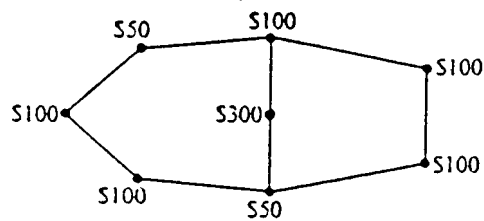


*Category 8-2 Word Problems*

1. George is one of 500 people standing in line. If there are 345 people in front of George, how many people are behind him?
- (A) 153  
(B) 154  
(C) 155  
(D) 254  
(E) 255
2. Each of the 750 students at a certain school is taking history or mathematics or both. If 489 students are taking history and 606 students are taking mathematics, how many students are taking both?
- (A) 117  
(B) 144  
(C) 261  
(D) 345  
(E) 489

	EVENT 1	EVENT 2	EVENT 3
First Place: 6 points	Team A	Team C	
Second Place: 3 points	Team C	Team B	
Third Place: 1 point	Team B	Team A	

3. The table above shown the results of the first two events in a competition that involved three teams and three events. If there are no disqualifications, what is the greatest possible difference in points between the total scores of any two teams after the third event?
- (A) 15  
(B) 10  
(C) 8  
(D) 7  
(E) 5



4. The map above shows the eight locations where an agent must collect the amounts indicated. If the agent wants to start and stop at the same point and not retrace any part of the trip, what is the greatest amount that the agent can collect on one trip?
- (A) \$300  
(B) \$650  
(C) \$700  
(D) \$750  
(E) \$900
5. If 0.497 mark has the value of one dollar, what is the value to the nearest dollar of 350 marks?
- (A) \$174  
(B) \$176  
(C) \$524  
(D) \$696  
(E) \$704
6. If the number  $n$  of calculators sold per week varies with the price  $p$  in dollars according to the equation  $n = 300 - 20p$ , what would be the total weekly revenue from the sale of \$10 calculators?
- (A) \$100  
(B) \$300  
(C) \$1,000  
(D) \$2,800  
(E) \$3,000

7. Starting from Town  $S$ , Fred rode his bicycle 8 miles due east, 3 miles due south, 2 miles due west, and 11 miles due north, finally stopping at Town  $T$ . If the entire region is flat, what is the straight-line distance, in miles, between Towns  $S$  and  $T$ ?
- (A) 10  
(B)  $8\sqrt{2}$   
(C)  $\sqrt{157}$   
(D) 14  
(E) 24
8. A dress shop is having a sale in which for every dress purchased at the full price a second dress that has the same price or a lower price may be purchased for \$1. If during the sale a customer buys six dresses priced at \$40, \$42, \$48, \$50, \$52, and \$60, what is the least amount the customer can expect to pay for the dresses?
- (A) \$134  
(B) \$143  
(C) \$146  
(D) \$152  
(E) \$155
9. Kim put  $d$  dollars into a new savings account in 1966. The account doubled in value during the next 8 years, and doubled again in the 10 years that followed. If the increase in the value of the account over those last 10 years was \$1,230, then  $d =$
- (A) 246  
(B) 308  
(C) 615  
(D) 984  
(E) 1,230

*8	9
6	*7
4	5
*2	3
-9	*-8

10. In a certain game 4 disks are tossed onto numbered spaces. The figure above shows the location of the disks after such a toss. The score is determined by adding 2 times the sum of the numbers in left-hand spaces, containing disks to 3 times the sum of the numbers in right-hand spaces containing disks. What is the score for this toss?

(A) 9                      (B) 17                      (C) 23                      (D) 27                      (E) 28

11. If  $a, b$ , and  $m$  are integers, then  $a$  and  $b$  are said to be  $m$ -related if  $m$  is a factor of  $a - b$ . If 15 and  $-3$  are  $m$ -related, which of the following could NOT be a value of  $m$ ?

(A) 2  
(B) 3  
(C) 4  
(D) 6  
(E) 9

$x$	27	$z$
29	31	33
30	$y$	28

12. In the figure above, the sum of the numbers in any row is equal to the sum of the numbers in any column. What is the sum of  $x, y$ , and  $z$ ?

(A) 101  
(B) 97  
(C) 93  
(D) 89  
(E) 85

13. On the first day of her vacation, Louisa traveled 216 miles. On the second day, traveling at the same average speed, she traveled 378 miles. If the 216-mile trip took 3 hours less than the 378-mile trip, what was the average speed, in miles per hour?
- (A) 31  
(B) 38  
(C) 50  
(D) 54  
(E) 56
14. An express train traveled between two stations at a constant rate of 50 miles per hour. If it traveled  $\frac{1}{3}$  the distance between the two stations in 15 minutes, which of the following is closest to the number of miles between the two stations?
- (A) 13  
(B) 38  
(C) 45  
(D) 67  
(E) 88
15. How many minutes does it take a car traveling at 80 kilometers per hour to travel 100 kilometers?
- (A) 65  
(B) 70  
(C) 75  
(D) 80  
(E) 85

16. Juan and Carla each drove their motorbike up a logging road. Juan reached the top 3 hours after starting but Carla took 1 additional hour. If the distance along the logging road to the top was 15 miles, how many more miles per hour did Juan average than?
- (A) 1  
(B)  $\frac{5}{4}$   
(C) 2  
(D)  $\frac{15}{4}$   
(E) 5
17. If a hiker walks at a constant speed of  $2\frac{1}{2}$  miles per hour, how many miles can the hiker walk in 4 hours and 12 minutes?
- (A) 10.0  
(B) 10.3  
(C) 10.4  
(D) 10.5  
(E) 10.8
18. The number of bacteria in a certain culture doubles once every minute. If there were  $p$  bacteria in the culture at 8:55 a.m., how many bacteria were there at 9:00 a.m. the same morning?
- (A)  $10p$   
(B)  $32p$   
(C)  $5p^2$   
(D)  $2p^5$   
(E)  $32p^5$

19. How many liters of pure alcohol must be added to a 100-liter solution that is 20 percent alcohol in order to produce a solution that is 25 percent alcohol?
- (A)  $\frac{7}{2}$
- (B) 5
- (C)  $\frac{20}{3}$
- (D) 8
- (E)  $\frac{39}{4}$
20. A lunar month, the time between two successive new moon, is approximately 29 days, 12 hours, and 44 minutes long. What is the approximate length of two lunar months?
- (A) 29 days 1 hour 28 min.
- (B) 49 days 0 hour 18 min.,
- (C) 58 days 1 hour 18 min.
- (D) 59 days 0 hour 28 min.
- (E) 59 days 1 hour 28 min.
21. One glass bulb can be manufactured in 10 seconds. At that rate, approximately how many minutes will it take to manufacture 100 glass bulbs?
- (A) 0.6
- (B) 6.0
- (C) 15.0
- (D) 16.7
- (E) 36.0

22. If every 31 weeks an electric clock uses an amount of energy equivalent to that released in burning 1 liter of gasoline, then in 1 year the clock would use an amount of energy equivalent to that released in burning approximately how many liters of gasoline?
- (A) 0.6    (B) 1.4    (C) 1.5    (D) 1.7    (E) 2.0
23. If a certain data entry operator types characters at the rate of 10,000 per hour, how many characters will the operator type in 12 minutes?
- (A) 50,000  
(B) 2,500  
(C) 2,000  
(D) 1,200  
(E) 120

Annual Salaries of Acme Tool Corporation Officers	
Salary	Number of Employees
\$80,000	1
70,000	2
60,000	1
50,000	3
40,000	1
30,000	1
20,000	1

24. According to the table above, what is the average (arithmetic mean) annual salary of the 10 officers of the Acme Tool Corporation?
- (A) \$34,820  
(B) \$35,000  
(C) \$47,500  
(D) \$52,000  
(E) \$53,600



## &lt;High Level Questions&gt;

25. In 1985 a company sold a brand of shoes to retailers for a fixed price per pair. In 1986 the number of pairs of the shoes that the company sold to retailers decreased by 20 percent, while the price per pair increased by 20 percent. If the company's revenue from the sale of the shoes in 1986 was \$3.0 million, what was the approximate revenue from the sale of the shoes in 1985?
- (A) \$2.4 million  
(B) \$2.9 million  
(C) \$3.0 million  
(D) \$3.1 million  
(E) \$3.6 million
26. A hiker walked for two days. On the second day the hiker walked 2 hours longer and at an average speed 1 mile per hour faster than he walked on the first day. If during the two days he walked a total of 64 miles and spent a total of 18 hours walking, what was his average speed on the first day?
- (A) 2 mph  
(B) 3 mph  
(C) 4 mph  
(D) 5 mph  
(E) 6 mph
27. An optometrist charges \$150 per pair for soft contact lenses and \$85 per pair for hard contact lenses. Last week she sold 5 more pairs of soft lenses than hard lenses. If her total sales for pairs of contact lenses last week were \$1,690, what was the total number of pairs of contact lenses that she sold?
- (A) 11  
(B) 13  
(C) 15  
(D) 17  
(E) 19

28. On a certain trip, a cyclist averaged 20 miles per hour for the first 10 miles and 16 miles per hour for the remaining 20 miles. If the cyclist returned immediately via the same route and took a total of 4 hours for the round trip, what was the average speed, in miles per hour, for the return trip?
- (A) 24  
(B) 18  
(C)  $17\frac{1}{7}$   
(D) 15  
(E)  $13\frac{1}{3}$
29. The cost of chartering a plane was shared equally among 30 passengers. If there had been 35 passengers sharing that cost, the cost per passenger would have been \$30 less. What was the cost of chartering the plane?
- (A) \$5,400  
(B) \$6,125  
(C) \$6,300  
(D) \$6,800  
(E) \$7,350
30. In traveling a certain distance, car  $R$  averaged  $x$  miles per gallon of gasoline. Car  $S$  traveled 300 miles and averaged 25 miles per gallon of gasoline. If car  $R$  used the same amount of gasoline as car  $S$ , how many miles, in terms of  $x$ , did car  $R$  travel?
- (A)  $12x$   
(B)  $x$   
(C)  $x + 12$   
(D)  $\frac{x}{12}$   
(E)  $\frac{12}{x}$

31. Under a certain company's medical insurance plan, the amount an employee must pay for medical expenses consists of payment of the first \$450 of expenses plus 20 percent of additional expenses, up to a maximum total payment of \$1,350 per year. All remaining expenses are paid by the plan. Last year, if an employee paid the maximum amount for medical expenses, what is the least amount that the plan could have paid?
- (A) \$720  
(B) \$1,080  
(C) \$3,600  
(D) \$4,500  
(E) \$4,950
32. A delivery truck starts on its route with a load of goods weighing  $T$  tons. At each of its first 4 stops,  $\frac{1}{2}$  of the weight of the goods still on the truck is unloaded. After the 4th stop, what is the weight, in tons, of the goods still on the truck?
- (A)  $\frac{15}{16}T$       (B)  $\frac{1}{4}T$       (C)  $\frac{1}{6}T$       (D)  $\frac{1}{8}T$       (E)  $\frac{1}{16}T$
33. Analysts of the automobile industry say that the total number of domestic suppliers of automobile parts was reduced by  $\frac{1}{3}$  from 1980 to 1985 and that the number was again reduced by  $\frac{1}{3}$  from 1985 to 1988. According to these analysts, if there were 2,520 domestic suppliers in 1985, how many fewer were there in 1988 than there were in 1980?
- (A) 1,260  
(B) 1,400  
(C) 1,680  
(D) 2,100  
(E) 2,940

34. A subway train made eleven stops on its route. If an average (arithmetic mean) of 30 passengers boarded at each of the first nine stops and at each stop, beginning with the second, 5 fewer passengers boarded than at the previous stop, how many passengers boarded the train at its first stop?
- (A) 60  
(B) 50  
(C) 30  
(D) 20  
(E) 10
35. Fox jeans regularly sell for \$15 a pair and Pony jeans regularly, sell for \$18 a pair. During a sale these regular unit prices are discounted at different rates so that a total of \$9 is saved by purchasing 5 pairs of jeans: 3 pairs of Fox jeans and 2 pairs of Pony jeans. If the sum of the two discount rates is 22 percent, what is the discount rate on Pony jeans?
- (A) 9%  
(B) 10%  
(C) 11%  
(D) 12%  
(E) 15%
36. A mixture of nuts is to contain 3 parts cashews to 6 parts almonds to 7 parts walnuts by weight. How many pounds of almonds will be needed to make 5 pounds of the mixture?
- (A)  $\frac{3}{8}$   
(B)  $\frac{8}{15}$   
(C)  $1\frac{1}{5}$   
(D)  $1\frac{2}{3}$   
(E)  $1\frac{7}{8}$

37. The time it took car  $A$  to travel 400 miles was 2 hours less than the time it took car  $B$  to travel the same distance. If car  $A$ 's average speed was 10 miles per hour greater than that of car  $B$ , what was car  $B$ 's average speed, in miles per hour?
- (A) 20  
(B) 30  
(C) 40  
(D) 50  
(E) 80
38. Ms. Jiminez plans an automobile trip of 7,000 to 9,000 miles. The cost of gasoline will be 85 to 95 cents per gallon, and her automobile will average 20 to 30 miles per gallon. What is the maximum possible cost of the gasoline for the trip?
- (A) \$485.00      (B) \$427.50      (C) \$382.50      (D) \$297.50      (E) \$256.00
39. A group of 12 people plan to rent a van and agree to share equally the total cost of the rental, which is  $E$  dollars. If  $n$  of the people decide not to participate at the last minute, by how many dollars will each remaining person's share of the total cost increase?
- (A)  $\frac{E}{12-n}$   
(B)  $\frac{12-n}{E}$   
(C)  $\frac{E}{12(12-n)}$   
(D)  $\frac{nE}{12(12-n)}$   
(E)  $\frac{(12-n)E}{12n}$

40. The concentration of a certain chemical in a full water tank depends on the depth of the water.

At a depth that is  $x$  feet below the top of the tank, the concentration is  $3 + \frac{4}{\sqrt{5-x}}$  parts per million, where  $0 < x < 4$ . To the nearest 0.1 foot, at what depth is the concentration equal to 6 parts per million?

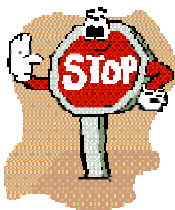
- (A) 2.4 ft  
(B) 2.5 ft  
(C) 2.8 ft  
(D) 3.0 ft  
(E) 3.2 ft
41. A breakfast that consists of 1 ounce of corn puffs and 8 ounces of fruit  $X$  provides 257 calories. When 8 ounces of fruit  $Y$  is substituted for the 8 ounces of fruit  $X$ , the total number of calories is reduced to 185. If fruit  $X$  provides 1.8 times as many calories as fruit  $Y$ , how many calories does 8 ounces of fruit  $Y$  alone provide?
- (A) 11.25  
(B) 72  
(C) 90  
(D) 95  
(E) 129.6
42. A 2-year certificate of deposit is purchased for  $k$  dollars. If the certificate earns interest at an annual rate of 6 percent compounded quarterly, which of the following represents the value, in dollars, of the certificate at the end of the 2 year?
- (A)  $(1.06)^2 k$   
(B)  $(1.06)^8 k$   
(C)  $(1.015)^2 k$   
(D)  $(1.015)^8 k$   
(E)  $(1.04)^4 k$

43. On a Saturday night, each of the rooms at a certain motel was rented for either \$40 or \$60. If 10 of the rooms that were rented for \$60 had instead been rented for \$40, then the total rent the motel charged for that night would have been reduced by 25 percent. What was the total rent to motel actually charged for that night?
- (A) \$600  
(B) \$800  
(C) \$1,000  
(D) \$1,600  
(E) \$2,400
44. On level farmland, two runners leave at the same time from the intersection of two country roads. One runner jogs due north at a constant rate of 8 miles per hour while the second runner jogs due east at a constant rate that is 4 miles per hour faster than the first runner's rate. How far apart, to the nearest mile, will they be after  $\frac{1}{2}$  hour?
- (A) 6  
(B) 7  
(C) 8  
(D) 12  
(E) 14
45. The rear wheels of a car crossed a certain line 0.5 second after the front wheels crossed the same line. If the centers of the front and rear wheels are 20 feet apart and the car traveled in a straight line at a constant speed, which of the following gives the speed of the car in miles per hour? (5,280 feet = 1 mile)
- (A)  $\left(\frac{20}{5,280}\right)\left(\frac{60^2}{0.5}\right)$   
(B)  $\left(\frac{20}{5,280}\right)\left(\frac{60}{0.5}\right)$   
(C)  $\left(\frac{20}{5,280}\right)\left(\frac{0.5}{60^2}\right)$   
(D)  $\frac{(20)(5,280)}{(60^2)(0.5)}$   
(E)  $\frac{(20)(5,280)}{(60)(0.5)}$

46. A cashier mentally reversed the digits of one customer's correct amount of change and thus gave the customer an incorrect amount of change. If the cash register contained 45 cents more than it should have as a result of this error, which of the following could have been the correct amount of change in cents?
- (A) 14            (B) 45            (C) 54            (D) 65            (E) 83
47. A shipment of 1,500 heads of cabbage, each of which was approximately the same size, was purchased for \$600. The day the shipment arrived,  $\frac{2}{3}$  of the heads were sold, each at 25 percent above the cost per head. The following day the rest were sold at a price per head equal to 10 percent less than the price each head sold for on the day before. What was the gross profit on this shipment?
- (A) \$100  
(B) \$115  
(C) \$125  
(D) \$130  
(E) \$135
48. If Sam were twice as old as he is, he would be 40 years older than Jim. If Jim is 10 years younger than Sam, how old is Sam?
- (A) 20  
(B) 30  
(C) 40  
(D) 50  
(E) 60



49. A store currently charges the same price for each towel that it sells. If the current price of each towel were to be increased by \$1, 10 fewer of the towels could be bought for \$120, excluding sales tax. What is the current price of each towel?
- (A) \$1            (B) \$2            (C) \$3            (D) \$4            (E) \$12
50. A ruby and a diamond have insured values of \$1,800 and \$1,200, respectively, and the annual premium rate for each gem is \$1.50 per \$100 of insured value. If the rate and insured values of the two gems remain constant over the years, after how many years will the total of the insurance premiums on both gems for those years first exceed the insured value of the diamond?
- (A) 8            (B) 12            (C) 20            (D) 27            (E) 40
51. A furnace service contract costs \$48 per year and covers payment of 80 percent of all repair costs. The total amount paid by the owner, including the cost of the contract, will equal the payment covered by the contract when the total repair costs for the year are
- (A) \$48            (B) \$60            (C) \$72            (D) \$80            (E) \$92





## Word Problems

1. George is one of 500 people standing in line. If there are 345 people in front of George, how many people are behind him?
- (A) 153
- ☒ (B) 154
- (C) 155
- (D) 254
- (E) 255


500	George	345	154
-----	--------	-----	-----

 (B) .

2. Each of the 750 students at a certain school is taking history or mathematics or both. If 489 students are taking history and 606 students are taking mathematics, how many students are taking both?
- (A) 117  
(B) 144  
(C) 261  
(D) 345  
(E) 489

$$\frac{.489}{n(A \cap B)} = \frac{606}{(489 \cdot 100)}$$

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

 (D) \_\_\_\_\_.

	Event 1	Event 2	Event 3
First Place 6 points	Team A	Team C	
Second Place 3 points	Team C	Team B	
Third Place 1 point	Team B	Team A	

3. The table above shown the results of the first two events in a competition that involved three teams and three events. If there are no disqualifications, what is **the greatest possible difference in points between the total scores of any two teams after the third event?**

(A) 15

☒ (B) 10

(C) 8

(D) 7

(E) 5

가 event

가 가

event1,2

event3 가

가

.

Event1,2가

team C 가 9

1

team B가 4

team C가 event 3 1

team B가 event3 3

가 가

.

Team C가 event 3 1

15 , Team B가 event 3 3

5

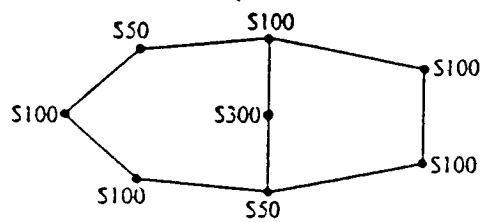
10

...



(B)

.



4. The map above shows the eight locations where an agent must collect the amounts indicated. If the agent wants to start and stop at the same point and not retrace any part of the trip, what is the greatest amount that the agent can collect on one trip?

- (A) \$300  
 (B) \$650  
 ✓ (C) \$700  
 (D) \$750  
 (E) \$900

8 가

,

가

.

.

...

: \$500

: \$700

: \$650



(C)

.

5. If 0.497 mark has the value of one dollar, what is the value to the nearest dollar of 350 marks?

- (A) \$174  
 (B) \$176  
 (C) \$524  
 (D) \$696  
 ✓ (E) \$704

\$1 = 0.497 mark      350 marks      Dollar 가?

\$ 1 : X = 0.497 mark : 350 marks



(E)

6. If the number  $n$  of calculators sold per week varies with the price  $p$  in dollars according to the equation  $n = 300 - 20p$ , what would be the total weekly revenue from the sale of \$10 calculators?

- (A) \$100  
 (B) \$300  
 (C) \$1,000  
 (D) \$2,800  
 (E) \$3,000

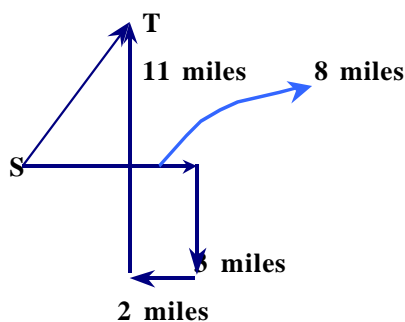
:  $n = 300 - 20p$   $p = \$10$  가 .



(C)

7. Starting from Town  $S$ , Fred rode his bicycle 8 miles due east, 3 miles due south, 2 miles due west, and 11 miles due north, finally stopping at Town  $T$ . If the entire region is flat, what is the straight-line distance, in miles, between Towns  $S$  and  $T$ ?

- (A) 10  
 (B)  $8\sqrt{2}$   
 (C)  $\sqrt{157}$   
 (D) 14  
 (E) 24



S T

$$8^2(11-3) + 6^2(8-2) = 10^2$$



(A)

8. A dress shop is having a sale in which **for every dress purchased at the full price a second dress that has the same price or a lower price may be purchased for \$1.** If during the sale a customer buys six dresses priced at \$40, \$42, \$48, \$50, \$52, and \$60, what is the least amount the customer can expect to pay for the dresses?

- (A) \$134  
 (B) \$143  
 (C) \$146  
 (D) \$152  
 (E) \$155

가 \$1 가 6가 \$60  
 가  
 \$52 \$1 가  
 $(\$60 + \$1(\$52)) + (\$50 + \$1(\$48)) + (\$42 + \$1(\$40)) = \$155$



(E)

9. Kim put  $d$  dollars into a new savings account in 1966. The account doubled in value during the next 8 years, and doubled again in the 10 years that followed. If the increase in the value of the account over those last 10 years was \$1,230, then  $d =$

- (A) 246  
 (B) 308  
 (C) 615  
 (D) 984  
 (E) 1,230

8 2 가 가 2d가 , 2d가 4d가 가  
 2d가 \$1,230  
 $2d = \$1,230 \Rightarrow d = \$615$



(C)

*8	9
6	*7
4	5
*2	3
-9	*-8

10. In a certain game 4 disks are tossed onto numbered spaces. The figure above shows the location of the disks after such a toss. The score is determined by adding 2 times the sum of the numbers in left-hand spaces, containing disks to 3 times the sum of the numbers in right-hand spaces containing disks. What is the score for this toss?

(A) 9      (B) 17      (C) 23      (D) 27      (E) 28

4 가 , 가  
3

$$2(8 + 2) + 3(7 - 8) = 17$$



(B)

11. If  $a, b$ , and  $m$  are integers, then  $a$  and  $b$  are said to be  $m$ -related if  $m$  is a factor of  $a - b$ . If 15 and  $-3$  are  $m$ -related, which of the following could NOT be a value of  $m$ ?

(A) 2  
(B) 3  
(C) 4  
(D) 6  
(E) 9

(a-b) (factor) 가 m a, b가 m-related  
(15 - (-3)) = 18 18 factors 1,2,3,6,9,18 m-related



(C)

$x$	27	$z$
29	31	33
30	$y$	28

12. In the figure above, the sum of the numbers in any row is equal to the sum of the numbers in any column. What is the sum of  $x$ ,  $y$ , and  $z$ ?

- (A) 101  
(B) 97  
(C) 93  
(D) 89  
(E) 85

$$29+31+33 = x+29+30 = 27+31+y = z+33+28$$



(A)

13. On the first day of her vacation, Louisa traveled 216 miles. On the second day, traveling at the same average speed, she traveled 378 miles. If the 216-mile trip took 3 hours less than the 378-mile trip, what was the average speed, in miles per hour?

- (A) 31  
(B) 38  
(C) 50  
(D) 54  
(E) 56

216miles

378miles

3

$$378 - 216 = 162 \quad 3$$

54



(D)



14. An express train traveled between two stations at a constant rate of 50 miles per hour. If it traveled  $\frac{1}{3}$  the distance between the two stations in 15 minutes, which of the following is

closest to the number of miles between the two stations?

- (A) 13  
 (B) 38  
 (C) 45  
 (D) 67  
 (E) 88

$$\begin{aligned} & \text{D 가 } \frac{\text{minutes}}{\text{hours}} \text{ } 15 \text{ minutes } 15/60 \text{ hours } \cdot 1/3 \text{ 가 } 15/60 \text{ hours } : \\ & \frac{D}{3} = 50 \times \frac{15}{60}, \quad D \approx 38 \\ & \text{Distance( )} = \text{Rate( )} \cdot \text{Time( )} \end{aligned}$$



(B)

15. How many **minutes** does it take a car traveling at 80 kilometers per hour to travel 100 kilometers?

- (A) 65  
 (B) 70  
 (C) 75  
 (D) 80  
 (E) 85

$$\begin{aligned} & \text{hours } \text{minutes} \cdot 60 ! \\ & (100 \text{ kilometers} \div 80) \times 60 = 75 \end{aligned}$$



(C)

16. Juan and Carla each drove their motorbike up a logging road. Juan reached the top 3 hours after starting but Carla took 1 additional hour. If the distance along the logging road to the top was 15 miles, how many more miles per hour did Juan average than Carla?

(A) 1      (B)  $\frac{5}{4}$       (C) 2      (D)  $\frac{15}{4}$       (E) 5

$$15/3 - 15/4 = 5/4$$



(B)

17. If a hiker walks at a constant speed of  $2\frac{1}{2}$  miles per hour, how many miles can the hiker walk in 4 hours and 12 minutes?

(A) 10.0  
(B) 10.3  
(C) 10.4  
(D) 10.5  
(E) 10.8

$$\text{walk in 4 hours and 12 minutes} = 4\frac{1}{5} \text{ hours}$$

$$\text{Distance( )} = \text{Rate( )} \times \text{Time( )} = \frac{21}{5} \times \frac{5}{2} = \frac{105}{10} = 10.5$$



(D)

18. The number of bacteria in a certain culture doubles once every minute. If there were  $p$  bacteria in the culture at 8:55 a.m., how many bacteria were there at 9:00 a.m. the same morning?

(A)  $10p$       (B)  $32p$       (C)  $5p^2$       (D)  $2p^5$       (E)  $32p^5$

가      가      8:55      가 P      9:00

1      2P, 2      4P, 3      8P, 5      32P가      ..



(B)

19. How many liters of pure alcohol must be added to a 100-liter solution that is 20 percent alcohol in order to produce a solution that is 25 percent alcohol?

- (A)  $\frac{7}{2}$   
 (B) 5  
 (C)  $\frac{20}{3}$   
 (D) 8  
 (E)  $\frac{39}{4}$

If  $N_1$  units of an item having a unit value of  $U_1$  are mixed with  $N_2$  units of an item having a unit value of  $U_2$ , then

$$\text{The Value of the Mixture}(\quad) = N_1 \cdot U_1 + N_2 \cdot U_2$$

20%      100-liter       $x$       pure alcohol      25%       $x$   
 .      :

$$(100 + x)0.25 = 100 \times 0.2 + x \Rightarrow x = \frac{20}{3}$$



(C)

20. A lunar month, the time between two successive new moon, is approximately 29 days, 12 hours, and 44 minutes long. What is the approximate length of two lunar months?

- (A) 29 days 1 hour 28 min.  
 (B) 49 days 0 hour 18 min.,  
 (C) 58 days 1 hour 18 min.  
 (D) 59 days 0 hour 28 min.  
 (E) 59 days 1 hour 28 min.



(E)

:

[help@vstudy.co.kr](mailto:help@vstudy.co.kr)

.

21. One glass bulb can be manufactured in 10 seconds. At that rate, approximately how many minutes will it take to manufacture 100 glass bulbs?

(A) 0.6  
 (B) 6.0  
 (C) 15.0  
 (D) 16.7  
 (E) 36.0

$$100 \times (10/60) \approx 16.7$$



(D)

22. If every 31 weeks an electric clock uses an amount of energy equivalent to that released in burning 1 liter of gasoline, then in 1 year the clock would use an amount of energy equivalent to that released in burning approximately how many liters of gasoline?

(A) 0.6      (B) 1.4      (C) 1.5      (D) 1.7      (E) 2.0

$$52 \text{ weeks} \div 31 \text{ weeks} \approx 1.7$$



(D)

23. If a certain data entry operator types characters at the rate of 10,000 per hour, how many characters will the operator type in 12 minutes?

(A) 50,000  
 (B) 2,500  
 (C) 2,000  
 (D) 1,200  
 (E) 120

$$12 \text{ } 12/60 \text{ } 1/5 \text{ hour } .$$

$$10,000 \times (1/5) = 2,000$$



(C)

Annual Salaries of Acme Tool Corporation Officers	
Salary	Number of Employees
\$80,000	1
70,000	2
60,000	1
50,000	3
40,000	1
30,000	1
20,000	1

24. According to the table above, what is the average (arithmetic mean) annual salary of the 10 officers of the Acme Tool Corporation?

- (A) \$34,820  
 (B) \$35,000  
 (C) \$47,500  
 (D) \$52,000  
 (E) \$53,600

$x_i$  가

$m$

$$m = \frac{x_1 f_1 + x_2 f_2 + \cdots + x_n f_n}{f_1 + f_2 + \cdots + f_n} = \frac{1}{N} \sum_{i=1}^n x_i f_i$$

$$\therefore \frac{80,000 + 140,000 + 60,000 + 150,000 + 40,000 + 30,000 + 20,000}{10} = 52,000$$



(D)

### <High Level Questions>

25. In 1985 a company sold a brand of shoes to retailers for a fixed price per pair. In 1986 the number of pairs of the shoes that the company sold to retailers decreased by 20 percent, while the price per pair increased by 20 percent. If the company's revenue from the sale of the shoes in 1986 was \$3.0 million, what was the approximate revenue from the sale of the shoes in 1985?

- (A) \$2.4 million                      (B) \$2.9 million                      (C) \$3.0 million  
 (D) \$3.1 million                      (E) \$3.6 million

'85 가 : P , '85 : Q

$$1.2P \times 0.8Q = 3,000,000 \Rightarrow PQ \approx 3,100,000$$

 (D)

26. A hiker walked for two days. On the second day the hiker walked 2 hours longer and at an average speed 1 mile per hour faster than he walked on the first day. If during the two days he walked a total of 64 miles and spent a total of 18 hours walking, what was his average speed on the first day?

(A) 2 mph (B) 3 mph (C) 4 mph (D) 5 mph (E) 6 mph

$$\begin{array}{l} 18 \text{ hours} \quad 64 \text{ miles} \quad , \quad 2 \\ \cdot \quad \quad \quad 8 \quad \quad \quad 10 \quad \quad \cdot \\ s \quad \quad \quad 8s + 10(s+1) = 64 \Rightarrow s = 3 \end{array}$$

 (B)

27. An optometrist charges \$150 per pair for soft contact lenses and \$85 per pair for hard contact lenses. Last week she sold 5 more pairs of soft lenses than hard lenses. If her total sales for pairs of contact lenses last week were \$1,690, what was the total number of pairs of contact lenses that she sold?

(A) 11  
(B) 13  
(C) 15  
(D) 17  
(E) 19

$$\begin{array}{l} \text{Hard contact lenses} \quad Q \text{ 가} \quad : \\ \$150(5+Q) + \$85Q = \$1,690 \Rightarrow Q = 4. \quad \text{soft contact lenses} \quad 9 \text{ 가} \\ 13 \end{array}$$

 (B)

28. On a certain trip, a cyclist averaged 20 miles per hour for the first 10 miles and 16 miles per hour for the remaining 20 miles. If the cyclist returned immediately via the same route and took a total of 4 hours for the round trip, what was the average speed, in miles per hour, for the return trip?

- (A) 24  
 (B) 18  
 (C)  $17\frac{1}{7}$   
 (D) 15  
 (E)  $13\frac{1}{3}$

$$10\text{miles} \div 20\text{miles per hour} = 1/2 \text{ hour,}$$

$$20\text{miles} \div 16\text{miles per hour} = 1(1/4) \text{ hour}$$

$$: 4 \text{ hours} ( ) - (1/2 + 1(1/4)) = 9/4$$

$$30\text{miles} \div (9/4) = 13\frac{1}{3}$$

 (E)

29. The cost of chartering a plane was shared equally among 30 passengers. If there had been 35 passengers sharing that cost, the cost per passenger would have been \$30 less. What was the cost of chartering the plane?

- (A) \$5,400  
 (B) \$6,125  
 (C) \$6,300  
 (D) \$6,800  
 (E) \$7,350

$$30 \quad 1 \quad C \quad : 30 \times C = 35 \times (C - 30)$$

$$5 \times (C - 30) = \$ 900, 5 \quad 1 \quad \$30$$

.

 (C)

30. In traveling a certain distance, car  $R$  averaged  $x$  miles per gallon of gasoline. Car  $S$  traveled 300 miles and averaged 25 miles per gallon of gasoline. If car  $R$  used the same amount of gasoline as car  $S$ , how many miles, in terms of  $x$ , did car  $R$  travel?

- (A)  $12x$   
 (B)  $x$   
 (C)  $x + 12$   
 (D)  $\frac{x}{12}$   
 (E)  $\frac{12}{x}$

Car S가 gasoline : 300miles  $\div$  25miles per gallon of gasoline = 12gallons

Car R 12 gallons :

$x$  miles per gallon of gasoline  $\times$  12 gallons of gasoline

 (A)

31. Under a certain company's medical insurance plan, the amount an employee must pay for medical expenses consists of payment of the first \$450 of expenses plus 20 percent of additional expenses, up to a maximum total payment of \$1,350 per year. All remaining expenses are paid by the plan. Last year, if an employee paid the maximum amount for medical expenses, what is the least amount that the plan could have paid?

- (A) \$720  
 (B) \$1,080  
 (C) \$3,600  
 (D) \$4,500  
 (E) \$4,950

\$450 20%

\$1,350

$\$450 + (x - \$450) \times 0.2 = \$1,350 \Rightarrow x = \$4,950$ ,

\$450 80%

$\$4,500 \times 0.8 = \$3,600$ , the plan

 (C)



32. A delivery truck starts on its route with a load of goods weighing  $T$  tons. At each of its first 4 stops,  $\frac{1}{2}$  of the weight of the goods still on the truck is unloaded. After the 4th stop, what is the weight, in tons, of the goods still on the truck?

(A)  $\frac{15}{16}T$  (B)  $\frac{1}{4}T$  (C)  $\frac{1}{6}T$  (D)  $\frac{1}{8}T$  (E)  $\frac{1}{16}T$

4

 $\frac{1}{2}$ 

$$T - (1/2)T = (1/2)T, (1/2)T - (1/4)T = (1/4)T, (1/4)T - (1/8)T = (1/8)T, (1/8)T - (1/16)T = (1/16)T$$

$$T - (1/2T + 1/4T + 1/8T + 1/16T) = \frac{1}{16}T$$

 (E)

33. Analysts of the automobile industry say that the total number of domestic suppliers of automobile parts was reduced by  $\frac{1}{3}$  from 1980 to 1985 and that the number was again reduced by  $\frac{1}{3}$  from 1985 to 1988. According to these analysts, if there were 2,520 domestic suppliers in 1985, how many fewer were there in 1988 than there were in 1980?

(A) 1,260  
(B) 1,400  
(C) 1,680  
(D) 2,100  
(E) 2,940

The total number of domestic suppliers in 1985 (2,520) =  $\frac{2}{3}(1 - \frac{1}{3})$  (the total number of domestic suppliers in 1980)  $\Rightarrow$  1980 domestic suppliers = 3,780 .

The total number of domestic suppliers in 1988 =  $\frac{2}{3}(1 - \frac{1}{3})$  (the total number of domestic suppliers in 1985)  $\Rightarrow$  1988 domestic suppliers = 1,680 .  
 $3,780 - 1,680 = 2,100$  가 !

 (D)

34. A subway train made eleven stops on its route. If an average (arithmetic mean) of 30 passengers boarded at each of the first nine stops and at each stop, beginning with the second, 5 fewer passengers boarded than at the previous stop, how many passengers boarded the train at its first stop?

(A) 60 (B) 50 (C) 30 (D) 20 (E) 10

11 9 30 , 5

, B( ) - 5, B - 10, ..., B - 40),

$$9B - (5 + 10 + 15 + \dots + 40) = 270 \Rightarrow B = 50$$

 (B)

Tips : 5 40 !

$$a_n = a + (n-1)d, \quad a_{n+1} - a_n = d \quad ( )$$

$$: S_n = \frac{n(a + l)}{2}$$

$$\text{가} : S_n = \frac{n(2a + (n-1)d)}{2}$$

35. Fox jeans regularly sell for \$15 a pair and Pony jeans regularly, sell for \$18 a pair. During a sale these regular unit prices are discounted at different rates so that a total of \$9 is saved by purchasing 5 pairs of jeans: 3 pairs of Fox jeans and 2 pairs of Pony jeans. If the sum of the two discount rates is 22 percent, what is the discount rate on Pony jeans?

(A) 9% (B) 10% (C) 11% (D) 12% (E) 15%

Fox jeans, Pony jeans f , p ,

$$\textcircled{1} f + p = 0.22 \quad \textcircled{2} \$15 \times 3 \times f + \$18 \times 2 \times p = \$9, \quad f \quad p .$$

 (B)

36. A mixture of nuts is to contain 3 parts cashews to 6 parts almonds to 7 parts walnuts by weight. How many pounds of almonds will be needed to make 5 pounds of the mixture?

(A)  $\frac{3}{8}$  (B)  $\frac{8}{15}$  (C)  $1\frac{1}{5}$  (D)  $1\frac{2}{3}$  (E)  $1\frac{7}{8}$

$$\text{cashews : almonds : walnuts} = 3 : 6 : 7 \Rightarrow 5 \text{ pounds} \times (6/16) = 1\frac{7}{8}$$

 (E)

37. The time it took car A to travel 400 miles was 2 hours less than the time it took car B to travel the same distance. If car A's average speed was 10 miles per hour greater than that of car B, what was car B's average speed, in miles per hour?

(A) 20 (B) 30 (C) 40 (D) 50 (E) 80

$$\begin{aligned} \text{car A} & \uparrow 400 \text{ miles} \quad \uparrow H & \text{car B} & \uparrow H+2, \text{ A} & \uparrow B \\ & \uparrow 10 \text{ miles} & & & : (400 / H) - 10 \text{ miles} = \\ 400 / H + 2 & \Rightarrow H = 8, & B & 10 & 400 \div 10 = 40 \end{aligned}$$

 (C)

38. Ms. Jiminez plans an automobile trip of 7,000 to 9,000 miles. The cost of gasoline will be 85 to 95 cents per gallon, and her automobile will average 20 to 30 miles per gallon. What is the maximum possible cost of the gasoline for the trip?

(A) \$485.00  
(B) \$427.50  
(C) \$382.50  
(D) \$297.50  
(E) \$256.00

가 ,가 gasoline ,가 average miles per gallon

$$(9,000 \text{ miles} \div 20 \text{ miles}) \times \$0.95 = \$427.5$$

 (B)

39. A group of 12 people plan to rent a van and agree to share equally the total cost of the rental, which is  $E$  dollars. If  $n$  of the people decide not to participate at the last minute, by how many dollars will each remaining person's share of the total cost increase?

- (A)  $\frac{E}{12-n}$   
 (B)  $\frac{12-n}{E}$   
 (C)  $\frac{E}{12(12-n)}$   
 (D)  $\frac{nE}{12(12-n)}$   
 (E)  $\frac{(12-n)E}{12n}$

$$\begin{aligned} & \$E/12, \quad n \text{ 가 } (12-n) \\ & : \frac{E}{12-n} - \frac{E}{12} \end{aligned}$$

 (D)

40. The concentration of a certain chemical in a full water tank depends on the depth of the water.

At a depth that is  $x$  feet below the top of the tank, the concentration is  $3 + \frac{4}{\sqrt{5-x}}$  parts per million, where  $0 < x < 4$ . To the nearest 0.1 foot, at what depth is the concentration equal to 6 parts per million?

- (A) 2.4 ft  
 (B) 2.5 ft  
 (C) 2.8 ft  
 (D) 3.0 ft  
 (E) 3.2 ft

$$\begin{aligned} & \text{가 tank } x \text{ feet } ( ) \text{ 가 6 parts} \\ & \text{per million} : 3 + \frac{4}{\sqrt{5-x}} = 6 \end{aligned}$$

 (E)

41. A breakfast that consists of 1 ounce of corn puffs and 8 ounces of fruit  $X$  provides 257 calories. When 8 ounces of fruit  $Y$  is substituted for the 8 ounces of fruit  $X$ , the total number of calories is reduced to 185. If fruit  $X$  provides 1.8 times as many calories as fruit  $Y$ , how many calories does 8 ounces of fruit  $Y$  alone provide?
- (A) 11.25  
 (B) 72  
 (C) 90  
 (D) 95  
 (E) 129.6

1 ounce of corn + 8 ounces of fruit  $X$  = 257 calories

1 ounce of corn + 8 ounces of fruit  $Y$  = 185 calories

①  $8X - 8Y = 72$

② fruit  $X = 1.8Y$

② ①  $Y = 11.25$  8 90 .

⌂ (C)

42. A 2-year certificate of deposit is purchased for  $k$  dollars. If the certificate earns interest at an annual rate of 6 percent compounded quarterly, which of the following represents the value, in dollars, of the certificate at the end of the 2 year?
- (A)  $(1.06)^2 k$   
 (B)  $(1.06)^8 k$   
 (C)  $(1.015)^2 k$   
 (D)  $(1.015)^8 k$   
 (E)  $(1.04)^4 k$

**Compounded Annual Interest ( )**

< principle( )  $\times (1 + \text{interest rate})^{\text{time}}$ , (time = ) >  
 an annual rate of 6% compounded quarterly 6% (1 4 )  
 . , 1.15% 가

2 가 8 time = 8

$k(1 + 0.015)^8$

⌂ (D)

- (B) \$800**

$$(\$ 20 \times 10) \times 4 = \$800$$


- (B) 7



(B)

45. The rear wheels of a car crossed a certain line 0.5 second after the front wheels crossed the same line. If the centers of the front and rear wheels are 20 feet apart and the car traveled in a straight line at a constant speed, which of the following gives the speed of the car in miles per hour? (5,280 feet = 1 mile)

(A)  $\left(\frac{20}{5,280}\right)\left(\frac{60^2}{0.5}\right)$

(B)  $\left(\frac{20}{5,280}\right)\left(\frac{60}{0.5}\right)$

(C)  $\left(\frac{20}{5,280}\right)\left(\frac{0.5}{60^2}\right)$

(D)  $\frac{(20)(5,280)}{(60^2)(0.5)}$

(E)  $\frac{(20)(5,280)}{(60)(0.5)}$

20feet                      가                      가                      0.5                      가

. 20 feet                      0.5 seconds

feet                      second

feet                      mile                      second                      hour                      .                      Speed =  $\frac{20\text{ feet}}{0.5\text{ seconds}}$                       feet

5,280                      0.5 seconds                      60×60                      .

(A)

46. A cashier mentally reversed the digits of one customer's correct amount of change and thus gave the customer an incorrect amount of change. If the cash register contained 45 cents more than it should have as a result of this error, which of the following could have been the correct amount of change in cents?

(A) 14                      (B) 45                      (C) 54                      (D) 65                      (E) 83

45cent

$10a + b - (10b + a) = 45 \Rightarrow 9(a - b) = 9 \times 5 \Rightarrow a - b = 5$                        $a - b = 5$

$(a, b) : (6, 1), (7, 2), (8, 3), (9, 4)$                        $ab - ba = 45$                        $(8, 3)$

(E)

47. A shipment of 1,500 heads of cabbage, each of which was approximately the same size, was purchased for \$600. The day the shipment arrived,  $\frac{2}{3}$  of the heads were sold, each at 25 percent above the cost per head. The following day the rest were sold at a price per head equal to 10 percent less than the price each head sold for on the day before. What was the gross profit on this shipment?

(A) \$100 (B) \$115 (C) \$125 (D) \$130 (E) \$135

$$(1,500 \times \frac{2}{3} \times 1.25 \times \frac{600}{1,500}) + (1,500 \times \frac{1}{3} \times 1.25 \times \frac{600}{1,500} \times 0.9) = \$725$$

$$\$725 - \$600 = \$125$$



(C)

48. If Sam were twice as old as he is, he would be 40 years older than Jim. If Jim is 10 years younger than Sam, how old is Sam?

(A) 20 (B) 30 (C) 40 (D) 50 (E) 60

<Tips> If Sam were twice as old as he is: “Sam 2 가 ”

$$\textcircled{1} 2\text{Sam} = 40 + \text{Jim}, \textcircled{2} \text{Jim} + 10 = \text{Sam}$$

$$\text{Sam} = 30$$



(B)

49. A store currently charges the same price for each towel that it sells. If the current price of each towel were to be increased by \$1, 10 fewer of the towels could be bought for \$120, excluding sales tax. What is the current price of each towel?

(A) \$1 (B) \$2 (C) \$3 (D) \$4 (E) \$12

$$\begin{array}{l} \text{가 } \$1 \quad \$120 \quad \text{가 } 10 \\ \text{가} \quad : n, \quad \text{가} : p \quad \text{가} \end{array}$$

$$\textcircled{1} NP = \$120, \textcircled{2} (N-10)(P+1) = \$120 \quad 120 = 2 \times 3 \times 4 \times 5 \quad . 120$$

$$\begin{array}{l} , \quad , \quad \text{가 } \$2 \quad 60 \quad \text{가} \\ \$1 \quad \text{가 } \$3 \quad 40 \quad \text{가} \\ \text{가 } 20 \quad \text{가 } \$3 \quad \$4 \end{array}$$

$$\text{가} \quad 40 \quad 30$$



(C)



50. A ruby and a diamond have insured values of \$1,800 and \$1,200, respectively, and the annual premium rate for each gem is \$1.50 per \$100 of insured value. If the rate and insured values of the two gems remain constant over the years, after how many years will the total of the insurance premiums on both gems for those years first exceed the insured value of the diamond?

(A) 8  
(B) 12  
(C) 20  
(D) 27  
(E) 40

$$\$3,000 \times \frac{1.5}{100} \times x \text{ years} = \$1,200 \Rightarrow x \text{ years} \approx 26.6$$

diamond 가 가

27

.



(D)

51. A furnace service contract costs \$48 per year and covers payment of 80 percent of all repair costs. The total amount paid by the owner, including the cost of the contract, will equal the payment covered by the contract when the total repair costs for the year are

(A) \$48  
(B) \$60  
(C) \$72  
(D) \$80  
(E) \$92

$$\$48 + 0.2 \times \text{all repair costs} = 0.8 \times \text{all repair costs} \Rightarrow \text{all repair costs} = \$80$$



(D)