

Category 7 Algebra Set 7-2

<High Level Questions>

1. Three musical tones have frequencies x , y , and z , respectively. If x , y , and z are positive, $\frac{x}{y} = \frac{y}{z}$, and $2x = z$, what is y in terms of x ?
- (A) $2x$
(B) $(\sqrt{2})x$
(C) $\frac{1}{\sqrt{2}}x$
(D) $\frac{1}{2}x$
(E) $\frac{\sqrt{2}}{3}x$
2. A certain fraction is equivalent to $\frac{2}{5}$. If the numerator of the fraction is increased by 4 and the denominator is doubled, the new fraction is equivalent to $\frac{1}{3}$. What is the sum of the numerator and denominator of the original fraction?
- (A) 49
(B) 35
(C) 28
(D) 26
(E) 21
3. If a total of x identical disks can be arranged in 8 stacks of equal height or in 12 stacks of equal height, the least possible value of x is
- (A) 96
(B) 48
(C) 36
(D) 24
(E) 12

4. 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) $\frac{50}{n(n - 1)}$

5. A plane was originally flying at an altitude of x feet when it ascended 2,000 feet and then descended 5,000 feet. If the plane's altitude after these two changes was $\frac{1}{3}$ its original altitude, then the solution of which of the following equations gives the plane's original altitude, in feet?

(A) $x + 2,000 = \frac{1}{3}(x - 3,000)$

(B) $\frac{1}{3}(x - 3,000) = x$

(C) $x + 3,000 = \frac{1}{3}x$

(D) $x - 7,000 = \frac{1}{3}x$

(E) $x - 3,000 = \frac{1}{3}x$

6. There are how many hours between x minutes past 12 noon and 8:10 p.m. of the same day, where $x < 60$?

(A) $\frac{490 - x}{60}$

(B) $\frac{480 - x}{60}$

(C) $\frac{470 - x}{60}$

(D) $60(60 - x + 7)$

(E) $60(60 - x + 17)$

7. There are how many seconds between x minutes past 3 p.m. and y minutes past 4 p.m. of the same day? ($0 < x < 60$ and $0 < y < 60$)
- (A) $3,600 + 60(y - x)$
(B) $3,600 + 60(x - y)$
(C) $60 + 60(x - y)$
(D) $60 + (y - x)$
(E) $60(x - y)^2$
8. A certain theater has 100 balcony seats. For every \$2 increase in the price of a balcony seat above \$10, 5 fewer seats will be sold. If all the balcony seats are sold when the price of each seat is \$10, which of the following could be the price of a balcony seat if the revenue from the sale of balcony seats is \$1,360?
- (A) \$12
(B) \$14
(C) \$16
(D) \$17
(E) \$18
9. A certain used-book dealer sells paperback books at 3 times dealer's cost and hardback books at 4 times dealer's cost. Last week the dealer sold a total of 120 books, each of which had cost the dealer \$1. If the gross profit (sales revenue minus dealer's cost) on the sale of all of these books was \$300, how many of the books sold were paperbacks?
- (A) 40
(B) 60
(C) 75
(D) 90
(E) 100

10. On a legislative committee, the number of males is 3 fewer than twice the number of females. If one male were replaced by a female, there would be an equal number of males and females on the committee. How many members are on the committee?
- (A) 14
(B) 12
(C) 10
(D) 9
(E) 7
11. An investor has stocks, bonds, and government securities currently worth a total of \$100,000, as well as a real estate investment. If the stocks and the bonds are worth a total of \$2,500 more than the value of the real estate investment, and if the government securities are worth \$7,500 more than twice the value of the real estate investment, how much are the government securities worth?
- (A) \$67,500
(B) \$62,500
(C) \$37,500
(D) \$32,500
(E) \$30,000
12. Kim bought a total of \$2.65 worth of postage stamps in four denominations. If she bought an equal number of 5-cent and 25-cent stamps and twice as many 10-cent stamps as 5-cent stamps, what is the least number of 1-cent stamps she could have bought?
- (A) 5
(B) 10
(C) 15
(D) 20
(E) 25

13. A certain truck traveling at 55 miles per hour gets 4.5 miles per gallon of diesel fuel consumed. Traveling at 60 miles per hour, the truck gets only 3.5 miles per gallon. On a 500-mile trip, if the truck used a total of 120 gallons of diesel fuel and traveled part of the trip at 55 miles per hour and the rest at 60 miles per hour, how many miles did it travel at 55 miles per hour?
- (A) 140
(B) 200
(C) 250
(D) 300
(E) 360
14. The cost of registration at a professional association meeting was \$50 per person; a lunch for registrants only was available for an additional \$22 per person. If the number of registrants who paid for lunch was 100 more than the number who did not, and if receipts for registration and lunch totaled \$92,600, how many people paid just for registration at the meeting?
- (A) 700
(B) 800
(C) 1,300
(D) 1,500
(E) 1,800
15. In a certain sequence, the first term is 1, and each successive term is 1 more than the reciprocal of the term that immediately precedes it. What is the fifth term of the sequence?
- (A) $\frac{3}{5}$
(B) $\frac{5}{8}$
(C) $\frac{8}{5}$
(D) $\frac{3}{5}$
(E) $\frac{9}{2}$

16. A kennel sold 3 puppies of breed X and 2 puppies of breed Y for a total of \$690. If each breed Y puppy was sold for 20 percent less than each breed X puppy, how much did each breed X puppy sell for?
- (A) \$120.00
(B) \$127.70
(C) \$138.00
(D) \$150.00
(E) \$156.70
17. In a certain brick wall, each row of bricks above the bottom row contains one less brick than the row just below it. If there are 5 rows in all and a total of 75 bricks in the wall, how many bricks does the bottom row contain?
- (A) 14
(B) 15
(C) 16
(D) 17
(E) 18

STOP



Category 7 Algebra

1. Three musical tones have frequencies x , y , and z , respectively. If x , y , and z are positive, $\frac{x}{y} = \frac{y}{z}$, and $2x = z$, what is y in terms of x ?

(A) $2x$ (B) $(\sqrt{2})x$ (C) $\frac{1}{\sqrt{2}}x$ (D) $\frac{1}{2}x$ (E) $\frac{\sqrt{2}}{3}x$

$$\frac{x}{y} = \frac{y}{z} \quad xz = y^2 \quad \cdot \quad 2x = z \quad \quad 2x^2 = y^2 \quad \cdot \quad x, y$$

$$y = \sqrt{2}x \quad \cdot$$

▶▶▶ (B) . ▶▶▶

2. A certain fraction is equivalent to $\frac{2}{5}$. If the numerator of the fraction is increased by 4 and the denominator is doubled, the new fraction is equivalent to $\frac{1}{3}$. What is the sum of the numerator and denominator of the original fraction?

(A) 49 (B) 35 (C) 28 (D) 26 (E) 21

$$\frac{n}{d} = \frac{2}{5} \quad \frac{n+4}{2d} = \frac{1}{3} \quad \cdot$$

▶▶▶ (E) . ▶▶▶

3. If a total of x identical disks can be arranged in 8 stacks of equal height or in 12 stacks of equal height, the least possible value of x is

- (A) 96
(B) 48
(C) 36
(D) 24
(E) 12

x 가 8 가 12
 x , x 8 12
 x 8 12

▶▶▶ (D) . ▶▶▶

4. 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) $\frac{50}{n(n - 1)}$

가 n 가 \$50 , $n - 1$ 가
 가 $\frac{50}{n}$. $n - 1$

가 $\$ \frac{50(n - 1)}{n}$.

▶▶▶ (C) . ▶▶▶

5. A plane was originally flying at an altitude of x feet when it ascended 2,000 feet and then descended 5,000 feet. If the plane's altitude after these two changes was $\frac{1}{3}$ its original altitude, then the solution of which of the following equations gives the plane's original altitude, in feet?

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(B) $\frac{1}{3}(x - 3,000) = x$

(C) $x + 3,000 = \frac{1}{3}x$

(D) $x - 7,000 = \frac{1}{3}x$

☒ (E) $x - 3,000 = \frac{1}{3}x$

x feet 2,000 feet \nearrow (x feet + 2,000 feet) 5,000 feet (x feet +
2,000 feet - 5,000 feet) $\frac{1}{3}$ ($\frac{1}{3}x$) .
▶▶▶▶ (E) . ▶▶▶▶

6. There are how many hours between x minutes past 12 noon and 8:10 p.m. of the same day, where $x < 60$?

☒ (A) $\frac{490 - x}{60}$

(B) $\frac{480 - x}{60}$

(C) $\frac{470 - x}{60}$

(D) $60(60 - x + 7)$

(E) $60(60 - x + 17)$

12 8 8 . 12 x
 x 8 10 .
▶▶▶▶ (A) . ▶▶▶▶

7. There are how many seconds between x minutes past 3 p.m. and y minutes past 4 p.m. of the same day? ($0 < x < 60$ and $0 < y < 60$)

- ☒ (A) $3,600 + 60(y - x)$
 (B) $3,600 + 60(x - y)$
 (C) $60 + 60(x - y)$
 (D) $60 + (y - x)$
 (E) $60(x - y)^2$

15 x 16 y 가 .
 1 y x .
 ▶▶▶ (A) . ▶▶▶

8. A certain theater has 100 balcony seats. For every \$2 increase in the price of a balcony seat above \$10, 5 fewer seats will be sold. If all the balcony seats are sold when the price of each seat is \$10, which of the following could be the price of a balcony seat if the revenue from the sale of balcony seats is \$1,360?

- (A) \$12
 (B) \$14
☒ (C) \$16
 (D) \$17
 (E) \$18

100 가 \$10 가 \$2
 5 가 \$10
 \$1,360 .
 가 \$2 가 5
 .
 $(10 + 2n)(100 - 5n) = 1,360$
 ▶▶▶ (C) . ▶▶▶

9. A certain used-book dealer sells paperback books at 3 times dealer's cost and hardback books at 4 times dealer's cost. Last week the dealer sold a total of 120 books, each of which had cost the dealer \$1. If the gross profit (sales revenue minus dealer's cost) on the sale of all of these books was \$300, how many of the books sold were paperbacks?

- (A) 40
 (B) 60
 (C) 75
 (D) 90
 (E) 100

dealer's cost가 \$1 paperback book 가 dealer cost 3 paperback
 book profit \$2 . Hardback book \$3 profit .
 가 .

$$P + H = 120 \quad 2P + 3H = 300$$

▶▶▶ (B) ▶▶▶

10. On a legislative committee, the number of males is 3 fewer than twice the number of females. If one male were replaced by a female, there would be an equal number of males and females on the committee. How many members are on the committee?

- (A) 14 (B) 12 (C) 10 (D) 9 (E) 7

$$(m = 2f - 3) \quad (m - 1 = f + 1 ;$$

$$(m = 2f - 3, m - 1 = f + 1)$$

▶▶▶ (B) ▶▶▶

11. An investor has stocks, bonds, and government securities currently worth a total of \$100,000, as well as a real estate investment. If the stocks and the bonds are worth a total of \$2,500 more than the value of the real estate investment, and if the government securities are worth \$7,500 more than twice the value of the real estate investment, how much are the government securities worth?

☒ (A) \$67,500

(B) \$62,500

(C) \$37,500

(D) \$32,500

(E) \$30,000

) stock + bond + government security = \$ 100,000

) “stock & bond” 가 - \$2,500 = 가

) “government security” 가 - \$7,500 = 2(가)

▶▶▶ (A) . ▶▶▶

12. Kim bought a total of \$2.65 worth of postage stamps in four denominations. If she bought an equal number of 5-cent and 25-cent stamps and twice as many 10-cent stamps as 5-cent stamps, what is the least number of 1-cent stamps she could have bought?

(A) 5 (B) 10 ☒ (C) 15 (D) 20 (E) 25

\$2.65 5 cent, 25cent 10 cent 5 cent

2 . 1cent 가

5 cent n .

$$(\$0.01 \times x) + (\$0.05 \times n) + (\$0.10 \times 2n) + (\$0.25 \times n) = \$2.65$$

$$\Rightarrow 0.01x + 0.5n = 2.65$$

n 5 x 가 .

▶▶▶ (C) . ▶▶▶

13. A certain truck traveling at 55 miles per hour gets 4.5 miles per gallon of diesel fuel consumed. Traveling at 60 miles per hour, the truck gets only 3.5 miles per gallon. On a 500-mile trip, if the truck used a total of 120 gallons of diesel fuel and traveled part of the trip at 55 miles per hour and the rest at 60 miles per hour, how many miles did it travel at 55 miles per hour?
- (A) 140 (B) 200 (C) 250 (D) 300 ~~(E)~~ 360

55 mile 1 4.5mile, 60 mile 1
 3.5mile 가 500mile 55mile, 60mile 가 120gallon
 . 55mile .
 55mile d .

$$\frac{d}{4.5} + \frac{500-d}{3.5} = 120$$

▶▶▶▶ (E) . ▶▶▶▶

14. The cost of registration at a professional association meeting was \$50 per person; a lunch for registrants only was available for an additional \$22 per person. If the number of registrants who paid for lunch was 100 more than the number who did not, and if receipts for registration and lunch totaled \$92,600, how many people paid just for registration at the meeting?

~~(A)~~ 700 (B) 800 (C) 1,300 (D) 1,500 (E) 1,800

\$50, \$22 100

T

$$\frac{T}{2} - 50$$

$$50T + 22 \times \left(\frac{T}{2} - 50 \right) = 92,600$$

▶▶▶▶ (A) . ▶▶▶▶

15. In a certain sequence, the first term is 1, and each successive term is 1 more than the reciprocal of the term that immediately precedes it. What is the fifth term of the sequence?

(A) $\frac{3}{5}$ (B) $\frac{5}{8}$ (C) $\frac{8}{5}$ (D) $\frac{3}{5}$ (E) $\frac{9}{2}$

가 1

1

$$1, 2, \frac{1}{2} + 1, \frac{2}{3} + 1, \frac{3}{5} + 1$$

▶▶▶ (C) . ▶▶▶

16. A kennel sold 3 puppies of breed X and 2 puppies of breed Y for a total of \$690. If each breed Y puppy was sold for 20 percent less than each breed X puppy, how much did each breed X puppy sell for?

(A) \$120.00
 (B) \$127.70
 (C) \$138.00
 (D) \$150.00
 (E) \$156.70

$$\begin{array}{l} X \quad 3 \quad Y \quad 2 \quad \$690 \\ 3X + 2Y = 690 \quad . \quad Y \quad \text{가} \quad X \quad \text{가} \quad 20\% \text{가} \\ Y = 0.8X \quad . \end{array}$$

▶▶▶ (D) . ▶▶▶

17. In a certain brick wall, each row of bricks above the bottom row contains one less brick than the row just below it. If there are 5 rows in all and a total of 75 bricks in the wall, how many bricks does the bottom row contain?

- (A) 14
(B) 15
(C) 16
☒ (D) 17
(E) 18

가 가

. 5 75

.

$$b \quad 5n - 10 = 75 \quad .$$

▶▶▶ (D) . ▶▶▶