

Chapter 4 Ratio, Proportion, and Fraction

1. A certain club has 35 male members and 45 female members. Which of the following equals the ratio of the number of male members to the number of female members?
- (A) 7:16
(B) 5:9
(C) 5:7
(D) 3:4
(E) 7:9
2. What is the ratio of $\frac{3}{4}$ to the product $4\left(\frac{3}{4}\right)$?
- (A) $\frac{1}{4}$
(B) $\frac{1}{3}$
(C) $\frac{4}{9}$
(D) $\frac{9}{4}$
(E) 4
3. If $\frac{2}{7}$ of the 210 students in a class attended graduate school, what was the total number of students in the class who did not attend graduate school?
- (A) 42
(B) 60
(C) 105
(D) 142
(E) 150

4. A certain test consists of 8 sections with 25 questions numbered from 1 to 25, in each section. If a student answered all of the even-numbered questions correctly and $\frac{3}{4}$ of the odd-numbered questions correctly, what was the total number of questions he answered correctly?
- (A) 150
(B) 172
(C) 174
(D) 175
(E) 176
5. Two cities that are geographically 380 miles apart are 2 inches apart on a certain map. If the map is drawn to scale, how many miles apart are two cities that are $7\frac{1}{2}$ inches apart on the map?
- (A) 665
(B) 1,330
(C) 1,425
(D) 2,090
(E) 2,850
6. Lou and Selma were hired to paint a room for a total of \$72. They completed the job with Lou working 3 hours and 20 minutes and Selma working 2 hours and 40 minutes. If they decided to split the \$72 in proportion to the amount of time each spent on the job, how much did Lou receive?
- (A) \$32.00
(B) \$36.00
(C) \$40.00
(D) \$41.14
(E) \$43.20

7. Kathy bought 4 times as many shares in Company X as Carl, and Carl bought 3 times as many shares in the same company as Tom. Which of the following is the ratio of the numbers of shares bought by Kathy to the number of shares bought by Tom?
- (A) $\frac{3}{4}$
- (B) $\frac{4}{3}$
- (C) $\frac{3}{1}$
- (D) $\frac{4}{1}$
- (E) $\frac{12}{1}$
8. Of the 40 schools invited to participate in a research study, $\frac{7}{8}$ agreed to participate. If 60 questionnaires were sent to each of the participating schools and $\frac{4}{5}$ of these questionnaires were completed and returned, what was the total number of questionnaires completed and returned?
- (A) 28
- (B) 1,344
- (C) 1,680
- (D) 1,920
- (E) 2,100
9. If a printer can 2 pages of text per second, then, at this rate, approximately how many minutes will it take to print 5,000 pages of text?
- (A) 4
- (B) 25
- (C) 42
- (D) 250
- (E) 417

10. If \$160 is divided among 3 people in the ratio 3 : 5 : 8, what is the least amount received by any one person?

(A) \$80
(B) \$50
(C) \$30
(D) \$20
(E) \$10

11. Which three of the following fractions are equivalent?

$$v = \frac{5}{80}, \quad w = \frac{0.05}{0.08}, \quad x = \frac{0.5}{8.0}, \quad y = \frac{0.05}{0.8}, \quad z = \frac{0.05}{0.008}$$

(A) v , w , and x
(B) v , x , and y
(C) w , x , and y
(D) w , y , and z
(E) x , y , and z

12. A study based on a random sample revealed that, on average, 2 out of 5 adults have high blood pressure. If these results hold true for the 580,000 adults in City A, approximately how many adults in City A have high blood pressure?

(A) 116,000
(B) 145,000
(C) 232,000
(D) 250,000
(E) 290,000

13. Two boxes of pudding mix cost a total of \$0.73 and 1 box of cake mix costs twice as much as two boxes of pudding mix. At these rates, what is the cost of 3 boxes of pudding mix and 3 boxes of cake mix?
- (A) \$1.10
(B) \$3.29
(C) \$4.38
(D) \$5.48
(E) \$6.57
14. Out of their annual net income, a couple spent 25 percent for food, 13.5 percent for entertainment, 20 percent for housing, 8 percent for car expenses, 15 percent for clothing, and saved the rest. What was the ratio of the amount saved to the amount spent for entertainment?
- (A) $\frac{19}{27}$
(B) $\frac{6}{5}$
(C) $\frac{37}{27}$
(D) $\frac{19}{9}$
(E) $\frac{7}{3}$
15. Approximately how many minutes will it take a secretary who types at an average rate of 60 words per minute to type a 5-page report with 250 words per page?
- (A) 4
(B) 12
(C) 21
(D) 30
(E) 75

16. If the speed of an airplane is 360 kilometers per hour, how many meters will it travel in one second? (1 kilometer = 1,000 meters)
- (A) 100
(B) 360
(C) 1,000
(D) 3,600
(E) 6,000

<High Level Questions>

17. The total time required to transport rail freight from City X to City Y is 4 days, 15 hours. If, by eliminating certain intermediate stops, the total time were reduced by $\frac{1}{3}$, the total transport time required would be
- (A) 1 day, $5\frac{1}{3}$ hours
(B) 1 day, 13 hours
(C) 2 days, $10\frac{2}{3}$ hours
(D) 2 days, $15\frac{2}{3}$ hours
(E) 3 days, 2 hours
18. A small firm spent $\frac{1}{4}$ of its annual budget during the first 2 months of its fiscal year and spent $\frac{1}{2}$ of its remaining budget during the next 5 months. What fraction of the annual budget remained unspent at the end of the first 7 months?
- (A) $\frac{3}{16}$
(B) $\frac{1}{4}$
(C) $\frac{5}{16}$
(D) $\frac{3}{8}$
(E) $\frac{5}{12}$

19. Members of a social club met to address 280 newsletters. If they addressed $\frac{1}{4}$ of the newsletters during the first hour and $\frac{2}{5}$ of the remaining newsletters during the second hour, how many newsletters did they address during the second hour?
- (A) 28 (B) 42 (C) 63 (D) 84 (E) 112
20. In a certain used-car lot, there are 4 times as many blue cars as green cars and $\frac{1}{3}$ as many green cars as red cars. If there are $4q$ red cars in the lot, how many blue cars are in the lot?
- (A) $12q$
(B) $\frac{16q}{3}$
(C) $3q$
(D) $\frac{4q}{3}$
(E) $\frac{3q}{4}$
21. When Inez and Fernando purchased a property for \$20,000. Fernando contributed $\frac{1}{3}$ the amount contributed by Inez for the purchase. If they sold the property for \$40,000 and shared this amount in proportion to their respective contributions, how much was Fernando's share?
- (A) \$5,000
(B) \$10,000
(C) \$13,333
(D) \$20,000
(E) \$26,666

22. Of Amy's monthly salary, $\frac{1}{4}$ goes to rent and $\frac{1}{5}$ to food. If the remainder of her monthly salary amounts to \$990, what is Amy's monthly salary?
- (A) \$1,042
(B) \$1,273
(C) \$1,800
(D) \$1,980
(E) \$2,200
23. When $\frac{2}{9}$ of the votes on a certain resolution have been counted, $\frac{3}{4}$ of those counted are in favor of the resolution. What fraction of the remaining votes must be against the resolution so that the total count will result in a vote of 2 to 1 against the resolution?
- (A) $\frac{11}{14}$
(B) $\frac{13}{18}$
(C) $\frac{4}{7}$
(D) $\frac{3}{7}$
(E) $\frac{3}{14}$
24. In a certain population, there are 3 times as many people aged twenty-one or under as there are people over twenty-one. The ratio of those twenty-one or under to the total population is
- (A) 1 to 2
(B) 1 to 3
(C) 1 to 4
(D) 2 to 3
(E) 3 to 4

25. Last year Department Store X had a sales total for December that was 4 times the average (arithmetic mean) of the monthly sales totals for January through November. The sales total for December was what fraction of the sales total for the year?

- (A) $\frac{1}{4}$
(B) $\frac{4}{15}$
(C) $\frac{1}{3}$
(D) $\frac{4}{11}$
(E) $\frac{4}{5}$

26. Millie and Rick addressed 150 invitations. If Millie addressed $1\frac{1}{2}$ times as many as Rick addressed, how many of the invitations did Rick address?

- (A) 30
(B) 60
(C) 75
(D) 90
(E) 100

27. In 1990 a total of x earthquakes occurred worldwide, some but not all of which occurred in Asia. If m of these earthquakes occurred in Asia, which of the following represents the ratio of the number of earthquakes that occurred in Asia to the number that did not occur in Asia?

- (A) $\frac{x}{m}$
(B) $\frac{m}{x}$
(C) $\frac{m}{x-m}$
(D) $\frac{x}{x-m}$
(E) $1 - \frac{m}{x}$

28. The ratio of two quantities is 3 to 4. If each of the quantities is increased by 5, what is the ratio of these two new quantities?
- (A) $\frac{3}{4}$
- (B) $\frac{8}{9}$
- (C) $\frac{18}{19}$
- (D) $\frac{23}{24}$
- (E) It cannot be determined from the information given.
29. Of the people who responded to a market survey, 120 preferred Brand X and the rest preferred Brand Y . If the respondents indicated a preference for Brand X over Brand Y by a ratio of 3 to 1, how many people responded to the survey?
- (A) 80
- (B) 160
- (C) 240
- (D) 360
- (E) 480
30. Orange juice of normal strength is prepared by adding three 6-ounce cans of water to the contents of a 6-ounce can of orange juice concentrate. If 1 ounce of the can of concentrate was already used for some other purpose, how many 6-ounce cans of water should be added to the remainder of the concentrate to prepare juice of normal strength?
- (A) $1\frac{2}{3}$
- (B) 2
- (C) $2\frac{1}{3}$
- (D) $2\frac{1}{2}$
- (E) $2\frac{5}{6}$

31. A coffee merchant makes a house blend of coffee using 4 pounds of Arabian beans costing \$3 per pound, 2 pounds of Java beans costing \$4 per pound, and 4 pounds of Brazilian beans costing \$1 per pound. If the merchant sold all of the blend for 50 percent more than the total cost of the beans used, at what price per pound was the blend sold?
- (A) \$1.20
(B) \$2.40
(C) \$3.00
(D) \$3.60
(E) \$4.50
32. The current ratio of men to women on a certain board of trustees is 2 to 5. If 4 men were added to the board, the ratio of men to women would be 2 to 3. How many men are currently on the board?
- (A) 2
(B) 4
(C) 5
(D) 6
(E) 8
33. A custom blend of paint is made by mixing red, yellow, and black paints in the ratio of 12 to 11 to 1. If all of the paints are sold only in pint-sized containers, how many containers of yellow are used in preparing 6 gallons of the blend? (8 pints = 1 gallon)
- (A) 2
(B) 3
(C) 11
(D) 22
(E) 24

34. A rectangular office floor is 28 meters by 20 meters. A custodian, working at a constant rate, waxes a section of the floor that is 5 meters by 20 meters in $\frac{3}{4}$ hour. How many hours does it take the custodian, working at this same constant rate, to wax the entire floor?
- (A) 2.52
(B) 3
(C) 3.45
(D) 4.2
(E) 7
35. A glucose solution contains 15 grams of glucose per 100 cubic centimeters of solution. If 45 cubic centimeters of the solution were poured into an empty container, how many grams of glucose would be in the container?
- (A) 3.00
(B) 5.00
(C) 5.50
(D) 6.50
(E) 6.75
36. Dan bought x pencils, some at 10 cents each and the rest at 6 cents each. For the same amount of money that he spent on these pencils, he could have bought x pencils at 9 cents each. What is the ratio of the number of 10-cent pencils purchased to the number of 6-cent pencils purchased?
- (A) 1 : 1
(B) 2 : 1
(C) 3 : 1
(D) 4 : 1
(E) 5 : 1
37. A certain shade of gray paint is obtained by mixing 3 parts of white paint with 5 parts of black paint. If 2 gallons of the mixture is needed and the individual colors can be purchased only in one-gallon or half-gallon cans, what is the least amount of paint, in gallons, that must be purchased in order to measure out the portions needed for the mixture?
- (A) 2
(B) $2\frac{1}{2}$
(C) 3
(D) $3\frac{1}{2}$
(E) 4

38. Working alone, printers X , Y , and Z can do a certain printing job, consisting of a large number of pages, in 12, 15, and 18 hours, respectively. What is the ratio of the time it takes printer X to do the job, working alone at its rate, to the time it takes printers Y and Z to do the job, working together at their individual rates?
- (A) $\frac{4}{11}$
(B) $\frac{1}{2}$
(C) $\frac{15}{22}$
(D) $\frac{22}{15}$
(E) $\frac{11}{4}$
39. The ratio, by volume, of soap to alcohol to water in a certain solution is 2:50:100. The solution will be altered so that the ratio of soap to alcohol is doubled while the ratio of soap to water is halved. If the altered solution will contain 100 cubic centimeters of alcohol, how many cubic centimeters of water will it contain?
- (A) 50 (B) 200 (C) 400 (D) 625 (E) 800
40. Tom and Carlos begin to play a series of four games with 400 chips each. At the end of each game, there is a loser who must surrender half of his chips to the winner. If Tom wins only the first and third games, how many chips does he have after the pay-off at the end of the fourth game?
- (A) 200
(B) 275
(C) 400
(D) 525
(E) 550

STOP



Category 4 Ratio and Proportion

1. A certain club has 35 male members and 45 female members. Which of the following equals the ratio of the number of male members to the number of female members?

- (A) 7:16
(B) 5:9
(C) 5:7
(D) 3:4
(E) 7:9

$$35 : 45 = 5 \times 7 : 5 \times 9 = \frac{5 \times 7}{5 \times 9} = \frac{7}{9} = 7 : 9$$

» (E) »

2. What is the ratio of $\frac{3}{4}$ to the product $4\left(\frac{3}{4}\right)$?

- (A) $\frac{1}{4}$
(B) $\frac{1}{3}$
(C) $\frac{4}{9}$
(D) $\frac{9}{4}$
(E) 4

$$\frac{3}{4} : 4\left(\frac{3}{4}\right) = 1 : 4 = \frac{1}{4}$$

» (A) »

3. If $\frac{2}{7}$ of the 210 students in a class attended graduate school, what was the total number of students in the class who did not attend graduate school?
- (A) 42 (B) 60 (C) 105 (D) 142 (E) 150

210 $\frac{2}{7}$ 가 , $\frac{5}{7}$.
 $210 \times \frac{5}{7} = 150,$
 ▶▶ (E) ▶▶

4. A certain test consists of 8 sections with 25 questions numbered from 1 to 25, in each section. If a student answered all of the even-numbered questions correctly and $\frac{3}{4}$ of the odd-numbered questions correctly, what was the total number of questions he answered correctly?
- (A) 150
 (B) 172
 (C) 174
 (D) 175
 (E) 176

25 8 sections ,
 $\frac{3}{4}$ 가 가 25
 12 8sections 8 96 .
 가 $13 \times 8 = 104$. 96,
 $104 \times \frac{3}{4} = 78$, $96 + 78 = 174$.
 ▶▶ (C) ▶▶

5. Two cities that are geographically 380 miles apart are 2 inches apart on a certain map. If the map is drawn to scale, how many miles apart are two cities that are $7\frac{1}{2}$ inches apart on the map?
- (A) 665
 (B) 1,330
 (C) 1,425
 (D) 2,090
 (E) 2,850

Proportion . $A : B = C : D \Rightarrow AD = BC,$ $\frac{A}{B} = \frac{C}{D}$
 $380 \text{ miles} : 2 \text{ inches} = X : 7\frac{1}{2} \text{ inches} ,$ $X = 1,425$.
 ▶▶ (C) ▶▶

6. Lou and Selma were hired to paint a room for a total of \$72. They completed the job with Lou working 3 hours and 20 minutes and Selma working 2 hours and 40 minutes. If they decided to split the \$72 in proportion to the amount of time each spent on the job, how much did Lou receive?

(A) \$32.00
 (B) \$36.00
 (C) \$40.00
 (D) \$41.14
 (E) \$43.20

Lou 3 20 = 200 , Selma 2 40 = 160

Lou 가 $\frac{200}{360} = \frac{5}{9}$, \$72

Lou $\frac{5}{9} \times \$72 = \40 ,

▶▶ (C) ▶▶

7. Kathy bought 4 times as many shares in Company X as Carl, and Carl bought 3 times as many shares in the same company as Tom. Which of the following is the ratio of the numbers of shares bought by Kathy to the number of shares bought by Tom?

(A) $\frac{3}{4}$ (B) $\frac{4}{3}$ (C) $\frac{3}{1}$ (D) $\frac{4}{1}$ (E) $\frac{12}{1}$

①Kathy = 4 Carl, ②Carl = 3 Tom

② ① Kathy = 12 Tom .

Kathy : Tom = 12 : 1 .

▶▶ (E) ▶▶

8. Of the 40 schools invited to participate in a research study, $\frac{7}{8}$ agreed to participate. If 60 questionnaires were sent to each of the participating schools and $\frac{4}{5}$ of these questionnaires were completed and returned, what was the total number of questionnaires completed and returned?

(A) 28 (B) 1,344 (C) 1,680 (D) 1,920 (E) 2,100

40 $\frac{7}{8}$ research study 가 $: 40 \times \frac{7}{8} = 35$

가 60 가 $\frac{4}{5} : 60 \times \frac{4}{5} = 48$

40 completed .

$(35 \times 48) = 1,680$,

▶▶ (C) ▶▶

9. If a printer can 2 pages of text per second, then, at this rate, approximately how many minutes will it take to print 5,000 pages of text?

(A) 4
(B) 25
(C) 42
(D) 250
(E) 417

2 pages : 1 second = 5,000 pages : X

X = 2,500 seconds . second minute 2,500 ÷ 60

≅ 42 minutes .

▶▶ (C) ▶▶

10. If \$160 is divided among 3 people in the ratio 3 : 5 : 8, what is the least amount received by any one person?

(A) \$80
(B) \$50
(C) \$30
(D) \$20
(E) \$10

\$160 $\frac{3}{16(=3+5+8)}, \frac{5}{16}, \frac{8}{16}$, 가 가

. 3/16 (3/16) × \$160 = \$30

▶▶ (C) ▶▶

11. Which three of the following fractions are equivalent?

$$v = \frac{5}{80}, w = \frac{0.05}{0.08}, x = \frac{0.5}{8.0}, y = \frac{0.05}{0.8}, z = \frac{0.05}{0.008}$$

(A) v, w, and x
(B) v, x, and y
(C) w, x, and y
(D) w, y, and z
(E) x, y, and z

. 가 . 37

2 ~ 3 !

v, x, and y fractions 0.0625 .

▶▶ (B) ▶▶

12. A study based on a random sample revealed that, on average, 2 out of 5 adults have high blood pressure. If these results hold true for the 580,000 adults in City A, approximately how many adults in City A have high blood pressure?

(A) 116,000

(B) 145,000

(C) 232,000

(D) 250,000

(E) 290,000

5 2 , 580,000

$$\frac{2}{5} \times 580,000 = 232,000,$$

▶▶ (C) ▶▶

13. Two boxes of pudding mix cost a total of \$0.73 and 1 box of cake mix costs twice as much as two boxes of pudding mix. At these rates, what is the cost of 3 boxes of pudding mix and 3 boxes of cake mix?

(A) \$1.10

(B) \$3.29

(C) **\$4.38**

(D) \$5.48

(E) **\$6.57**

Two boxes of pudding mix = \$0.73 \Rightarrow one box of pudding mix = \$0.3650

$$1 \text{ box of cake mix} = 2(\$0.73) = \$1.46$$

3 boxes of pudding mix = $3 \times \$0.3650 = \1.0950 , 3 boxes of cake mix = $3 \times \$1.46 = \4.38

\$5.48.

▶▶ (D) ▶▶

14. Out of their annual net income, a couple spent 25 percent for food, 13.5 percent for entertainment, 20 percent for housing, 8 percent for car expenses, 15 percent for clothing, and saved the rest. What was the ratio of the amount saved to the amount spent for entertainment?

(A) $\frac{19}{27}$

(B) $\frac{6}{5}$

(C) $\frac{37}{27}$

(D) $\frac{19}{9}$

(E) $\frac{7}{3}$

Income	$25\% + 13\% + 20\% + 8\% + 15\% = 81.5\%$	18.5%
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entertainment ratio .

$$18.5\%: 13.5\% = \frac{0.185}{0.135} = \frac{37}{27}$$

▶▶ (C) ▶▶

15. Approximately how many minutes will it take a secretary who types at an average rate of 60 words per minute to type a 5-page report with 250 words per page?

(A) 4 (B) 12 (C) 21 (D) 30 (E) 75

1 60 words 가 1,250 words (250 × 5 pages) 가
 $\therefore .60 = X : 1,250 \quad X = 20.8333 \quad 21,$
 (C)

16. If the speed of an airplane is 360 kilometers per hour, how many meters will it travel in one second? (1 kilometer = 1,000 meters)

(A) 100 (B) 360 (C) 1,000 (D) 3,600 (E) 6,000

360 kilometers meters $360 \times 1,000 = 360,000$ meters
 1 hours one second $1 \times 60 \times 60 = 3600$ seconds
 $360,000$ meters 3600 seconds 1 가 가 100 meters가
 (A)

<High Level Questions >

17. The total time required to transport rail freight from City X to City Y is 4 days, 15 hours.

If, by eliminating certain intermediate stops, the total time were reduced by $\frac{1}{3}$, the total transport time required would be

- (A) 1 day, $5\frac{1}{3}$ hours
 (B) 1 day, 13 hours
 (C) 2 days, $10\frac{2}{3}$ hours
 (D) 2 days, $15\frac{2}{3}$ hours
 (E) 3 days, 2 hours

$\frac{1}{3}$ (be reduced by $\frac{1}{3}$) $\frac{2}{3}$

$$111(\text{hours}) \times \frac{2}{3} = 74(\text{hours})$$

(4 days, 15 hours 111 .)

(E)

18. A small firm spent $\frac{1}{4}$ of its annual budget during the first 2 months of its fiscal year and spent $\frac{1}{2}$ of its remaining budget during the next 5 months. What fraction of the annual budget remained unspent at the end of the first 7 months?

(A) $\frac{3}{16}$ (B) $\frac{1}{4}$ (C) $\frac{5}{16}$ (D) $\frac{3}{8}$ (E) $\frac{5}{12}$

가 2 $\frac{3}{4}$, 5 $\frac{1}{2}$ $\frac{3}{8}$.

►► (D) . ►►

19. Members of a social club met to address 280 newsletters. If they addressed $\frac{1}{4}$ of the newsletters during the first hour and $\frac{2}{5}$ of the remaining newsletters during the second hour, how many newsletters did they address during the second hour?

(A) 28 (B) 42 (C) 63 (D) 84 (E) 112

$$210 \left(= \frac{3}{4} \times 280 \right) \quad \cdot \quad \frac{2}{5} \text{ 가}$$

►► (D) . ►►

20. In a certain used-car lot, there are 4 times as many blue cars as green cars and $\frac{1}{3}$ as many green cars as red cars. If there are $4q$ red cars in the lot, how many blue cars are in the lot?

(A) $12q$ **(B) $\frac{16q}{3}$** (C) $3q$ (D) $\frac{4q}{3}$ (E) $\frac{3q}{4}$

가 4 가 $\frac{1}{3}$. (

가 3 가 .)

“ : : = 4 : 1 : 3” .

4:3 .

▶▶ (B) . ▶▶

21. When Inez and Fernando purchased a property for \$20,000. Fernando contributed $\frac{1}{3}$ the amount contributed by Inez for the purchase. If they sold the property for \$40,000 and shared this amount in proportion to their respective contributions, how much was Fernando's share?

(A) \$5,000 (B) \$10,000 (C) \$13,333 (D) \$20,000 (E) \$26,666

Inez Fernando \$20,000 . Fernando
 Inez가 $\frac{1}{3}$ \$40,000 ,
 Fernando가
 Fernando Inez가 $\frac{1}{3}$, Inez Fernando가
 3 . Fernando Inez가 Fernando :
 Inez = 1 : 3 . \$40,000 4
 Fernando 1 .
 percent, ratio 가
 가 가 .
 (B) .

22. Of Amy's monthly salary, $\frac{1}{4}$ goes to rent and $\frac{1}{5}$ to food. If the remainder of her monthly salary amounts to \$990, what is Amy's monthly salary?

(A) \$1,042
 (B) \$1,273
 (C) \$1,800
 (D) \$1,980
 (E) \$2,200

$\frac{1}{4}$ rent , $\frac{1}{5}$ \$990

$$\frac{9}{20} \left(= \frac{1}{4} + \frac{1}{5} \right) \quad \frac{11}{20} \quad \$990$$

$$\$1,800 \left(= \frac{20}{11} \times \$990 \right)$$

(C)

23. When $\frac{2}{9}$ of the votes on a certain resolution have been counted, $\frac{3}{4}$ of those counted are in favor of the resolution. What fraction of the remaining votes must be against the resolution so that the total count will result in a vote of 2 to 1 against the resolution?

(A) $\frac{11}{14}$

(B) $\frac{13}{18}$

(C) $\frac{4}{7}$

(D) $\frac{3}{7}$

(E) $\frac{3}{14}$

가 $\frac{2}{9}$, 가 $\frac{3}{4}$. 2 : 1

가

$\frac{2}{9}$ 가

가 $\frac{3}{4}$

$\frac{1}{18} \left(= \frac{2}{9} \times \frac{1}{4} \right)$.

2:1

$\frac{12}{18}$ 가

x

$\frac{7}{9} \times x = \frac{11}{18}$

▶▶ (A) ▶▶

24. In a certain population, there are 3 times as many people aged twenty-one or under as there are people over twenty-one. The ratio of those twenty-one or under to the total population is

(A) 1 to 2

(B) 1 to 3

(C) 1 to 4

(D) 2 to 3

(E) 3 to 4

. 21

(people aged twenty-one or under-

.) 22

(people over twenty-one - 21

.) 3

. 21

3 : 4가

▶▶ (E) ▶▶

25. Last year Department Store X had a sales total for December that was 4 times the average (arithmetic mean) of the monthly sales totals for January through November. The sales total for December was what fraction of the sales total for the year?

- (A) $\frac{1}{4}$
 (B) $\frac{4}{15}$
 (C) $\frac{1}{3}$
 (D) $\frac{4}{11}$
 (E) $\frac{4}{5}$

12 1 11 4 , 12
 1 .
 1 11 q 12 $4q$. 1
 15 q 가 .
 (B) .

26. Millie and Rick addressed 150 invitations. If Millie addressed $1\frac{1}{2}$ times as many as Rick addressed, how many of the invitations did Rick address?

- (A) 30
 (B) 60
 (C) 75
 (D) 90
 (E) 100

Millie Rick 150 . Mille Rick
 $1\frac{1}{2}$, Rick .
 Rick R .
 $1\frac{1}{2}R + R = 150$
 Millie Rick
 $1\frac{1}{2}$ Millie 가 Rick 50%가
 .
 (B)

27. In 1990 a total of x earthquakes occurred worldwide, some but not all of which occurred in Asia. If m of these earthquakes occurred in Asia, which of the following represents the ratio of the number of earthquakes that occurred in Asia to the number that did not occur in Asia?

(A) $\frac{x}{m}$ (B) $\frac{m}{x}$ (C) $\frac{m}{x-m}$ (D) $\frac{x}{x-m}$ (E) $1 - \frac{m}{x}$

▶▶▶ (C) ▶▶▶

28. The ratio of two quantities is 3 to 4. If each of the quantities is increased by 5, what is the ratio of these two new quantities?

(A) $\frac{3}{4}$
 (B) $\frac{8}{9}$
 (C) $\frac{18}{19}$
 (D) $\frac{23}{24}$
 (E) It cannot be determined from the information given.

3 : 5 5 가 가 5가

) $300 : 500 \Rightarrow 305 : 505$, $30 : 50 \Rightarrow 35 : 55$

▶▶▶ (E) ▶▶▶

29. Of the people who responded to a market survey, 120 preferred Brand X and the rest preferred Brand Y . If the respondents indicated a preference for Brand X over Brand Y by a ratio of 3 to 1, how many people responded to the survey?

(A) 80 (B) 160 (C) 240 (D) 360 (E) 480

X 120 X Y
 3 : 1

X 가 120 Y
 40

▶▶▶ (B) ▶▶▶

30. Orange juice of normal strength is prepared by adding three 6-ounce cans of water to the contents of a 6-ounce can of orange juice concentrate. If 1 ounce of the can of concentrate was already used for some other purpose, how many 6-ounce cans of water should be added to the remainder of the concentrate to prepare juice of normal strength?

- (A) $1\frac{2}{3}$
 (B) 2
 (C) $2\frac{1}{3}$
 (D) $2\frac{1}{2}$
 (E) $2\frac{5}{6}$

6-ounce can 6-ounce can
 1-ounce
 can
 6 ounce 18ounce “ : =
 1 : 3 ” 5 ounce 15ounce

▶▶▶▶ (D) . ▶▶▶▶

31. A coffee merchant makes a house blend of coffee using 4 pounds of Arabian beans costing \$3 per pound, 2 pounds of Java beans costing \$4 per pound, and 4 pounds of Brazilian beans costing \$1 per pound. If the merchant sold all of the blend for 50 percent more than the total cost of the beans used, at what price per pound was the blend sold?

- (A) \$1.20
 (B) \$2.40
 (C) \$3.00
 (D) \$3.60
 (E) \$4.50

\$3 Arabian 4 (\$12) , \$4 Java 2
 (\$8), \$1 Brazil 4 (\$4)
 가 50%가 1
 가
 10 \$24 . 1 \$2 4가
 가 \$ 2.4 50% \$3.6 .

▶▶▶▶ (D) . ▶▶▶▶

32. The current ratio of men to women on a certain board of trustees is 2 to 5. If 4 men were added to the board, the ratio of men to women would be 2 to 3. How many men are currently on the board?

(A) 2
(B) 4
(C) 5
(D) 6
(E) 8

2 : 5 . 4 가
2 : 3 .
m , f m : f = 2 : 5 . 4 가
m + 4 : f = 2 : 3 .

▶▶▶ (D) . ▶▶▶

33. A custom blend of paint is made by mixing red, yellow, and black paints in the ratio of 12 to 11 to 1. If all of the paints are sold only in pint-sized containers, how many containers of yellow are used in preparing 6 gallons of the blend? (8 pints = 1 gallon)

(A) 2
(B) 3
(C) 11
(D) 22
(E) 24

, , 12:11:1 a custom blend of paint
가 (pint : 1/8gallon) , 6 gallon blend .

< 1 >

A custom blend of paint

$$\frac{11}{24}$$

$$2.75\text{gallon} \left(= 6\text{gallon} \times \frac{11}{24} \right) \quad 22 (= 2.75\text{gallon} \times 8) \text{ 가}$$

< 2 >

$$6\text{gallon} \quad 48 \quad .48 \quad \frac{11}{24} \quad 22$$

▶▶▶ (D) . ▶▶▶

34. A rectangular office floor is 28 meters by 20 meters. A custodian, working at a constant rate, waxes a section of the floor that is 5 meters by 20 meters in $\frac{3}{4}$ hour. How many hours does it take the custodian, working at this same constant rate, to wax the entire floor?
- (A) 2.52 (B) 3 (C) 3.45 (D) 4.2 (E) 7

$$\frac{\frac{3}{4} \text{ hours}}{5 \text{ meters by } 20 \text{ meters}} = \frac{x \text{ hours}}{28 \text{ meters by } 20 \text{ meters}}$$

$$x = \frac{28 \times 20}{5 \times 20} \times \frac{3}{4} = 5.6$$

28 meters by 20 meters $\frac{3}{4}$ 5 meters by 20

meters 5.6 $\left(\frac{28 \times 20}{5 \times 20} = 5.6 \right)$ 5.6

»» (D) »»»

35. A glucose solution contains 15 grams of glucose per 100 cubic centimeters of solution. If 45 cubic centimeters of the solution were poured into an empty container, how many grams of glucose would be in the container?
- (A) 3.00 (B) 5.00 (C) 5.50 (D) 6.50 (E) 6.75

$$\frac{15 \text{ grams}}{100 \text{ cubic centimeter}} = \frac{x \text{ grams}}{45 \text{ cubic centimeter}}$$

$$x = \frac{45}{100} \times 15 = 6.75$$

100 cubic centimeter 15

45 cubic centimeter

»» (E) »»»

36. Dan bought x pencils, some at 10 cents each and the rest at 6 cents each. For the same amount of money that he spent on these pencils, he could have bought x pencils at 9 cents each. What is the ratio of the number of 10-cent pencils purchased to the number of 6-cent pencils purchased?
- (A) 1 : 1 (B) 2 : 1 (C) 3 : 1 (D) 4 : 1 (E) 5 : 1

$$10 \text{ cent} \times a + 6 \text{ cent} \times b = 9 \text{ cent} \times x$$

$$10a + 6b = 9x$$

Dan x 가 10cent

6cent . 가

9cent x . 10 cent 6cent

가 9cent x

9cent

9cent가 6cent 10 cent 3
 10 cent 6 cent 3:1
 (C)

37. A certain shade of gray paint is obtained by mixing 3 parts of white paint with 5 parts of black paint. If 2 gallons of the mixture is needed and the individual colors can be purchased only in one-gallon or half-gallon cans, what is the least amount of paint, in gallons, that must be purchased in order to measure out the portions needed for the mixture?

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

3, 5
 2 gallon 가 1 gallon $\frac{1}{2}$ gallon
 $\frac{5}{8}$ $\frac{5}{8}$ $\frac{1}{2}$
 1 가 1.5gallon
 1.5gallon 가 1 gallon
 $\frac{1}{2}$ gallon 1.5gallon 1.25gallon
 $\frac{3}{8}$ $\frac{3}{8}$ $\frac{1}{4}(=0.25)$ $\frac{1}{2}$
 1gallon .($0.75 \text{ gallon} \left(= 2 \times \frac{3}{8} \right)$.)
 (B)

38. Working alone, printers X , Y , and Z can do a certain printing job, consisting of a large number of pages, in 12, 15, and 18 hours, respectively. What is the ratio of the time it takes printer X to do the job, working alone at its rate, to the time it takes printers Y and Z to do the job, working together at their individual rates?

- (A) $\frac{4}{11}$ (B) $\frac{1}{2}$ (C) $\frac{15}{22}$ (D) $\frac{22}{15}$ (E) $\frac{11}{4}$

X , Y , Z 가 12, 15, 18
 X 가 Y , Z 가

$$\frac{1}{12} : \left(\frac{1}{15} + \frac{1}{18} \right) = \frac{1}{12} : \frac{11}{90} = \frac{90}{12} : \frac{90}{11} = 15 : \frac{90}{11}$$

▶▶▶ (D) ▶▶▶

39. The ratio, by volume, of soap to alcohol to water in a certain solution is 2:50:100. The solution will be altered so that the ratio of soap to alcohol is doubled while the ratio of soap to water is halved. If the altered solution will contain 100 cubic centimeters of alcohol, how many cubic centimeters of water will it contain?

- (A) 50 (B) 200 (C) 400 (D) 625 (E) 800

soap : alcohol : water = 2 : 50 : 100
 1/2 가 100
 cubic centimeters (cm^3) , cubic centimeters

$$\begin{aligned} & 2 : 50 \left(= \frac{2}{50} \right) \\ & 2 \text{ 가 } \left(2 \cdot \frac{2}{50} \right) \\ & \frac{1}{2} \text{ 가 } 2 \text{ 가 } 4 \text{ 가} \\ & \left(\frac{2}{100} \rightarrow \frac{2 \times 2}{100 \times 4} = \frac{1}{100} \right) \\ & = 4 : 50 : 400 \end{aligned}$$

100 cubic centimeters 800cubic centimeters

▶▶▶ (E) ▶▶▶

40. Tom and Carlos begin to play a series of four games with 400 chips each. At the end of each game, there is a loser who must surrender half of his chips to the winner. If Tom wins only the first and third games, how many chips does he have after the pay-off at the end of the fourth game?

(A) 200
 (B) 275
 (C) 400
 (D) 525
 (E) 550

Tom Carlos 400 가 4 . 가
 가 , Tom , Tom 4
 가 .
 Tom .(가
 800 . “800 – Tom ”가 Carlos가 가
 .)

600 300 550 275
 + 200() - 300() + 250() - 275()

▶▶▶ (B) ▶▶▶