CXC (CSEC) MATHEMATICS MAY 2011 BOOTCAMPS

WORKOUT 2C – Algebra 1 and Sets

PAPER 2 (Structured)

#1 – Jun 2008 # 2, 4a	#6 – Jun 2003 # 2, 3a, 9a	#11 – Jan 2009 # 2a, 3a, 9a
#2 – Jun 2007 # 2, 3a	#7 – Jun 2002 # 2, 4a	#12 – Jan 2008 # 3a, 9
#3 – Jun 2006 # 2, 3b	#8 – Jun 2001 # 2, 3a, 3c	#13 – Jan 2007 # 2, 3, 9a, 9b
#4 – Jun 2005 # 2, 3a	#9 – Jun 2000 # 2, 3	
#5 – Jun 2004 # 2, 3a	#10 – Jun 1999 # 2, 3a	

PAPER 1– (Multiple Choices)

1. Given that $a \Delta b = 2a - 3b$ then $2 \Delta (-3) =$

(A) -7
(B) -5
(C) 3
(D) 13

2. If $20a - 16 = 12(3 - a)$, then $a =$

(A) $\frac{5}{8}$

(B) $\frac{21}{16}$

(C) $\frac{13}{8}$

(D) $\frac{5}{2}$

3. $2(a^2b)^3 =$

(A) $2a^5b^3$
(B) $2a^6b^3$
(C) $6a^2b$
(D) $8a^6b^3$

4. Of a class of 32 students, 17 study Music and 20 study Art. What is the LEAST number of students who study BOTH Music and ART?

(A) 3
(B) 5
(C) 12
(D) 15

5. Which of the following sets is defined by $\{x \in Z : -2 \leq x \leq 4\}$?

(A) {0, 1, 2, 3, 4}
(B) {1, 2, 3, 4}
(C) {-1, 0, 1, 2, 3}
(D) {-2, -1, 0, 1, 2, 3, 4}

6. $5(x+y)-3(x-y)=$

(A) $2x$
(B) $2x+2y$
(C) $2x+8y$
(D) $8x+8y$

7. If $r * s = s^r$, then $3 * 2 =$

(A) 8
(B) 9
(C) 12
(D) 27

8. If $3n$ is an odd number, which of the following is an even number?

(A) $3n+2n$
(B) $3n+2$
(C) $3n-2$
(D) $3n-1$

9. $(4-x)(3+2x)=$

(A) $7+5x-2x^2$
(B) $12+5x+2x^2$
(C) $12+11x-2x^2$
(D) $12+5x-2x^2$

10. For $2x+3\geq 9$, the range of values of x is

(A) $x\geq 3$
(B) $x>3$
(C) $x\geq 6$
(D) $x>6$

11. If $x=-2, y=3, t=2$, then $\left(\frac{x}{y}\right)^t =$

(A) $-\frac{4}{9}$
(B) $\frac{4}{9}$
(C) $\frac{4}{3}$
(D) $\frac{9}{4}$

12. The values of x and y which satisfy the equations $x+2y=27$ and $2x-y=19$ are respectively

(A) 15 and 10
(B) 10 and 15
(C) 7 and 13
(D) 13 and 7

13. If $m = \frac{1}{2}$, n $= -\frac{1}{4}$, then $m^2 + n^2 =$

(A) $\frac{1}{16}$

(B) $\frac{3}{16}$

(C) $\frac{5}{16}$

(D) $\frac{7}{16}$

14. $(\frac{1}{2})^3$ is the same as

(A) $-\frac{1}{8}$

(B) $-\frac{1}{6}$

(C) $\frac{1}{8}$

(D) $\frac{1}{6}$

15. If $U = \{1, 3, 5, 6, 8\}$ and $A = \{3, 6\}$, then the number of elements in A' is

(A) 2
(B) 3
(C) 4
(D) 8

16. If $a * b = \frac{b}{a} - 1$, then $7 * 28 =$

(A) $-\frac{3}{4}$

(B) $\frac{1}{4}$

(C) 3

(D) 4

17. If $a = 3$ and $ab = 6$, then $(a + b)^2 - a^2 - b^2 =$

(A) 0
(B) 8
(C) 12
(D) 20

18. For all a and b,

$3a(a + 2b) - b(2a - 3b) \equiv$

(A) $3a^2 + 8ab - 3b^2$
(B) $3a^2 + 4ab + 3b^2$
(C) $3a^2 + 4ab - 3b^2$
(D) $3a^2 - ab + 3b^2$

19. $\frac{4}{5x} + \frac{2}{5x} =$

(A) $\frac{6}{25x}$

(B) $\frac{8}{25x}$

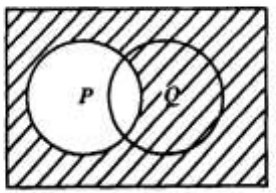
(C) $\frac{6}{10x}$

(D) $\frac{6}{5x}$

20. Which of the following represents the statement "The difference of two square numbers is positive"

(A) $x^2 - y^2 > 0$
(B) $2x - 2y > 0$
(C) $(y - x)^2 > 0$
(D) $2(y - x) > 0$

Item 21 refers to the following Venn diagram.



21. In the Venn diagram above, the shaded area represents

(A) P′
(B) $(P \cup Q)'$
(C) $Q \cup P'$
(D) $Q \cap P'$

22. P and Q are two finite sets such that $n(P) = 7$, $n(Q) = 5$ and $n(P \cap Q) = 3$. What is $n(P \cup Q)$?

(A) 6
(B) 9
(C) 15
(D) 18

23. If p sweets are sold for q cents, then one sweet is sold for

(A) $\frac{p}{q}$ cents

(B) pq cents

(C) $\frac{q}{p}$ cents

(D) $(q - p)$ cents

24. If $2(y - 4) = 16$, then $y =$

(A) 4
(B) 6
(C) 10
(D) 12

Item 25 refers to the expansion below.

$$(x + a)(x + b) = x^2 + (a + b)x + ab$$

25. The middle term in the expansion of $(x+3)(x-1)$ is

(A) 2
(B) 3
(C) $2x$
(D) $4x$

26. The expression $-2(x-4)$ is the same as

(A) $-2x - 8$
(B) $-2x - 4$
(C) $-2x + 4$
(D) $-2x + 8$

27. If $m * n = \sqrt{mn - n^2}$ then $5 * 3 =$

(A) $\sqrt{6}$

(B) 3

(C) $\sqrt{15}$

(D) 6

28. If $15^2 = 225$ then the square root of 0.0225 is

(A) 0.015
(B) 0.15
(C) 1.5
(D) 15.0

29. When 6 is added to a number and the sum is divided by three, the result is four. This statement written in mathematical symbols is

(A) $\frac{6+x}{3} = 4$

(B) $\frac{6}{3} + x = 4$

(C) $\frac{6+x}{3} = \frac{4}{3}$

(D) $6 + \frac{x}{3} = 4$

30. The sides of a triangle are x cm, $(x - 1)$ cm and $(x + 2)$ cm. If the perimeter is 31 cm, then the SHORTEST side is

(A) 9
(B) 10
(C) 11
(D) 12

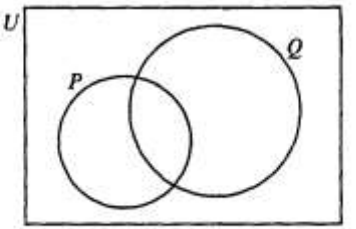
31. If $P = \{2,3,5,7\}$, $Q = \{2,3,6\}$ and $S = \{2,4,5\}$, then $P \cap Q \cap S =$

(A) $\{\ \}$
(B) $\{2\}$
(C) $\{2,3\}$
(D) $\{2,3,4,5,6,7\}$

32. $(-8a) \times (-3b) =$

(A) $-24ab$
(B) $-11ab$
(C) $11ab$
(D) $24ab$

33.



In the Venn diagram above, $n(P) = 5$, $n(Q) = 9$ and $n(P \cup Q) = 10$.

What is $n(P \cap Q)$?

(A) 4
(B) 6
(C) 14
(D) 24

34. $(8a)^2 =$

(A) $16a$
(B) $64a$
(C) $16a^2$
(D) $64a^2$

35. $5(2x - y) - 2(3y - 5x) =$

(A) $-11y$
(B) $2x - 6y$
(C) $6x - 7y$
(D) $20x - 11y$

36. $3x^2 \times 2x^3 =$

(A) $6x^5$
(B) $5x^5$
(C) $6x^6$
(D) $72x^5$

37. If $50 - 3x = x - 26$, then $x =$

(A) -12
(B) -6
(C) 6
(D) 19

38. If $P = \dfrac{m^2}{2 - m}$ when $m = -3$, then $P =$

(A) -6

(B) $\dfrac{-6}{5}$

(C) $\dfrac{9}{5}$

(D) 9

39. Althea saves $\$x$ each month; but in June she saved \$4 more than twice her regular amount. In June she saved

(A) $\$4x$
(B) $\$6x$
(C) $\$(x+4)$
(D) $\$(2x+4)$

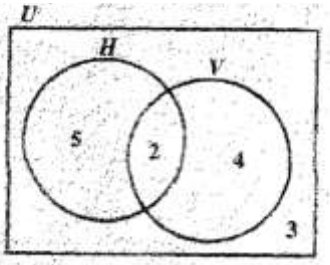
40. If $p = 3(a - q)$, then $6a$ is equal to

(A) $2(p + 3q)$
(B) $2(p + q)$
(C) $p + 3q$
(D) $p + q$

41. If $Q = \{a, b, c, d, e\}$ how many subsets can be obtained from the set Q?

(A) $2+5$
(B) 2×5
(C) 5^2
(D) 2^5

Item 41 refers to the following Venn Diagram



42. In the Venn diagram above

U = {students who play games}
H = {students who play hockey}
V = {students who play volleyball}

The number of students in each set is indicated. How many students do NOT play volleyball?

(A) 2
(B) 3
(C) 5
(D) 8

43. "When 7 is added to 3 times a certain number n, the result is 22".

The statement above may be represented by the equation

(A) $3n + 7 = 22$
(B) $7n - 22 = 3$
(C) $3n + 22 = 7$
(D) $7n + 3 = 22$

44. John had x marbles and Max had twice as many. Max gives Tom 5 of his marbles. How many marbles does Max now have?

(A) $x + 5$
(B) $x - 5$
(C) $2x + 5$
(D) $2x - 5$

45. The expression $(2a)^3$ is the same as

(A) $6a$
(B) $8a$
(C) $6a^3$
(D) $8a^3$

46. If $5(2x-1)=35$, then $x=$

(A) -4

(B) $\frac{1}{4}$

(C) 3

(D) 4

47. The sum of x and y is 18, and their difference is 14. Which pair of equations describes the above statement?

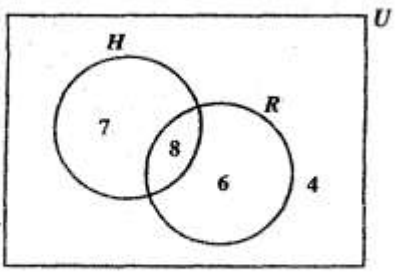
(A) $2(x+y)=18$
$2(x-y)=4$

(B) $2(xy)=18$
$2(x-y)=4$

(C) $(x+y)=18$
$(x-y)=14$

(D) $(x+y)=22$
$(x-y)=14$

Items 48 to 49 refer to the diagram below.



In the Venn diagram above

U = {Form 5 students}
H = {Form 5 students belonging to the hockey team}
R = {Form 5 students belonging to the rugby team}

The number of students belonging to each team is indicated.

48. How many Form 5 students belong to the hockey team **or** rugby team **or** both?

(A) 6
(B) 7
(C) 8
(D) 21

49. The number of Form 5 students who do NOT belong to the rugby team is

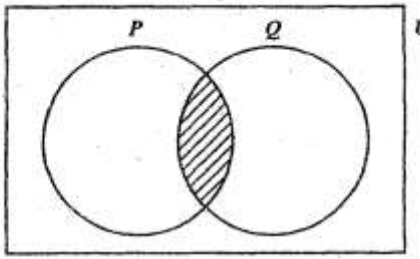
(A) 4
(B) 7
(C) 11
(D) 18

50. Complete the following statement **correctly** by selecting ONE of the expressions below.

There are 4 students in Form 5 who

(A) play rugby but not hockey
(B) play hockey but not rugby
(C) do not belong to a sports team
(D) do not belong to the rugby team nor the hockey team

51.



The two circles above represent set P and set Q. If P = {Factors of 6} and Q = {Factors of 4}, then the shaded region represents

(A) { }
(B) {1, 2}
(C) {4, 6, 8 ...}
(D) {12, 24, 36, ...}

52. When 8 is subtracted from a certain number and the result is multiplied by 3 the final answer is 21. What is the original number?

(A) 1
(B) 3
(C) 10
(D) 15

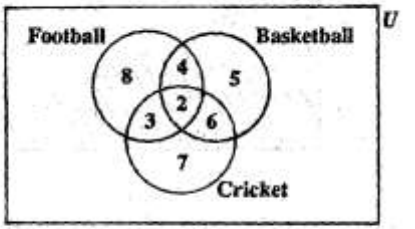
53. $5x - (3x + 2y) =$

(A) $2x - 2y$
(B) $2x + 2y$
(C) $8x - 2y$
(D) $8x + 2y$

54. Given that $3 * 6 = 12$ and $2 * 5 = 9$, then $a * b$ may be defined as

(A) $4(b - a)$
(B) $a^2 + b$
(C) $6a - b$
(D) $2a + b$

Items 55 – 56 refer to the diagram below.



The Venn diagram shows the sports played by the students in a club. Every student plays at least one of the sports.

55. How many students play basketball only?

(A) 2
(B) 5
(C) 15
(D) 17

56. How many students do NOT play cricket?

(A) 4
(B) 13
(C) 17
(D) 28

57. $2^{-3} =$

(A) -8

(B) $-\frac{1}{8}$

(C) $\frac{1}{8}$

(D) 8

58. $\frac{4x+8}{2} =$

(A) $6x$
(B) $2x+4$
(C) $4x+4$
(D) $2x+8$

59. $-4-(-7) =$

(A) -11
(B) -3
(C) 3
(D) 11

60. If $5x-26 = x+50$, then the value of x is

(A) -12
(B) -6
(C) 6
(D) 19

61. If $x \in W$, the solution set of $2x-7 \leq -2$ is

(A) $\{0, 1\}$
(B) $\{1, 2\}$
(C) $\{0, 1, 2\}$
(D) $\{1, 2, 3, \ldots\}$

62. All students in a class play scrabble or checkers or both. 36% of the students play scrabble only; 48% of the students play checkers only. What percentage of students play BOTH games?

(A) 12
(B) 16
(C) 84
(D) 88

63. John has x marbles and Tom has twice as many. Tom loses 5 of his marbles. How many marbles does Tom now have?

(A) $x+5$
(B) $x-5$
(C) $2x+5$
(D) $2x-5$

64. Which of the following sets is equivalent to $\{a, b, c, d\}$?

(A) $\{4\}$
(B) $\{a, b, c\}$
(C) $\{p, q, r, s\}$
(D) $\{1, 2, 3, 4, 5\}$

65. $(-8a) \times (-3b) =$

(A) $-24ab$
(B) $-11ab$
(C) $11ab$
(D) $24ab$

66. For all a and b,
$a(a+2b) - b(2a+b) =$

(A) $a^2 - b^2$
(B) $a^2 + b^2$
(C) $a^2 - 4ab - b^2$
(D) $a^2 + 4ab + b^2$

67. If $\frac{7x}{100} = 21$, then $x =$

(A) 0.3
(B) 3
(C) 30
(D) 300

68. A youth group has 200 members, 104 are interested in both football and cricket, 66 are interested in football only and 10 are NOT interested in either game. How many members are interested in cricket ONLY?

(A) 20
(B) 30
(C) 38
(D) 124

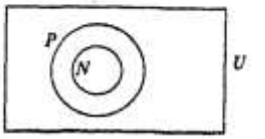
69. U = (Integers)

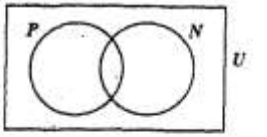
P = (Positive integers)

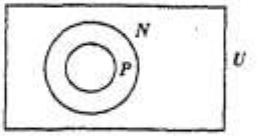
N = (Negative integers)

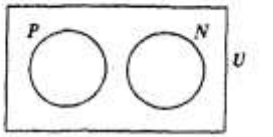
Which of the Venn diagrams below illustrates the following statement:

"No positive integer is a negative integer"?

(A)


(B)


(C)


(D)


70. $3^2 \times 3^3 =$

(A) 3^5
(B) 9^5
(C) 3^6
(D) 9^6

71. Given that $p * q$ means $2p - q$, the value of $2 * 1$ is

(A) 0
(B) 2
(C) 3
(D) 5

72. $(-4)^3 =$

(A) –64
(B) –12
(C) +12
(D) +64

73. If $50 - 3x = x - 26$, then $x =$

(A) 12
(B) –6
(C) 6
(D) 19

74. $2a^3 \times 3a =$

(A) $5a^3$
(B) $6a^4$
(C) $6a^3$
(D) $12a^3$

75. $15 - (-3) =$

(A) –45
(B) 12
(C) 18
(D) 45

76. The solution of the inequality $3x > 18$ is

(A) $x > 4$
(B) $x > 6$
(C) $x > 15$
(D) $x > 21$

77. The value of $(-2a)(-3a)$ is

(A) $-6a$
(B) $-5a$
(C) $5a^2$
(D) $6a^2$

78. $-3x + 5y + 5x + 2y =$

(A) $8x - 7y$
(B) $2x + 7y$
(C) $-2x - 3y$
(D) $-2x + 7y$

79. U is the universal set.
If $U = \{a, b, c, d, e, f, g\}$
$S = \{a, c, e\}$, then $S' =$

(A) $\{b, d, f\}$
(B) $\{a, c, e, g\}$
(C) $\{b, d, e, g\}$
(D) $\{b, d, f, g\}$

80. What is the value of $x^2 - 9$ when $x = 10$?

(A) 1
(B) 11
(C) 91
(D) 109

81. $3x(x + y) =$

(A) $3x + 3xy$
(B) $3x^2 + 3y$
(C) $3x^2 + y$
(D) $3x^2 + 3xy$

82. If $x * y \equiv 3x + y$. Then $2 * 3$ is

(A) 5
(B) 6
(C) 9
(D) 11

83. If $V = \frac{4}{3}\pi R^3$, then R is

(A) $\sqrt[3]{\frac{3V}{4\pi}}$

(B) $\sqrt[3]{\left(\sqrt{\frac{V}{4\pi}}\right)}$

(C) $\frac{4\pi V}{9}$

(D) $\frac{2\pi V}{3}$

84. The product of a number p and its reciprocal is

(A) $p \times -p$

(B) $p^2 \times -p$

(C) $p^2 \times \frac{1}{p}$

(D) $p \times \frac{1}{p}$

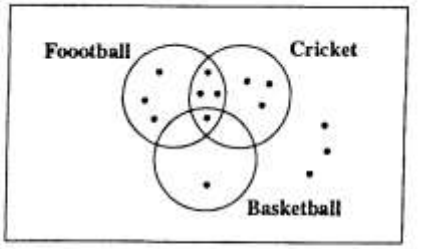
85. If the universal set $U = \{1, 2, 3, 4, 5, 6\}$ and $H = \{3, 4, 6\}$, then $H' =$

(A) $\{3, 4, 6\}$
(B) $\{1, 2, 5\}$
(C) $\{2, 4, 6\}$
(D) $\{1, 3, 5\}$

86. $(-3)^2 + (-2)^3 =$

(A) -17
(B) 0
(C) 1
(D) 12

Items 87 -88 refer to the diagram below.



In the Venn diagram, a dot (•) is used to represent one boy. The diagram shows those boys who play cricket, football and basketball in Form 1.

87. How many boys of Form 1 play cricket?

(A) 3
(B) 6
(C) 7
(D) 8

88. How many boys of Form 1 play only ONE sport?

(A) 3
(B) 4
(C) 7
(D) 12

89. If $2p - 5 = 15$, then $p =$

(A) 5
(B) 10
(C) 20
(D) 40

90. $2x - 3(x + 8) =$

(A) $x + 8$
(B) $-x - 24$
(C) $5x + 8$
(D) $-5x - 24$

91. If $p * q \equiv 2p + q$.
Then $2 * 3$ is

(A) 5
(B) 7
(C) 8
(D) 9

92. Which of the following sets is equivalent to $\{a, b, c, d\}$?

(A) $\{4\}$
(B) $\{a, b, c\}$
(C) $\{p, q, r, s\}$
(D) $\{1, 2, 3, 4, 5\}$

93. Using the distributive law,
$(p \times q) - (p \times r)$ is simplified to

(A) $p^2 - qr$
(B) $p(q - r)$
(C) $-qr$
(D) $-2pqr$

94. What is the value of $\frac{x^2 + 3y}{xy}$, if $x = 4$ and $y = 2$?

(A) $1\frac{3}{4}$
(B) $2\frac{1}{2}$
(C) $2\frac{3}{8}$
(D) $2\frac{3}{4}$

95. $-2(x - 4) =$

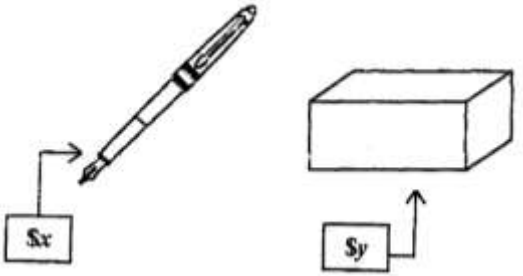
(A) $-2x - 8$
(B) $-2x - 4$
(C) $-2x + 4$
(D) $-2x + 8$

96. $(x - 2)(3x + 4) =$

(A) $3x^2 - 6x - 8$
(B) $3x^2 - 2x - 8$
(C) $3x^2 + 10x + 8$
(D) $3x^2 - 10x + 8$

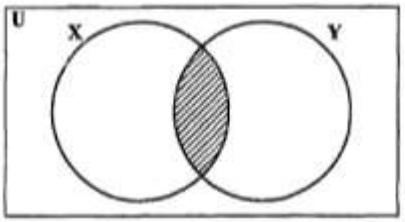
97. By the distributive law $49 \times 17 + 49 \times 3 =$

(A) $52 + 66$
(B) 52×66
(C) $49 + 20$
(D) 49×20



98. The TOTAL cost of 3 pens and 2 boxes is

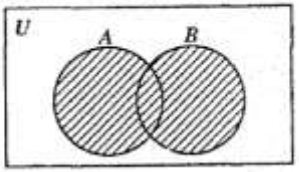
(A) $3x + 2y$
(B) $2x + 3y$
(C) $5(x + y)$
(D) $6xy$

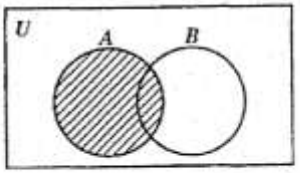


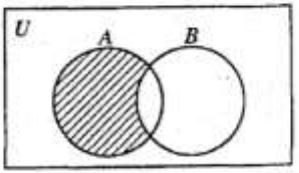
99. X represents the set of multiples of four.
Y represents the set of multiples of five.
The shaded region is the set of multiples of

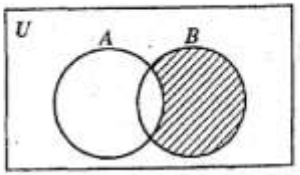
(A) 8
(B) 9
(C) 10
(D) 20

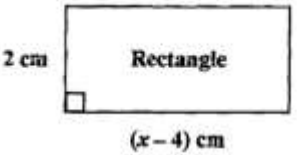
100. In which one of the following Venn diagrams is the region $A \cap B'$ shaded?

(A)


(B)


(C)


(D)




101. The area of the rectangle, in cm^2, is x^2. The equation that may be used to find the value of x is

(A) $x^2 = 2(x - 4)$
(B) $x^2 = (x - 2)(x - 4)$
(C) $x^2 = 2(x - 4)(x - 2)$
(D) $x^2 = (x - 4)(x + 2)$

102. Think of a number. Subtract 8 from it. Multiply this difference by 3. The result is 21. What is the original number?

(A) 1
(B) 3
(C) 10
(D) 15

103. A = {Factors of 30}
B = {Prime numbers less than 10}
C = {Even whole numbers less than 10}

Then $n(A \cap B \cap C)$ is

(A) 0
(B) 1
(C) 2
(D) 9

104. Given $2x + 3 \geq 9$, the range of values of x is

(A) $x > 3$
(B) $x \geq 3$
(C) $x > 6$
(D) $x \geq 6$

105. If $3 + \frac{2}{x} = 1$, then the value of x is

(A) -1
(B) $\frac{1}{5}$
(C) $\frac{1}{2}$
(D) 5

106. If x is an integer that satisfies the inequality $4 < 2x \leq 6$, then

(A) $2 < x \leq 3$
(B) $-2 < x \leq 3$
(C) $-3 < x \leq 2$
(D) $-3 \leq x < -2$

107. $(8a)^2 =$

(A) $16a$
(B) $64a$
(C) $16a^2$
(D) $64a^2$

108. Given that $a * b = 2a - 3b$, then $2 * (-3) =$

(A) 13
(B) 3
(C) -5
(D) -7

109. $2(a^2b)^3 =$

(A) $2a^5b^3$
(B) $2a^6b^3$
(C) $6a^2b$
(D) $8a^6b^3$