot \cdot & \cdot & \cdot \\ \hline 25 & 5 & 1 \\ \hline \end{array}$$
 represent? 68) \_\_\_\_\_

- 69) Is it possible to have  $8_{\text{seven}}$ ? If not, how should you write this number? 69) \_\_\_\_\_
- 70) Is it possible to have  $5_{\text{two}}$ ? 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  $56_{\text{ten}} = b_{\text{five}}$  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)  $2013_{\text{four}}$       B)  $312_{\text{four}}$       C)  $213_{\text{four}}$       D)  $3120_{\text{four}}$

**Write the set as indicated.**

- 75) List the whole numbers between 1 and 5. 75) \_\_\_\_\_  
 A) {2, 3, 4, 5}      B) {1, 2, 3, 4}      C) {2, 3, 4}      D) {1, 2, 3, 4, 5}
- 76) List the set of all whole numbers greater than 5 and less than 9. 76) \_\_\_\_\_  
 A) {5, 6, 7, 8}      B) {6, 7, 8}      C) {6, 7, 8, 9}      D) {5, 6, 7, 8, 9}
- 77) List the counting numbers that are multiples of 5. 77) \_\_\_\_\_  
 A) {0, 5, 10, 15, ...}      B) {5, 10, 15, ...}      C) {5, 10, 15, ...}      D) {10, 15, 20, ...}
- 78) List the set of states that border California. 78) \_\_\_\_\_  
 A) {Oregon, Nevada, Arizona}      B) {Oregon, Nevada, Utah}  
 C) {Nevada, Utah}      D) {Washington, Utah, Arizona}
- 79) Write {2} using set-builder notation. 79) \_\_\_\_\_  
 A) {x | x is the natural number 2}  
 B) {x | x is a constant}  
 C) {x | x is all natural numbers}      D) {x}

- 80) Write {2, 4, 6, 8} using set-builder notation. 80) \_\_\_\_\_  
 A) {2, 4, 6, 8}  
 B) {x | x is any even natural number}  
 C) {x | x is an even natural number less than 10}  
 D) {x | x is any natural number}

- 81) Write {17, 18, 19, 20} using set-builder notation. 81) \_\_\_\_\_  
 A) {x | x is a natural number between 17 and 20}  
 B) {17, 18, 19, 20}  
 C) {x | x is a natural number less than 21}  
 D) {x | x is a natural number between 16 and 21}

- 82) Write {8, 12, 16, 20, ... 48} using set-builder notation. 82) \_\_\_\_\_  
 A) {x | x is a multiple of 4 greater than 8}      B) {x | x is a multiple of 4 between 8 and 48}



C)  $\{x|x \text{ is a multiple of 4 between 4 and 52}\}$

D)  $\{x|x \text{ is a multiple of 4}\}$

83) Write the odd natural numbers less than 39 using set-builder notation.

83) \_\_\_\_\_

A)  $\{x \in \mathbb{N} | x < 39 \text{ and } x \text{ is odd}\}$   
C)  $\{x \in \mathbb{N} | x < 39\}$

B)  $\{x \in \mathbb{N} | x < 37 \text{ and } x \text{ is odd}\}$   
D)  $\{x \in \mathbb{N} | x < 38\}$

Rewrite the statement using mathematical symbols.

84) P is the set of even numbers less than 30 and more than 20.

84) \_\_\_\_\_

A)  $P = \{22, 24, 26, 28\}$

B)  $Q = \{20, 22, 24, 26, 28, 30\}$

C)  $Q = \{22, 24, 26, 28, 30\}$

D)  $P = \{20, 22, 24, 26, 28\}$

85) The set A with elements Indiana and Minnesota is not equal to the set B with elements Kansas and Virginia.

85) \_\_\_\_\_

A)  $A = \{\text{Indiana, Minnesota}\}, B = \{\text{Kansas, Virginia}\}, A \neq B$

B)  $B = \{\text{Indiana, Minnesota}\}, A = \{\text{Kansas, Virginia}\}, B \neq A$

C)  $A = \{\text{Indiana, Arizona}\}, B = \{\text{Kansas, Virginia}\}, A \neq B$

D)  $A = \{\text{Indiana, Minnesota}\}, B = \{\text{Kansas, Virginia}\}, A \neq B$

86) Q is equal to the set of letters in the word wed.

86) \_\_\_\_\_

A)  $Q = \{w, e, e, d\}$

B)  $Q = \{w, e, d\}$

C)  $Q \in \{w, e, d\}$

D)  $Q \subset \{w, e, d\}$

87) The set A is the set containing only the element 6.

87) \_\_\_\_\_

A)  $A = \{ \}$

B)  $A = \{6\}$

C)  $A \subset \{6\}$

D)  $A \in \{6\}$

88) a is an element of  $\{k, a, d, z, t\}$ .

88) \_\_\_\_\_

A)  $\{k, a, d, z, t\}$

C)  $\{k, a, d, z, t\}$

B)  $\{a\} \in \{k, a, d, z, t\}$

D)  $\{a\} \subset \{k, a, d, z, t\}$

Indicate which symbol,  $\in$  or  $\notin$ , makes the statement true.

89)  $0$  \_\_\_\_\_

89) \_\_\_\_\_

90)  $\emptyset$  \_\_\_\_\_

B)  $\in$

90) \_\_\_\_\_

91)  $3$  \_\_\_\_\_  $\{1, 2, 3, \dots, 10\}$

B)  $\notin$

91) \_\_\_\_\_

92)  $\{3\}$  \_\_\_\_\_  $\{1, 2, 3, \dots, 10\}$

B)  $\in$

92) \_\_\_\_\_

93)  $27$  \_\_\_\_\_  $\{x | x = 3^n \text{ and } n \in \mathbb{N}\}$

93) \_\_\_\_\_

A)  $\in$

B)  $\in$

A)  $\in$

B)  $\in$

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

**Provide an appropriate response.**

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

94) \_\_\_\_\_

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

95) \_\_\_\_\_

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

96) Is it possible or not possible to set up a one-to-one correspondence between  $\{0, 6, 9, 19\}$  and  $\{6, 9, 19\}$ ? 96)

A) Possible

B) Not possible

97) Is it possible or not possible to set up a one-to-one correspondence between {Mon, Tue, Wed} and {Oct, Nov, Dec}? 97) \_\_\_\_\_

A) Possible

B) Not possible

98) Is it possible or not possible to set up a one-to-one correspondence between {a, b, c, d} and {A, B, C, D}? 98) \_\_\_\_\_

A) Not possible

B) Possible

99) Is it possible or not possible to set up a one-to-one correspondence between {0} and {333}? 99) \_\_\_\_\_

A) Not possible

B) Possible

100) Is it possible or not possible to set up a one-to-one correspondence between  $\emptyset$  and {37}? 100) \_\_\_\_\_

A) Not possible

B) Possible

101) How many one-to-one correspondences are there between two sets with 4 elements each? 101) \_\_\_\_\_

A) 6

B) 24

C) None

D) 2

102) How many one-to-one correspondences are there between the sets {x, y, z, u, v} and {2, 4, 6, 7, 9} if in each correspondence x must correspond to 7 and z to 6? 102) \_\_\_\_\_

A) 6

B) 120

C) 16

D) 21

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

103) There are five seats available for a show. Ten people are in the line for the tickets to these 103) \_\_\_\_\_ seats. Illustrate the utility of one-to-one correspondence with this example.

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

**Find  $n(A)$  for the set A.**

104)  $A = \{3, 5, 7, 9, 11\}$  104) \_\_\_\_\_  
A)  $n(A) = 11$  B)  $n(A) = 2$  C)  $n(A) = 4$  D)  $n(A) = 5$

105)  $A = \{700, 701, 702, \dots, 7000\}$  105) \_\_\_\_\_  
A)  $n(A) = 4$  B)  $n(A) = 6301$  C)  $n(A) = 6300$  D)  $n(A) = 7000$

106)  $A = \{x|x \text{ is a month in the year}\}$  106) \_\_\_\_\_  
A)  $n(A) = 12$  B)  $n(A) = 52$  C)  $n(A) = 1$  D)  $n(A) = 24$

107)  $A = \{x|x \text{ is a number on a clock face}\}$  107) \_\_\_\_\_  
A)  $n(A) = 24$  B)  $n(A) = 3$  C)  $n(A) = 6$  D)  $n(A) = 12$

108)  $A = \{x|x \text{ is a second in a minute}\}$  108) \_\_\_\_\_  
A)  $n(A) = \text{Infinite}$  B)  $n(A) = 120$  C)  $n(A) = 60$  D)  $n(A) = 12$

109)  $A = \{2, 2, 3, 3, \dots, 6, 6\}$  109) \_\_\_\_\_  
A)  $n(A) = 10$  B)  $n(A) = 5$  C)  $n(A) = 6$  D)  $n(A) = 3$

110)  $A = \{x|x \in \mathbb{N} \text{ and } 17 \leq x \leq 25\}$  110) \_\_\_\_\_  
A) 43 B) 9 C) 7 D) 42

**Rewrite the statement using mathematical symbols.**

- 111) P is the set of even numbers less than 50 and more than 40. 111) \_\_\_\_\_  
 A)  $Q = \{42, 44, 46, 48, 50\}$  B)  $P = \{42, 44, 46, 48\}$   
 C)  $P = \{40, 42, 44, 46, 48\}$  D)  $Q = \{40, 42, 44, 46, 48, 50\}$
- 112) The set consisting of the elements k and y is a proper subset of  $\{k, b, e, y, u\}$ . 112) \_\_\_\_\_  
 A)  $\{k, y\} \sim \{k, b, e, y, u\}$  B)  $\{k, y\} \subset \{k, b, e, y, u\}$   
 C)  $\{k, y\} \subseteq \{k, b, e, y, u\}$  D)  $\{k, y\} \in \{k, b, e, y, u\}$
- 113) The set consisting of the elements k and z is not a proper subset of  $\{c, f, z, u\}$ . 113) \_\_\_\_\_  
 A)  $\{k, z\} \sim \{c, f, z, u\}$  B)  $\{k, z\} \subseteq \{c, f, z, u\}$   
 C)  $\{k, z\} \subset \{c, f, z, u\}$  D)  $\{k, z\} \in \{c, f, z, u\}$

**Write a statement that represents the relationship between the following.**

- 114)  $A = \{x \mid x \text{ is a letter from the word "garage"}\}$  and  $B = \{y \mid y \text{ is a letter from the word "rage"}\}$  114) \_\_\_\_\_  
 A)  $A \subset B$  B)  $A \in B$  C)  $A = B$  D)  $A \neq B$
- 115)  $P = \{9, 11, 13, 15, 17\}$  and  $Q = \{2, 4, 6, 8, 10\}$  115) \_\_\_\_\_  
 A)  $P \neq Q$  B)  $P \in Q$  C)  $P \neq Q$  D)  $P = Q$
- 116)  $M = \emptyset$  and  $N = \{ \}$  116) \_\_\_\_\_  
 A)  $M = N$  B)  $M \subset N$  C)  $M \neq N$  D)  $N \in M$
- 117)  $A = \{b, f, n, t, e, r\}$  and  $r$  117) \_\_\_\_\_  
 A)  $r \subset A$  B)  $r \in A$  C)  $r \in A$  D)  $r = A$
- 118)  $C = \{x \mid x \text{ is a letter of the alphabet}\}$  and  $D = \{x \mid x \text{ is a letter in the word "math"}\}$  118) \_\_\_\_\_  
 A)  $D \subset C$  B)  $D \subset C$  C)  $C \subseteq D$  D)  $D = C$
- 119)  $A = \{7, 8, 9\}$  and  $B = \{x \mid 7 \leq x \leq 9, x \in \mathbb{N}\}$  119) \_\_\_\_\_  
 A)  $A \subseteq B$  B)  $B \subset A$  C)  $A \subset B$  D)  $A \in B$
- 120)  $\emptyset$  and  $B = \{a, b, c, d, e\}$  120) \_\_\_\_\_  
 A)  $\emptyset \in B$  B)  $\emptyset \in B$  C)  $\emptyset \in B$  D)  $\emptyset \in B$
- 121)  $A = \{x \mid 2 < x < 6, x \in \mathbb{N}\}$  and  $2$  121) \_\_\_\_\_  
 A)  $2 \in A$  B)  $2 = A$  C)  $2 \in A$  D)  $2 \subset A$
- 122)  $A = \{a, e, i, o, u\}$  and  $B = \{e, o, i, u, a\}$  122) \_\_\_\_\_  
 A)  $A = B$  B)  $A \subset B$  C)  $A \subset B$  D)  $a = A$

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

- 123) 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? 123) \_\_\_\_\_
- 124) Given that  $n(P) = 10$  and  $P \subset Q$ , 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? 124) \_\_\_\_\_
- 125) If  $P \subseteq Q$  and  $Q \subseteq P$ , then what can be said about the equality of the two sets? 125) \_\_\_\_\_

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

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) \_\_\_\_\_

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

129)  $\bar{A}$  is equal to the universal set  $U$ .

129) \_\_\_\_\_

A) True

B) False

130)  $n(A \cup B) \neq n(A) + n(B) - n(A \cap B)$

130) \_\_\_\_\_

A) True

B) False

131)  $A - B = (A \cup B) - B$

131) \_\_\_\_\_

A) True

B) False

132)  $A \cup \emptyset = A \cap \emptyset$

A) True

B) False

132) \_\_\_\_\_

133)  $A \cap (B \cap C) = (A \cap B) \cap C$

A) True

B) False

133) \_\_\_\_\_

134)  $(A - B) \cup A = B$

A) True

B) False

134) \_\_\_\_\_

135)  $(A \cap B) \cup (A \cap C) = (A \cap B) \cup (B \cap C)$

A) True

B) False

135) \_\_\_\_\_

136)  $A \cap \bar{B} = A - B$

A) True

B) False

136) \_\_\_\_\_

137)  $A \cup \bar{B} = A \cap \bar{B}$

A) True

B) False

137) \_\_\_\_\_

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

A) True

B) False

138) \_\_\_\_\_

**Find the Cartesian product or cardinal number as requested.**

139)  $A = \{6, 10, 12\}$

$B = \{5, 10\}$

Find  $A \times B$ .

139) \_\_\_\_\_

A)  $\{(6, 5), (6, 10), (10, 5), (10, 10), (12, 5), (12, 10)\}$

B)  $\{(6, 5), (10, 10)\}$

C)  $\{(5, 6), (5, 10), (5, 12), (10, 6), (10, 10), (10, 12)\}$

D)  $\{(6, 5), (10, 12), (12, 5)\}$

140)  $A = \{i, a\}$

$B = \{t, d\}$

m} 140)

Find  $A \times$

B.

A)  $\{(i, t), (a, t), (i, d), (a, d)\}$

C)  $\{(t, i), (t, a), (d, i), (d, a), (m, i), (m, a)\}$

B)  $\{(i, t), (i, d), (i, m), (a, t), (a, d), (a, m)\}$

D)  $\{(i, t), (t, a), (i, d), (d, a), (i, m), (m, a)\}$

141)  $A = \{0\}$

$B = \{11, 21, 31\}$

Find  $B \times A$ .

A)  $\{0\}$

C)  $\{(0, 11), (0, 21), (0, 31)\}$

B)  $\{(11, 0), (21, 0), (31, 0)\}$

D)  $\{0, 0, 0\}$

141) \_\_\_\_\_

142)  $A = \{4, 3, 8, 7\}$

$B = \{0, 1\}$

Find  $B \times A$ .

A)  $\{(4, 0), (4, 1), (3, 0), (3, 1)\}$

B)  $\{(4, 0), (3, 0), (8, 0), (7, 0), (4, 1), (3, 1), (8, 1), (7, 1)\}$

C)  $\{0, 1, 4, 3, 8, 7\}$

D)  $\{(0, 4), (0, 3), (0, 8), (0, 7), (1, 4), (1, 3), (1, 8), (1, 7)\}$

142) \_\_\_\_\_

143) Write  $\{(k, 3), (k, 4), (j, 3), (j, 4)\}$  as a Cartesian product.

A)  $\{k, 3\} \times \{j, 4\}$

B)  $\{3, 4\} \times \{k, j\}$

C)  $\{k, j\} \times \{3, 4\}$

D)  $\{k, j, 3, 4\} \times \{1\}$

143) \_\_\_\_\_

144)  $A = \{15, 3, 10\}$

$B = \{5, 12\}$

Find  $n(A \times B)$ .

A) 12

B) 5

C) 9

D) 6

144) \_\_\_\_\_

145)  $n(A) = 21$

$n(B) = 9$

Find  $n(A \times B)$ .

A) 12

B) 189

C) 30

D) 39

145) \_\_\_\_\_

146)  $n(A \times B) = 32$

$n(A) = 4$

Find  $n(B)$ .

A) 36

B) 4

C) 28

D) 8

146) \_\_\_\_\_

147)  $n(A \times B) = 90$

$n(B) = 10$

Find  $n(A)$ .

A) 9

B) 100

C) 80

D) 10

147) \_\_\_\_\_

148)  $n(A) = 2$

$n(B) = 5$

$n(C) = 3$

$n(A \times B \times C) = ?$

A) 3

B) 7

C) 10

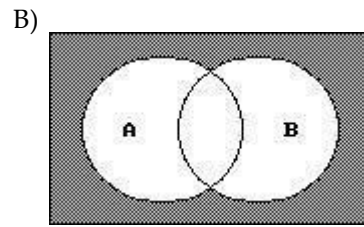
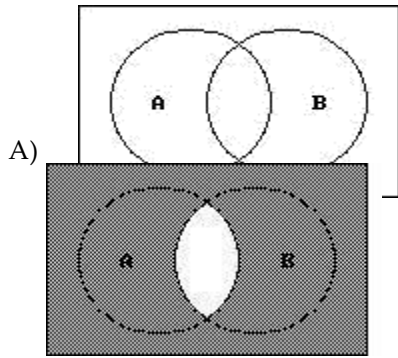
D) 30

148) \_\_\_\_\_

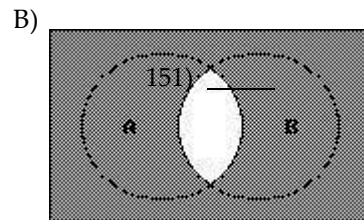
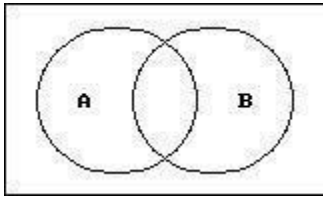
Shade the portion of the diagram that represents the given set.

149)  $A \cap B$

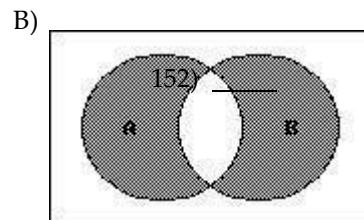
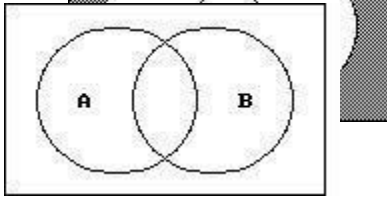
149)



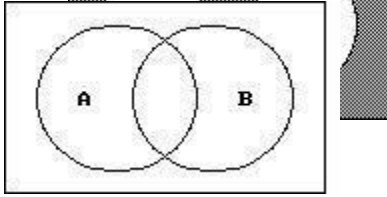
150)  $\bar{A} \cup \bar{B}$

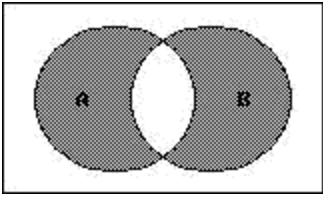


151)  $(A \cup B) \cap \overline{(A \cap B)}$

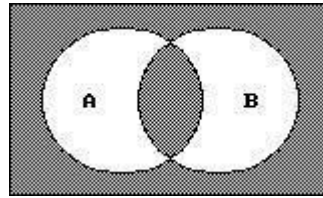


152)  $(A \cap B) \cup \overline{(A \cup B)}$

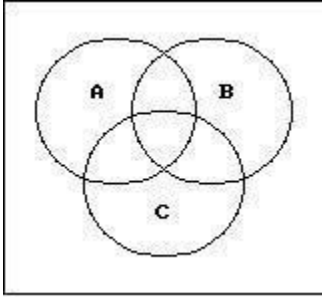




B)

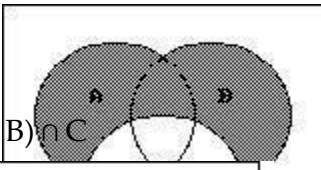


153)  $\bar{C} \cap (A \cup B)$

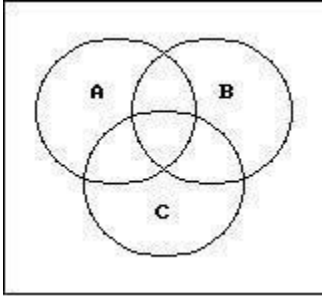


153) \_\_\_\_\_

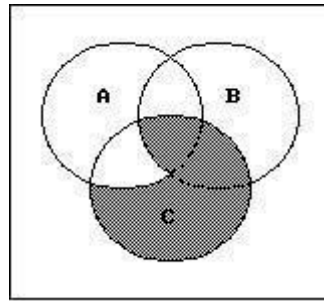
A)



154)  $(\bar{A} \cup \bar{B}) \cap C$

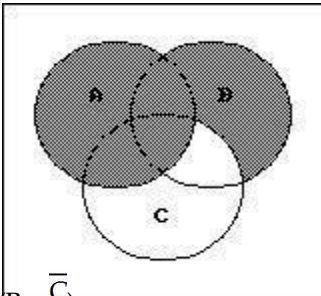


B)



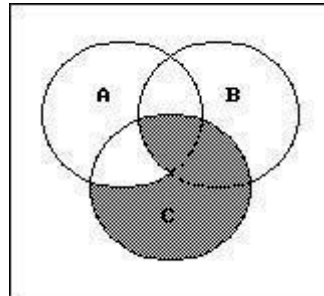
154) \_\_\_\_\_

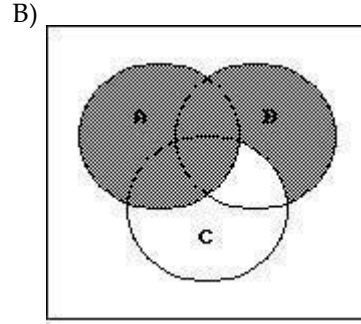
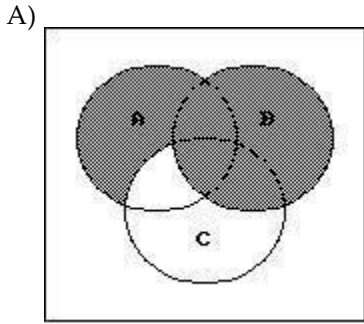
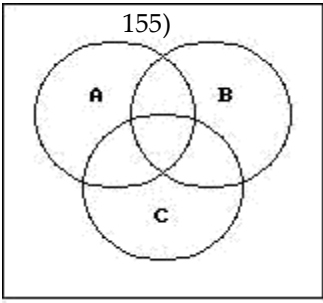
A)



155)  $A \cup (B \cap \bar{C})$

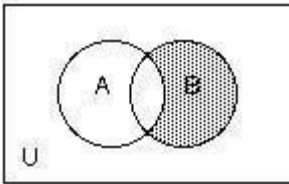
B)





Use set notation to identify the shaded region.

156)



A)  $A \cap \bar{B}$

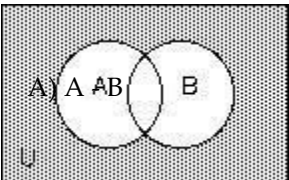
B)  $B \cap \bar{A}$

C)  $A - B$

D)  $B - \bar{A}$

156) \_\_\_\_\_

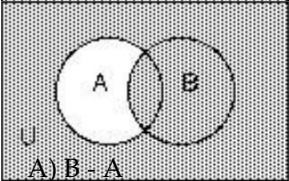
157)



A)  $A \cap B$

B)  $A \cup B$

158)



A)  $B - A$

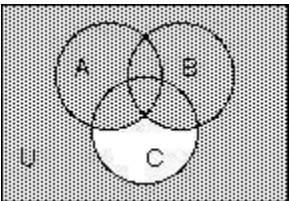
B)  $\bar{A} \cap B$

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

D)  $\bar{A} \cap \bar{B}$

158) \_\_\_\_\_

159)



A)

B)

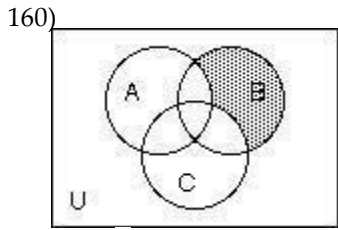
C)

D)

159) \_\_\_\_\_

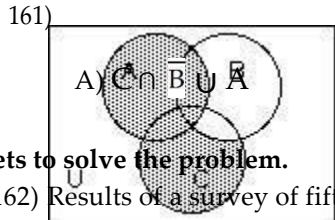


$\bar{C}$                       B)                       $\overline{A \cup B \cup C}$                       A                      D)                      (A  
 $\bar{B}$                        $\bar{C}$                        $\bar{B}$                        $\bar{C}$



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

160) \_\_\_\_\_



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

161) \_\_\_\_\_

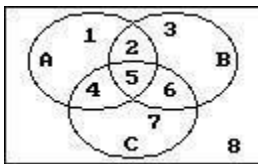
Use sets to solve the problem.

- 162) 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 neither red nor green jelly beans?
- A) 12                      B) 13                      C) 17                      D) 8

- 163) 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 cats?
- A) 27                      B) 10                      C) 22                      D) 15

- 164) 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?
- A) 150                      B) 100                      C) 250                      D) 400

- 165) 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 Products A or C?



- A) 1,2,4,5,6,7                      B) 4,5                      C) 2,4,5,6                      D) 2,5,6

- 166) 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 650 responses with the following results:

interview show and reruns.

195  
 were interested in none of the three.  
 How many are interested in exactly one kind of show?  
 interested in an interview show  
 and a documentary, but not reruns.

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

91 were interested in reruns but not an interview show.

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

65 were interested in a documentary and reruns.

39 were interested in an

A) 302

B) 322

C) 312

D) 292

167) A survey of 240 families showed that

167) \_\_\_\_\_

91 had a dog;

70 had a cat;

31 had a dog and a cat;

91 had neither a cat nor a dog nor a parakeet;

7 had a cat and dog and a parakeet.

How many had a parakeet only?

A) 34

B) 29

C) 19

D) 24

168) A survey of a group of 117 tourists was taken in St. Louis. The survey showed the following:

168) \_\_\_\_\_

66 of the tourists plan to visit Gateway Arch;

49 plan to visit the zoo;

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

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

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

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

16 plan to visit none of the three places.

How many plan to visit the Art Museum only?

A) 49

B) 37

C) 101

D) 12

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

- 52) C
- 53) B
- 54) C
- 55) D
- 56) C
- 57) D
- 58) A
- 59) C
- 60) C
- 61) D
- 62) A
- 63) A
- 64) D
- 65) 33
- 66) 23
- 67) 5
- 68) 56
- 69) No, <sup>11</sup>seven
- 70) No, <sup>101</sup>twc
- 71) <sup>432</sup>five
- 72) 100
- 73) 211
- 74) C
- 75) C
- 76) B
- 77) C
- 78) A
- 79) A
- 80) C
- 81) D
- 82) C
- 83) B
- 84) A
- 85) D
- 86) B
- 87) B
- 88) C
- 89) A
- 90) B
- 91) A
- 92) A
- 93) B
- 94) No, since "good" is a subjective term.
- 95) Yes, you can list the elements.
- 96) B
- 97) A
- 98) B
- 99) B
- 100) A
- 101) B
- 102) A
- 103) 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.

- 104) D
- 105) B
- 106) A
- 107) D
- 108) C
- 109) B
- 110) B
- 111) B
- 112) D
- 113) D
- 114) C
- 115) C
- 116) A
- 117) B
- 118) B
- 119) D
- 120) A
- 121) C
- 122) A
- 123)  $\overline{B}$
- 124) 11, No
- 125)  $P = Q$
- 126)  $n(U) = n(B) + n(\overline{B})$
- 127) The universal set is the set of all natural numbers. Also,  $A = \overline{B}$  and  $B = \overline{A}$ .
- 128) 64
- 129) A
- 130) B
- 131) A
- 132) B
- 133) A
- 134) B
- 135) B
- 136) A
- 137) A
- 138) B
- 139) A
- 140) B
- 141) B
- 142) D
- 143) C
- 144) D
- 145) B
- 146) D
- 147) A
- 148) D
- 149) B
- 150) B
- 151) B
- 152) B
- 153) A

154) B  
155) B  
156) B  
157) D  
158) C  
159) D  
160) B  
161) A  
162) D  
163) C  
164) C  
165) A  
166) C  
167) C  
168) D