Category 7 Algebra

<BASIC LEVEL QUESTIONS>

1. If $(a-1)(b-2)$ = 0, which of the following must be true?

answer

I. a = 1 and b = 2.

II. If $a \neq 1$, then b = 2

III. If $a = 1$, then $b \neq 2$.

(A) I only
(B) II only
(C) III only
(D) I and II
(E) II and III

2. If $(x-5)(y+2)=0$, which of the following must be true?

answer

(A) $x = y$
(B) $x > y$
(C) $x < y$
(D) $xy = -10$
(A) None of the above

3. If r and s are the two roots of the equation $x^2+8x+15=0$, and $r<s$, what is the value of $s-r$?

answer

(A) -8
(B) –2
(C) 2
(D) 7
(E) 8

4. If $(-2,k)$ is a point on the graph of $y=2x^2-3x+1$, then $k=$

answer

(A) -13
(B) -1
(C) 3
(D) 11
(E) 15

5. The product of two positive integers m and n is twice their sum. If n is 6, what is the value of m ?

answer

(A) 8
(B) 6
(C) 4
(D) 3
(E) 2

6. If $x:y=2:3$, $y:z=3:4$, and $x=8$, then $z-y=$

answer

(A) 1
(B) 4
(C) 6
(D) 8
(E) 12

7. **If S is the set of all numbers x such that $1-2x\le 3$, which of the following is true about S?**

answer

(A) **The least number in S is -1.**

(B) **The least number in S is 0.**

(C) **The least number in S is 3.**

(D) **The greatest number in S is -2.**

(E) **The greatest number in S is -1.**

8. **If $rt > st$ and $r > s$, then which of the following must be true?**

answer

(A) $t > 0$

(B) $s > 0$

(C) $r > 0$

(D) $t < 0$

(E) $rs > 0$

9. **If $-3 \le x \le 7$ and $-6 \le y \le 2$, what is the smallest possible value of $x-2y$?**

answer

(A) **–15**

(B) **–9**

(C) **–7**

(D) **0**

(E) **9**

10. For any integer x, $\bar{x}$ is defined by the equation $\bar{x} = x + 1$. Which of the following is equal to $(\bar{x})^2 - \overline{x^2}$ for all integers x?

answer

(A) 0
(B) 2
(C) $\overline{2x}$
(D) $2x$
(E) $2\bar{x}$

11. An operation * defined on whole numbers gives results such as the following:

answer

$$2 * 3 = 7$$
$$3 * 4 = 13$$
$$1 * 5 = 6$$
$$0 * 6 = 1$$

According to the equations above, which of the following could define the operation * ?

(A) $x * y = x + y$
(B) $x * y = 2x + y$
(C) $x * y = y^2 - x$
(D) $x * y = x^2 + y$
(E) $x * y = xy + 1$

12. If $r \circ s = rs + r + s$, then for what value of s is $r \circ s$ equal to r for all values of r?

answer

(A) –1
(B) 0
(C) 1
(D) $\frac{1}{r+1}$
(E) r

13. **Marie's monthly salary is determined by the formula $s = 850 + \frac{x}{10}$, were s is her salary and x is the total amount of her monthly sales, both expressed in dollars. If the total of Marie's sales for July was $22,000, then her salary for July was**

answer

(A) **$2,115**
(B) **$3,050**
(C) **$5,620**
(D) **$6,410**
(E) **$10,700**

14. **The total cost C, in dollars, of manufacturing x items of a certain type is given by $C = \frac{1}{2}x^2 + 5{,}000$. When the total cost is $10,000, exactly how many such items are manufactured?**

answer

(A) **100**
(B) **140**
(C) **200**
(D) **30,000**
(E) **50,000,000**

15. **A loaf of bread and 2 one-pound containers of butter cost a total of $4.95. If a pound of butter costs $0.90 more than a loaf of bread, how much does a pound of butter cost?**

answer

(A) **$1.05**
(B) **$1.58**
(C) **$1.95**
(D) **$2.03**
(E) **$2.93**

16. **Pat bought n apples at a cost of 3 for \$0.20 and then sold the n apples at a price of 4 for \$0.35. If Pat's revenue from the sale of the apples was \$2.50 more than the cost of the apples, what is the value of n?**

answer

(A) 150
(B) 120
(C) 90
(D) 80
(E) 60

17. **The total cost of 3 pounds of hamburger and 4 pounds of hot dogs is \$12.39. At the same rates, if the cost of 5 pounds of hamburger is \$9.45, what is the cost per pound of hot dogs?**

answer

(A) \$1.59
(B) \$1.68
(C) \$1.77
(D) \$1.89
(E) \$2.03

18. **At a certain bowling alley, it costs \$0.50 to rent bowling shoes for the day and \$1.25 to bowl 1 game. If a person has \$12.80 and must rent shoes, what is the greatest number of complete games that person can bowl in one day?**

answer

(A) 7
(B) 8
(C) 9
(D) 10
(E) 11

19. **A mother and her child have a combined weight of 150 pounds. If the mother's weight is 5 times her child's weight, what is the weight, in pounds, of the child?**

answer

(A) **32**
(B) **30**
(C) **28**
(D) **25**
(E) **24**

20. **Jim multiplied a number by 5 when he should have divided it by 4. If the result he got was 10, what would have been the result if he had not made the error?**

answer

(A) $\frac{1}{20}$
(B) $\frac{1}{10}$
(C) $\frac{1}{5}$
(D) $\frac{1}{4}$
(E) $\frac{1}{2}$

21. **An instructor scored a student's test of 50 questions by subtracting 2 times the number of incorrect answers from the number of correct answers. If the student answered all of the questions and received a score of 38, how many questions did that student answer correctly?**

answer

(A) **19**
(B) **38**
(C) **41**
(D) **44**
(E) **46**

22. **The area of a rectangular region with length $2x+1$ and width $x-3$ is**

answer

(A) $2x^2-3$

(B) $2x^2+x-3$

(C) $2x^2-5x-3$

(D) $2x^2-6x-3$

(E) $2x^2+7x+3$

23. **The total price of $n(n>1)$ equally priced copies of a certain book is \$50. In terms of n, which of the following gives the total price of $n-1$ of these copies?**

answer

(A) $50(n-1)$

(B) $\dfrac{50}{n-1}$

(C) $\dfrac{50(n-1)}{n}$

(D) $\dfrac{50n}{n-1}$

(E) $\dfrac{50}{n(n-1)}$

24. **The supply of a certain commodity is given by the formula $S=9x+x^2$ and the demand for the commodity is given by the formula $D=2{,}475-x$, where x is the price of the commodity in dollars. At which of the following values of x will the supply of the commodity equal the demand for the commodity?**

answer

(A) 9

(B) 45

(C) 55

(D) 275

(E) 2,475

$d = \frac{3v^2}{20}$ **and** $t = \frac{2d}{v}$**, where**

d **is the distance traveled, in meters, after the brakes are applied**

v **is the velocity, in meters pet second, before the brakes are applied**

t **is the time, in seconds, it takes to stop after the brakes are applied.**

25. The formulas above are used to compute the distance a car travels after the brakes are applied. If the driver of a car applied the brakes just as a traffic light turned yellow and stopped exactly 6 seconds later, what is the value of v?

answer

(A) 20

(B) $\frac{80}{3}$

(C) 30

(D) 40

(E) 60

수학 해설 Category 7 Algebra

1. If $(a-1)(b-2)$ = 0, which of the following must be true?

I. a = 1 and b = 2.

II. If $a \neq 1$, then b = 2

III. If $a = 1$, then $b \neq 2$.

(A) I only
(B) II only
(C) III only
(D) I and II
(E) II and III

a = 1 또는 b = 2이면 $(a-1)(b-2)$ =0이 됩니다. 따라서 $a \neq 1$이면 b 는 반드시 2가 됩니다. $a = 1$이면 b =2 이거나 $b \neq 2$ 입니다.

☞ 답은 (B)입니다.

2. If $(x-5)(y+2)=0$, which of the following must be true?

(A) $x = y$
(B) $x > y$
(C) $x < y$
(D) $xy = -10$
(E) None of the above

$x = 5$ 또는 $y = -2$ 이면 $(x-5)(y+2)=0$ 이 됩니다.

☞ 답은 (E)입니다.

3. If r and s are the two roots of the equation $x^2+8x+15=0$, and $r<s$, what is the value of $s-r$?

(A) -8
(B) –2
(C) 2
(D) 7
(E) 8

$x^2+8x+15=0$ 의 두 개의 근이(two roots) r, s 일 때 $s-r$ 의 값을 물어 보고 있습니다.
$x^2+8x+15=(x+3)(x+5)=0$, $r=-5, s=-3$

☞ 답은 (C)입니다.

4. If $(-2,k)$ is a point on the graph of $y=2x^2-3x+1$, then $k=$

(A) -13
(B) -1
(C) 3
(D) 11
(E) 15

$(-2,k)$ 가 그래프 $y=2x^2-3x+1$ 의 점일 때 k 의 값을 물어 보고 있습니다.

☞ 답은 (E)입니다.

5. The product of two positive integers m and n is twice their sum. If n is 6, what is the value of m?

(A) 8
(B) 6
(C) 4
(D) 3
(E) 2

양의 정수 m, n 을 곱하여 준 값이 $(m+n)$ 값의 두 배라고 합니다. n 이 6일 때 m 의 값을 물어 보고 있습니다.

☞ 답은 (D)입니다.

6. **If** $x:y=2:3$, $y:z=3:4$, **and** $x=8$, **then** $z-y=$

(A) 1
(B) 4
(C) 6
(D) 8
(E) 12

$x=8$ 이므로 $y=12$ 입니다. 따라서, $y:z=3:4=12:16$

☞ 답은 (B)입니다.

7. **If** S **is the set of all numbers** x **such that** $1-2x\le 3$, **which of the following is true about** S**?**

(A) The least number in S is -1.
(B) The least number in S is 0.
(C) The least number in S is 3.
(D) The greatest number in S is -2.
(E) The greatest number in S is -1.

$1-2x\le 3 \Rightarrow x\ge -1$

☞ 답은 (A)입니다.

8. **If** $rt>st$ **and** $r>s$, **then which of the following must be true?**

(A) $t>0$
(B) $s>0$
(C) $r>0$
(D) $t<0$
(E) $rs>0$

부등호의 양변을 양수로 나누어 주거나 곱해줄 부등호의 방향이 바뀌지 않습니다.

☞ 답은 (A)입니다.

9. If $-3 \le x \le 7$ and $-6 \le y \le 2$, what is the smallest possible value of $x - 2y$?

(A) –15 (B) –9 (C) –7 (D) 0 (E) 9

$x = -3$, $y = 2$ 일 때 가장 작은 값을 갖게 됩니다.

☞ 답은 (C)입니다.

10. For any integer x, $\bar{x}$ is defined by the equation $\bar{x} = x + 1$. Which of the following is equal to $(\bar{x})^2 - \overline{x^2}$ for all integers x?

(A) 0
(B) 2
(C) $\overline{2x}$
(D) $2x$
(E) $2\bar{x}$

$(\bar{x})^2 - \overline{x^2} = (x+1)^2 - x^2 - 1 = 2x$

☞ 답은 (D)입니다.

11. An operation * defined on whole numbers gives results such as the following:

$$2 * 3 = 7$$
$$3 * 4 = 13$$
$$1 * 5 = 6$$
$$0 * 6 = 1$$

According to the equations above, which of the following could define the operation * ?

(A) $x * y = x + y$
(B) $x * y = 2x + y$
(C) $x * y = y^2 - x$
(D) $x * y = x^2 + y$
(E) $x * y = xy + 1$

주어진 예만을 가지고 답을 생각하기 어렵다면 보기로부터 답을 찾으면 됩니다.

☞ 답은 (E)입니다.

12. If $r \circ s = rs + r + s$, then for what value of s is $r \circ s$ equal to r for all values of r?

(A) –1 **(B)** 0 **(C)** 1 **(D)** $\frac{1}{r+1}$ **(E)** r

$r \circ s = r$ 이 되도록 하는 s 의 값을 물어 보고 있습니다.

☞ 답은 (B)입니다.

13. **Marie's monthly salary is determined by the formula $s = 850 + \frac{x}{10}$, were s is her salary and x is the total amount of her monthly sales, both expressed in dollars. If the total of Marie's sales for July was $22,000, then her salary for July was**

(A) $2,115
(B) $3,050
(C) $5,620
(D) $6,410
(E) $10,700

Marie의 급여가 공식 $s = 850 + \frac{x}{10}$ 에(s : 급여, x : 한 달 동안의 판매액) 의해서 결정 된다고 합니다. 7월의 판매량이 $22,000이었을 때 7월의 급여를 물어 보고 있습니다.

☞ 답은 (B)입니다.

14. **The total cost C, in dollars, of manufacturing x items of a certain type is given by $C = \frac{1}{2}x^2 + 5{,}000$. When the total cost is $10,000, exactly how many such items are manufactured?**

(A) 100
(B) 140
(C) 200
(D) 30,000
(E) 50,000,000

x 개를 생산할 때의 총비용은 식 $C = \frac{1}{2}x^2 + 5{,}000$ 에 의해서 산출된다고 합니다. 총비용이 $10,000이었을 때 생산한 제품의 개수를 물어 보고 있습니다.

☞ 답은 (A)입니다.

15. A loaf of bread and 2 one-pound containers of butter cost a total of $4.95. If a pound of butter costs $0.90 more than a loaf of bread, how much does a pound of butter cost?

(A) $1.05
(B) $1.58
(C) $1.95
(D) $2.03
(E) $2.93

빵 (x) 과 1파운드 버터 (y) 2개의 가격이 $4.95입니다.($x+2y=4.95$) 버터의 가격이 빵의 가격 보다 $0.90 높을 때($y-0.90=x$) 1 파운드 버터의 가격을 물어보고 있습니다.

☞ 답은 (C)입니다.

16. Pat bought n apples at a cost of 3 for $0.20 and then sold the n apples at a price of 4 for $0.35. If Pat's revenue from the sale of the apples was $2.50 more than the cost of the apples, what is the value of n?

(A) 150 (B) 120 (C) 90 (D) 80 (E) 60

n 개의 사과를 3개에 $0.20씩 주고 구입하여 4개에 $0.35에 판매하여 사과판매소득이 사과구입비용보다 $2.50 많았을 때 n 의 값을 물어 보고 있습니다. 이 문제를 풀기 위하여 두 가지의 방법을 사용할 수 있습니다.

Ⅰ) 연립식을 세워주고 n 의 값을 찾는 것 입니다.

$$\frac{n}{4}(0.35)-\frac{n}{3}(0.20)=2.50$$

Ⅱ) 3과 4의 최소공배수가 12라는 사실을 이용하여 12개씩 판매하고 12개씩 구입했을 때의 금액 차이를 구하기는 쉽죠($1.05-0.8=0.25$). 이 차이를 이용하여 문제를 풀면 됩니다.($2.50\div 0.25=10$, 12개씩 10번을 판매한 것과 같죠.)

☞ 답은 (B)입니다.

17. The total cost of 3 pounds of hamburger and 4 pounds of hot dogs is $12.39. At the same rates, if the cost of 5 pounds of hamburger is $9.45, what is the cost per pound of hot dogs?

(A) $1.59
(B) $1.68
(C) $1.77
(D) $1.89
(E) $2.03

the cost of 5 pounds of hamburger가 $ 9.45라고 했기 때문에 the cost of 3 pound of hamburger 는 $5.67입니다 ($\frac{3}{5}\times 9.45 = 5.67$). 이 값을 the cost of 3 pounds of hamburger + the cost of 4 pounds of hot dogs = $12.39에 대입하여 계산하면 the cost per pound of hot dogs를 구할 수 있습니다.

☞ 답은 (B)입니다.

18. At a certain bowling alley, it costs $0.50 to rent bowling shoes for the day and $1.25 to bowl 1 game. If a person has $12.80 and must rent shoes, what is the greatest number of complete games that person can bowl in one day?

(A) 7
(B) 8
(C) 9
(D) 10
(E) 11

신발대여비용은 $0.50, 게임비는 $1.25일 때, 신발대여를 해야 하는 사람이 $12.80를 가지고 할 수 있는 최대의 게임 수를 물어 보고 있습니다. 가진 돈 $12.80에서 신발을 대여하고 남은 돈으로 할 수 있는 게임 수를 구하면 됩니다. ($(12.80-0.50)\div 1.25$)

☞ 답은 (C)입니다.

19. A mother and her child have a combined weight of 150 pounds. If the mother's weight is 5 times her child's weight, what is the weight, in pounds, of the child?

(A) 32
(B) 30
(C) 28
(D) 25
(E) 24

엄마와 아이의 몸무게의 합이 150 pounds이고 엄마의 몸무게가 아이몸무게의 5배일 때, 아이의 몸무게를 물어 보고 있습니다.

Mother's weight + child's weight = 150
Mother's weight = 5 Child's weight

☞ 답은 (D)입니다.

20. Jim multiplied a number by 5 when he should have divided it by 4. If the result he got was 10, what would have been the result if he had not made the error?

(A) $\frac{1}{20}$ **(B)** $\frac{1}{10}$ **(C)** $\frac{1}{5}$ **(D)** $\frac{1}{4}$ **(E)** $\frac{1}{2}$

4로 나누어야 할 때 5를 곱해주었고 그 결과는 10이었다고 합니다. 실수를 하지 않았을 때 얻어졌을 숫자를 물어보고 있습니다. 10은 5가 곱해진 숫자입니다. 따라서 5가 곱해진 숫자는 2였습니다.

☞ 답은 (E)입니다.

21. An instructor scored a student's test of 50 questions by subtracting 2 times the number of incorrect answers from the number of correct answers. If the student answered all of the questions and received a score of 38, how many questions did that student answer correctly?

(A) 19
(B) 38
(C) 41
(D) 44
(E) 46

맞은 문제의 개수에서 틀린 문제의 개수에 2를 곱한 값을 빼어 주어 점수를 계산 한다고 합니다. 모든 문제에 답을 하고 38점을 받았다고 합니다. 이때 맞은 문제의 개수를 물어 보고 있습니다. 맞은 문제의 개수를 x 하면 틀린 문제의 개수는 $50-x$ 입니다. 따라서 다음의 식을 풀면 답을 구할 수 있습니다.

$x-2(50-x)=38$

☞ 답은 (E)입니다.

22. The area of a rectangular region with length $2x+1$ and width $x-3$ is

(A) $2x^2-3$
(B) $2x^2+x-3$
(C) $2x^2-5x-3$
(D) $2x^2-6x-3$
(E) $2x^2+7x+3$

직사각형의 세로가 $2x+1$, 가로가 $x-3$일 때 넓이를 물어 보고 있습니다.

$(2x+1)(x-3)=2x^2-5x-3$

☞ 답은 (C)입니다.

23. The total price of $n(n > 1)$ equally priced copies of a certain book is \$50. In terms of n, which of the following gives the total price of $n-1$ of these copies?

(A) $50(n-1)$

(B) $\frac{50}{n-1}$

(C) $\frac{50(n-1)}{n}$

(D) $\frac{50n}{n-1}$

(E) $\frac{50}{n(n-1)}$

권별 가격이 동일한 n 권의 책값이 \$50일 때 $n-1$ 권의 책값을 물어 보고 있습니다.

n 권의 책값이 \$50이므로 한 권의 책값은 $\$\frac{50}{n}$ 입니다. 따라서 $n-1$ 권의 책값은

$\$\frac{50}{n}(n-1)$ 입니다.

☞ 답은 (C)입니다.

24. The supply of a certain commodity is given by the formula $S = 9x + x^2$ and the demand for the commodity is given by the formula $D = 2{,}475 - x$, where x is the price of the commodity in dollars. At which of the following values of x will the supply of the commodity equal the demand for the commodity?

(A) 9
(B) 45
(C) 55
(D) 275
(E) 2,475

x 가 재화의 가격일 때 공급은 식 $S = 9x + x^2$ 에 의해서 수요는 식 $D = 2{,}475 - x$ 에 의해서 결정 될 때, 수요와 공급이 일치하는 가격 x 를 물어 보고 있습니다. 따라서 다음의 식을 계산하면 가격을 구할 수 있습니다.

$9x + x^2 = 2{,}457 - x$

☞ 답은 (B)입니다.

$d = \frac{3v^2}{20}$ **and** $t = \frac{2d}{v}$**, where**

d **is the distance traveled, in meters, after the brakes are applied**

v **is the velocity, in meters pet second, before the brakes are applied**

t **is the time, in seconds, it takes to stop after the brakes are applied.**

25. The formulas above are used to compute the distance a car travels after the brakes are applied. If the driver of a car applied the brakes just as a traffic light turned yellow and stopped exactly 6 seconds later, what is the value of v?

(A) 20

(B) $\frac{80}{3}$

(C) 30

(D) 40

(E) 60

d 는 브레이크를 밟은 후 자동차가 움직인 거리, v 는 브레이크를 밟기 전 속도, t 는 브레이크를 밟은 후 자동차가 멈추는데 소요된 시간을 나타내고 있습니다. 운전자가 브레이크를 밟고 6초 후에 차가 멈추었을 때 자동차의 속도를 물어 보고 있습니다.

$t = \frac{2d}{v}$ 이므로 $d = 3v$ 입니다. 식 $d = \frac{3v^2}{20}$ 에 $d = 3v$ 을 대입하여 v 값을 구할 수 있습니다.

☞ 답은 (A)입니다.