

Section 21
30 Minutes 20 Questions

1. In Township *K* each property is taxed at 8 percent of its assessed value. If the assessed value of a property in Township *K* is increased from \$20,000 to \$24,000, by how much will the property tax increase?

(A) \$32
 (B) \$50
 (C) \$320
 (D) \$400
 (E) \$500

2. One night 18 percent of the female officers on a police force were on duty. If 180 officers were on duty that night and half of these were female officers, how many female officers were on the police force?

(A) 90
 (B) 180
 (C) 270
 (D) 500
 (E) 1,000

3. If an integer n is divisible by both 6 and 8, then it must also be divisible by which of the following?

(A) 10
 (B) 12
 (C) 14
 (D) 16
 (E) 18

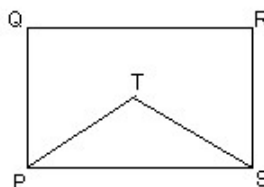
4. On the number line, if x is halfway between -5 and 3, and if y is halfway between -2 and 6, what number is halfway between x and y ?

(A) -1
 (B) $-\frac{1}{2}$
 (C) 0
 (D) $\frac{1}{2}$
 (E) 1

5. In a certain company, the total monthly payroll for the 12 production workers is \$18,000 and the total monthly payroll for the 36 office workers is \$63,000.

By how much does the average (arithmetic mean) monthly salary of an office worker exceed that of a production worker in this company?

(A) \$62.50
 (B) \$187.50
 (C) \$250.00
 (D) \$375.00
 (E) \$500.00



Note: Not drawn to scale.

6. In the figure above, if the area of the rectangular region $PQRS$ is 40, and if $PT = TS$, what is the area of the pentagonal region $PQRST$?

(A) 15
 (B) 20
 (C) 25
 (D) 30
 (E) It cannot be determined from the information given.

$$7. \frac{\frac{1}{100} - \frac{2}{1,000}}{\frac{1}{1,000} - \frac{2}{10,000}} =$$

(A) $\frac{1}{10}$
 (B) $\frac{1}{8}$
 (C) 1
 (D) 8
 (E) 10

8. Which of the following is the prime factorization of 2,520?

(A) $2^2 \times 3^2 \times 5^2$

- (B) $2^2 \times 3 \times 5^2 \times 7$
 (C) $2^3 \times 3 \times 5 \times 7^2$
 (D) $2^3 \times 3^2 \times 5 \times 7$
 (E) $2^3 \times 3^2 \times 5^2 \times 7$
9. If $\frac{2x}{3} = x - 1$, then $\frac{x}{6} =$
- (A) $\frac{1}{2}$
 (B) $\frac{1}{3}$
 (C) $\frac{1}{4}$
 (D) $\frac{1}{10}$
 (E) $\frac{1}{18}$
10. 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) $\frac{7}{3}$
11. If $\frac{z+3}{z-1} + \frac{z+1}{z-3} = 2$, then $z =$
- (A) 2
 (B) 1
 (C) -1
 (D) -2
 (E) -3
12. The population of city X increased from 325,000 in 1980 to 350,000 in 1990, and it is projected that the population will increase by the same number from 1990 to 2000. Approximately what is the projected percent increase in population from 1990 to 2000 ?
- (A) 7.1%
 (B) 7.7%
 (C) 8.3%
 (D) 14.3%
 (E) 15.3%
13. A jar contains only x black balls and y white balls. One ball is drawn randomly from the jar and is not replaced. A second ball is then drawn randomly from the jar. What is the probability that the first ball drawn is black and the second ball drawn is white?
- (A) $\left(\frac{x}{x+y}\right)\left(\frac{y}{x+y}\right)$
 (B) $\left(\frac{x}{x+y}\right)\left(\frac{x-1}{x+y-1}\right)$
 (C) $\frac{xy}{x+y}$
 (D) $\left(\frac{x-1}{x+y}\right)\left(\frac{y-1}{x+y}\right)$
 (E) $\left(\frac{x}{x+y}\right)\left(\frac{y}{x+y-1}\right)$
14. If $y + |y| = 0$, which of the following must be true?
- (A) $y > 0$
 (B) $y \geq 0$
 (C) $y < 0$
 (D) $y \leq 0$
 (E) $y = 0$
15. Of the z students at a certain college, x are studying French and y are studying German. If w are studying both French and German, which of the following expresses the number of students at the college not studying either French or German ?
- (A) $z + w - x - y$

- (B) $z - w - x - y$
 (C) $z - w - x + y$
 (D) $w + x + y - z$
 (E) $w - x - y - z$
16. Of the science books in a certain supply room, 50 are on botany, 65 are on zoology, 90 are on physics, 50 are on geology, and 110 are on chemistry. If science books are removed randomly from the supply room, how many must be removed to ensure that 80 of the books removed are on the same science?
- (A) 81
 (B) 159
 (C) 166
 (D) 285
 (E) 324
17. What is the greatest possible straight-line distance, in centimeters, between two vertices of the rectangular box shown above?
- (A) $10\sqrt{2}$
 (B) $10\sqrt{5}$
 (C) $10\sqrt{6}$
 (D) 30
 (E) 40
18. 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
19. A merchant paid \$300 for a shipment of x identical calculators. The merchant used 2 of the calculators as demonstrators and sold each of the others for \$5 more than the average (arithmetic mean) cost of the x calculators. If the total revenue from the sale of the calculators was \$120 more than the cost of the shipment, how many calculators were in the shipment?
- (A) 24
 (B) 25
 (C) 26
 (D) 28
 (E) 30
20. $5^{12} + 5^{13} =$
- (A) 5^{25}
 (B) 10^{25}
 (C) $6(5^{12})$
 (D) $10^{12} + 5$
 (E) $2(5^{12}) + 5$

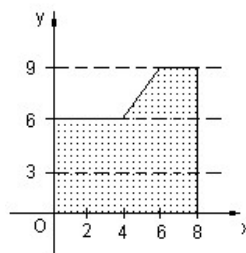
Section 22
30 Minutes 20 Questions

1. Tamara saves \$35 each week. If she now has \$100 saved, in how many weeks can she first have enough saved to buy a lawn mower that costs \$250 ?
 (A) 2 (B) 3 (C) 4 (D) 5 (E) 6
2. $-2(-4 - (-3 + 5)) =$
 (A) -16
 (B) -10
 (C) 6
 (D) 12
 (E) 16
3. On a certain test, 3 students each had a score of 90, 9 students each had a score of 80, 4 students each had a score of 70, and 4 students each had a score of 60. What was the average (arithmetic mean) score for the 20 students ?
 (A) 70.5
 (B) 75.0
 (C) 75.5
 (D) 80.0
 (E) 80.5
4. 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
5. In the manufacture of a certain product, 5 percent of the units produced are defective and 4 percent of the defective units are shipped for sale. What percent of the units produced are defective units that are shipped for sale?
 (A) 0.125%
 (B) 0.2%
 (C) 0.8%
 (D) 1.25%

(E) 2.0%

6. $x(x+1)(x+2) + x(x+3) =$

- (A) $x^3 + 4x^2 + 5x$
 (B) $x^3 + 3x^2 + 2x$
 (C) $x^3 + 6x^2 + 3x$
 (D) $2x^3 + 3x^2 + 5x$
 (E) $2x^2 + 6x + 2$



7. What is the area of the shaded region in the figure above ?
 (A) 72
 (B) 57
 (C) 55
 (D) $54\frac{1}{2}$
 (E) $49\frac{1}{2}$
8. Which of the following equals the ratio of $3\frac{1}{3}$ to $1\frac{1}{3}$?
 (A) 1 : 3
 (B) 2 : 5
 (C) 5 : 2
 (D) 3 : 1
 (E) 40 : 9

| | Company X | Company Y |
|---------------------------------|-----------|-----------|
| Prince | \$75 | \$530 |
| Surcharge as a Percent of Price | 4% | 3% |
| Installation Charge | \$82.50 | \$93.00 |

9. The table above shows the various charges made by two companies for the same air conditioner. What is the total amount that can be saved on the purchase and installation of the air conditioner by

- dealing with the company that offers the lower total charge?
- (A) \$41.60
(B) \$45.00
(C) \$50.75
(D) \$55.75
(E) \$61.25
10. The numbers in which of the following pairs do NOT have a pair of distinct prime divisors in common ?
- (A) 10 and 20
(B) 12 and 18
(C) 24 and 32
(D) 21 and 63
(E) 22 and 88
11. If the sum of two integers is 6, then it must be true that
- (A) both integers are even
(B) both integers are odd
(C) both integers are positive
(D) if one integer is negative, the other is positive
(E) if one integer is positive, the other is negative
12. A square picture frame has an outer perimeter of 36 inches and is 1 inch wide on all sides. What is the inner perimeter of the frame, in inches?
- (A) 27
(B) $27\frac{1}{2}$
(C) 28
(D) $31\frac{1}{2}$
(E) 32
13. If $2 - x(\frac{1}{x} + 2) = 19 - 4x$, then $x =$
- (A) -3
(B) 3
(C) 4
(D) 5
(E) 9
14. For a group of n people, k of whom are of the same sex, the expression $\frac{n-k}{n}$ yields an index for a certain phenomenon in group dynamics for members of that sex. For a group that consists of 20 people, 4 of whom are females, by how much does the index for the females exceed the index for the males in the group?
- (A) 0.05
(B) 0.0625
(C) 0.2
(D) 0.25
(E) 0.6
15. 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
- $d = \frac{3v^2}{20}$ and $t = \frac{2d}{v}$, where

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

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

t is the time, in seconds, it takes to stop after the brakes are applied
16. 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

17. 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

18. If all of the telephone extensions in a certain company must be even numbers, and if each of the extensions uses all four of the digits 1, 2, 3, and 6, what is the greatest number of four-digit extensions that the company can have?

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

(D) 16 (E) 24

19. The product of the first twelve positive integers is divisible by all of the following EXCEPT

(A) 210

(B) 88

(C) 75

(D) 60

(E) 34

20. A car traveled 462 miles per tankful of gasoline on the highway and 336 miles per tankful of gasoline in the city. If the car traveled 6 fewer miles per gallon in the city than on the highway, how many miles per gallon did the car travel in the city?

(A) 14

(B) 16

(C) 21

(D) 22

(E) 27

Section 23

30 Minutes 20 Questions

1. The value of which of the following expressions is equal to 2?

I. $\frac{2^2 + 2}{2}$

II. $\frac{2^2 + 2^2}{2}$

III. $\frac{2^4 + 2^4}{2^4}$

(A) I only

(B) II only

(C) III only

(D) I and II only

(E) I, II, and III

2. If a survey shows that 28 citizens out of a sample of 200 support a particular Senate bill, what percent of the sample does not support the bill?

(A) 56%

(B) 64%

(C) 72%

(D) 82%

(E) 86%

3. Joe went on a diet 6 months ago when he weighed 222 pounds. If he now weighs 198 pounds and continues to lose at the same average monthly rate, in approximately how many months will he weigh 180 pounds?

(A) 3

(B) 3.5

(C) 4

(D) 4.5

(E) 5

4. $\frac{\left(\frac{1}{2}\right)^3}{\left(\frac{1}{2}\right)^4} =$

(A) 2

(B) $\frac{4}{3}$

(C) 1

(D) $\frac{3}{4}$

(E) $\frac{1}{2}$

5. $3x^2 + 2x - 8 =$

(A) $(3x + 4)(x - 2)$

(B) $(3x - 4)(x + 2)$

(C) $(3x + 2)(x - 4)$

(D) $(3x - 2)(x + 4)$

(E) none of the above

6. NOT SCORED

7. If the sum of 7 consecutive integers is 434, then the greatest of the 7 integers is

(A) 71

(B) 69

(C) 67

(D) 65

(E) 62

8. At a certain college, 50 percent of the total number of students are freshmen. If 20 percent of the freshmen are enrolled in the school of liberal arts and, of these, 30 percent are psychology majors, what percent of the students at the college are freshmen psychology majors enrolled in the school of liberal arts?

(A) 3%

(B) 6%

(C) 12%

(D) 15%

(E) 20%

9. 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?

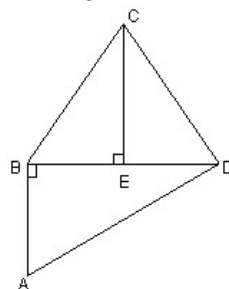
(A) $x + 2,000 = \frac{1}{3}(x - 3,000)$

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

10. In the figure above, $CE = 5$, $BD = 8$, and the area of quadrilateral $ABCD$ is 36. What is the area of $\triangle ABD$?

(A) 4

(B) 9

(C) 16

(D) 20

(E) 56

11. If the remainder is 7 when positive integer n is divided by 18, what is the remainder when n is divided by 6?

(A) 0

(B) 1

(C) 2

(D) 3

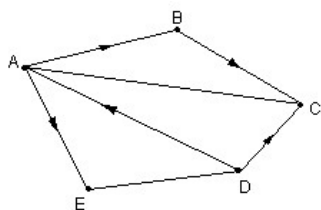
(E) 4

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

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

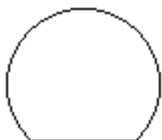
(B) $\frac{480 - x}{60}$

- (C) $\frac{470-x}{60}$
(D) $60(60-x+7)$
(E) $60(60-x+17)$
13. If $x = 4$ and $y = 16$, then $\sqrt{\frac{x+y}{xy}}$ is closest to which of the following?
- (A) $\frac{1}{3}$
(B) $\frac{1}{2}$
(C) $\frac{3}{4}$
(D) $\frac{7}{8}$
(E) 1
14. A total of \$20,000 was invested in two certificates of deposit at simple annual interest rates of 6 percent and 8 percent, respectively. If the total interest on the two certificates was \$1,440 at the end of one year, what fractional part of the \$20,000 was invested at the higher rate?
- (A) $\frac{3}{8}$
(B) $\frac{2}{5}$
(C) $\frac{1}{2}$
(D) $\frac{3}{5}$
(E) $\frac{3}{4}$
15. If the tens digit x and the units digit y of a positive integer n are reversed, the resulting integer is 9 more than n . What is y in terms of x ?
- (A) $10 - x$
(B) $9 - x$
(C) $x + 9$
(D) $x - 1$
(E) $x + 1$
16. Beth received $\frac{3}{10}$ of the votes cast in a certain election. What fraction of the other votes cast would she have needed in order to have received $\frac{1}{2}$ of the votes cast?
- (A) $\frac{1}{5}$
(B) $\frac{2}{7}$
(C) $\frac{3}{10}$
(D) $\frac{7}{20}$
(E) $\frac{1}{2}$
17. 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
18. If x is an even integer and y is an odd integer, which of the following CANNOT be true?
- (A) x^y is an even integer.
(B) y^x is an odd integer.
(C) x is a multiple of y .
(D) y is a multiple of x .
(E) xy is an even integer.



19. In the diagram above, points A , B , C , D , and E represent the five teams in a certain league in which each team must play each of the other teams exactly once. The segments connecting pairs of points indicate that the two corresponding teams have already played their game. The arrows on the segments point to the teams that lost; the lack of an arrow on a segment indicates that the game ended in a tie. After all games have been played, which of the following could NOT be the percent of games played that ended in a tie?

- (A) 10%
(B) 20%
(C) 30%
(D) 40%
(E) 50%



20. The figure above shows the shape of a tunnel entrance. If the curved portion is $\frac{3}{4}$ of a circle and the base of the entrance is 12 feet across, what is the perimeter, in feet, of the curved portion of the entrance?

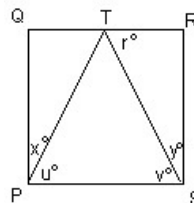
- (A) 9π
(B) 12π
(C) $9\pi\sqrt{2}$
(D) 18π
(E) $\frac{9\pi}{\sqrt{2}}$

Section 24

30 Minutes 20 Questions

1. Of the 10 employees at a certain company, 5 had annual salaries of \$20,000, 4 had annual salaries of \$25,000, and 1 had an annual salary of \$30,000. If a bonus equal to 10 percent of annual salary was given to each employee, what was the total amount of the bonuses?

- (A) \$230,000
(B) \$75,000
(C) \$30,000
(D) \$23,000
(E) \$7,500



2. In the figure above, if $PQRS$ is a square and $QT = TR$, which of the following statements is NOT true?

- (A) $PT = TS$
(B) $x = y$
(C) $u = v$
(D) $r = y$
(E) The area of $\triangle PQT$ is equal to the area of $\triangle SRT$.

3. If $ab \neq 0$, which of the following is equal to $\frac{1}{\frac{a}{b}}$?

- (A) $\frac{a}{b}$
(B) 1
(C) a
(D) b
(E) $\frac{b}{a}$

4. What is the greatest integer k such that $2^k \leq 100$?

- (A) 5 (B) 6 (C) 7 (D) 49 (E) 50

5. A certain electric-company plan offers customers reduced rates for electricity used between 8 p.m. and 8 a.m. weekdays and 24 hours a day Saturdays and Sundays. Under this plan, the reduced rates apply to what fraction of a week?

- (A) $\frac{1}{2}$
 (B) $\frac{5}{8}$
 (C) $\frac{9}{14}$
 (D) $\frac{16}{21}$
 (E) $\frac{9}{10}$

6. A certain mixture of nuts consists of 5 parts almonds to 2 parts walnuts, by weight. What is the number of pounds of almonds in 140 pounds of the mixture?

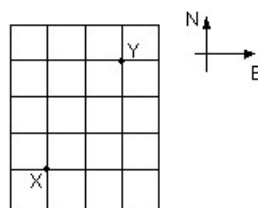
- (A) 100
 (B) 84
 (C) 40
 (D) 28
 (E) 20

7. $(0.01)^2(0.014) + (0.01)(0.0026) =$

- (A) 0.0000166
 (B) 0.0000274
 (C) 0.00004
 (D) 0.000166
 (E) 0.0004

8. The pages of a report are numbered consecutively from 1 to 10. If the sum of the page numbers up to and including page number x of the report is equal to one more than the sum of the page numbers following page number x , then $x =$

- (A) 4 (B) 5 (C) 6 (D) 7 (E) 8



Note: Figure not drawn to scale.

9. In City R , streets run either east-west or north-south, as shown on the map above. Blocks along east-west streets are 400 feet long and blocks along north-south streets are 200 feet long. If the width of the streets is ignored, what is the straight-line distance, in feet, from X to Y ?

- (A) $200\sqrt{5}$
 (B) 1,000
 (C) 1,200
 (D) $400\sqrt{10}$
 (E) 1,600

10. If $x(1 - \frac{1}{x}) = 1 - y$, then $y =$

- (A) $\frac{1}{x}$
 (B) x
 (C) $x - 2$
 (D) $1 - \frac{1}{x^2}$
 (E) $2 - x$

11. A side of beef lost 35 percent of its weight in processing. If the side of beef weighed 546 pounds after processing, how many pounds did it weigh before processing?

- (A) 191
 (B) 355
 (C) 737
 (D) 840
 (E) 1,560

12. 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) $\frac{50}{n(n - 1)}$
13. Of the following sums, which is greatest?
- (A) $\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{4}} + \frac{1}{\sqrt{5}}$
 (B) $\frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \frac{1}{5^2}$
 (C) $\frac{1}{2^2} + \frac{1}{2^3} + \frac{1}{2^4} + \frac{1}{2^5}$
 (D) $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4}$
 (E) $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$
14. One millisecond is 0.001 of a second. The costs for a single run of a computer program are \$1.07 for operating-system overhead, \$0.023 per millisecond of computer time, and \$4.35 for the mounting of a data tape. What is the total of these three costs for 1 run of a program that requires 1.5 seconds of computer time?
- (A) \$7.15
 (B) \$8.87
 (C) \$28.96
 (D) \$35.57
 (E) \$39.92
15. 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
16. If $n = (2^2)(3^4)(5^6)$, the value of which of the following products is greater than \sqrt{n} ?
- I. $(2)(3^3)(5^2)$
 II. $(2)(3)(5^4)$
 III. $(2^2)(3^2)(5^3)$
- (A) None
 (B) I only
 (C) II only
 (D) III only
 (E) II and III
17. If b and c are positive numbers and $\frac{1}{b} = \frac{b}{c} = \frac{c}{8}$, then $b + c =$
- (A) 4
 (B) 6
 (C) 7
 (D) 8
 (E) 9
18. In a certain performance of a 3-act play, the first act was 18 minutes shorter than the third act and half as long as the second act. If the average (arithmetic mean) length of the 3 acts was 46 minutes, how many minutes long was the third act?
- (A) 30
 (B) 39
 (C) 46
 (D) 48
 (E) 66
19. In an office, 40 percent of the workers have at least 5 years of service, and a total of 16 workers have at least 10 years

of service. If 90 percent of the workers have fewer than 10 years of service, how many of the workers have at least 5 but fewer than 10 years of service?

- (A) 48
- (B) 64
- (C) 50
- (D) 144
- (E) 160

20. If n and p are different positive prime numbers, which of the integers n^4 , p^3 , and np has (have) exactly 4 positive divisors?

- (A) n^4 only
- (B) p^3 only
- (C) np only
- (D) n^4 and np
- (E) p^3 and np

Section 25**30 Minutes 20 Questions**

1. For each color copy, Print Shop X charges \$1.25 and Print Shop Y charges \$2.75. How much greater is the charge for 84 color copies at Print Shop Y than at Print Shop X ?

- (A) \$84.00
- (B) \$105.00
- (C) \$126.00
- (D) \$231.00
- (E) \$336.00

2. The sum of 25 percent of 36 and 75 percent of 56 equals

- (A) 23
- (B) 37
- (C) 41
- (D) 51
- (E) 69

3. If $x^2 < x$, then x must be

- (A) less than 0
- (B) equal to 0
- (C) between 0 and 1
- (D) equal to 1
- (E) greater than 1

4. If 15 people contributed a total of \$20.00 toward a gift and each of them contributed at least \$1.00, then the maximum possible amount any one person could have contributed is

- (A) \$1.00
- (B) \$1.25
- (C) \$5.00
- (D) \$6.00
- (E) \$20.00

5. If the cost of a yearly membership in a certain club increased from \$199 to \$299, what was the approximate percent increase in cost?

- (A) $33\frac{1}{3}\%$

- (B) 50%
(C) $66\frac{2}{3}\%$
(D) 100%
(E) 150%
6. On the number line, the number p is twice as many units from -2 as -2 is from 6 . If p is less than -2 , what is the value of p ?
- (A) -18
(B) -10
(C) -6
(D) 10
(E) 14
7. A telephone call costs \$1.25 for the first minute and \$0.32 for each additional minute. What is the cost, in dollars, of a telephone call that lasts for x minutes, where x is an integer?
- (A) $0.32 + 1.25x$
(B) $1.25 + 0.32x$
(C) $0.32 + 1.25(x - 1)$
(D) $1.25 + 0.32(x + 1)$
(E) $1.25 + 0.32(x - 1)$
8. If x and y are integers, then $\frac{1}{x+y}$ CANNOT be equal to
- (A) -1
(B) $-\frac{1}{2}$
(C) 0
(D) $\frac{1}{2}$
(E) 1
9. The markup on a television set is 20 percent of the cost. The markup is what percent of the selling price?
(markup = selling price - cost)
- (A) 8%
(B) 10%
(C) $12\frac{1}{2}\%$
(D) 15%
(E) $16\frac{2}{3}\%$
10. If x and y are two-digit integers such that $x > 40$ and $y < 70$, which of the following is closest to the maximum possible value of xy ?
- (A) 700
(B) 2,800
(C) 4,000
(D) 7,000
(E) 28,000
11. What is the diameter of a circular region that has area 10π ?
- (A) 5
(B) 10
(C) 20
(D) $\sqrt{10}$
(E) $2\sqrt{10}$
12. If $3x + 2y = 7$ and $2x - y = 7$, what is the value of x ?
- (A) 0
(B) 1
(C) $\frac{7}{5}$
(D) $\frac{21}{11}$
(E) 3
13. Worldwide production of motor vehicles was 3.9 million vehicles in 1946 and 45.7 million in 1987. Of the following, which is closest to the average (arithmetic mean) annual increase, in millions, in worldwide production of motor vehicles during this period?
- (A) 0.08
(B) 1.0
(C) 1.1
(D) 10.5
(E) 41.8
14. Raymond took several days to mow a certain lawn. He mowed $\frac{1}{3}$ of the lawn

the first day, $\frac{1}{2}$ of the remaining

unmowed portion the second day, and $\frac{3}{4}$

of the remaining unmowed portion the third day. What fraction of the lawn remained unmowed at the end of the third day?

- (A) $\frac{1}{6}$
 (B) $\frac{1}{8}$
 (C) $\frac{1}{12}$
 (D) $\frac{1}{16}$
 (E) $\frac{1}{24}$

15. Of the votes cast on a certain proposal, 80 more were in favor of the proposal than were against it. If the number of votes against the proposal was 40 percent of the total vote, what was the total number of votes cast?

(Each vote cast was either in favor of the proposal or against it.)

- (A) 480
 (B) 400
 (C) 300
 (D) 240
 (E) 160

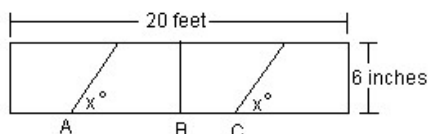
16. If $xy \neq 0$ and $\frac{1}{x} - \frac{1}{y} = cx$. Which of the following is equal to c ?

- (A) $\frac{x}{y(1-x^2)}$
 (B) $\frac{1}{-x^2y}$
 (C) $\frac{y-x}{x^2y}$
 (D) $\frac{y-x}{y}$

(E) $\frac{y}{y-x}$

17. Due to construction, the speed limit along an 8-mile section of highway is reduced from 55 miles per hour to 35 miles per hour. Approximately how many minutes more will it take to travel along this section of highway at the new speed limit than it would have taken at the old speed limit?

- (A) 5
 (B) 8
 (C) 10
 (D) 15
 (E) 24



Note: Figure not drawn to scale.

18. The figure above shows the dimensions of a rectangular board that is to be cut into four identical pieces by making cuts at points A , B , and C , as indicated. If $x = 45$, what is the length AB ?

(1 foot = 12 inches)

- (A) 5 ft 6 in
 (B) 5 ft $3\sqrt{2}$ in
 (C) 5 ft 3 in
 (D) 5 ft
 (E) 4 ft 9 in

19. If $x < y < z$ and $y - x > 5$, where x is an even integer and y and z are odd integers, what is the least possible value of $z - x$?

- (A) 6
 (B) 7
 (C) 8
 (D) 9
 (E) 10

20. On the day of the performance of a certain play, each ticket that regularly sells for less than \$10.00 is sold for half price plus \$0.50, and each ticket that regularly sells for \$10.00 or more is sold for half price plus \$1.00. On the day of the performance, a person purchases a total of y tickets, of which x regularly sell for \$9.00 each and the rest regularly sell for \$12.00 each. What is the amount paid, in dollars, for the y tickets?

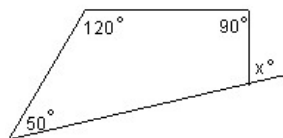
- (A) $7y - 2x$
(B) $12x - 7y$
(C) $\frac{9x + 12y}{2}$
(D) $7y + 4x$
(E) $7y + 5x$

Section 26**30 Minutes 20 Questions**

1. A car with a 12-gallon gas tank used $\frac{1}{2}$ of a full tank of gas to make a 150-mile trip. How many miles per gallon did the car average on the trip?
- (A) 30
(B) 25
(C) $12\frac{1}{2}$
(D) $8\frac{1}{3}$
(E) 6
2. If $5n + 4 = 11$, what is the value of $10n - 2$?
- (A) 68
(B) 14
(C) 12
(D) 7
(E) -1
3. At the beginning of each year, the price of item X is 10 percent higher than its price at the beginning of the previous year. During three consecutive years, if the price of item X is \$8 at the beginning of the first year, what is its price at the beginning of the third year?
- (A) \$8.80
(B) \$9.60
(C) \$9.68
(D) \$10.00
(E) \$16.00
4. $\frac{\left(\frac{1}{2}\right)\left(\frac{1}{3}\right)}{\frac{1}{2} \div \frac{1}{3}} =$
- (A) $\frac{1}{9}$
(B) $\frac{1}{4}$
(C) 1

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

(E) 6



5. An association of mathematics teachers has 1,260 members. Only 525 of these members cast votes in the election for president of the association. What percent of the total membership voted for the winning candidate if the winning candidate received 60 percent of the votes cast?

- (A) 75%
(B) 58%
(C) 42%
(D) 34%
(E) 25%

6. In the figure above, what is the value of x ?

- (A) 50
(B) 70
(C) 80
(D) 90
(E) 100

7. Which of the following fractions, if written as a decimal, would have a 2 in the thousandths place?

- (A) $\frac{3}{11}$
(B) $\frac{7}{9}$
(C) $\frac{1}{8}$
(D) $\frac{4}{7}$
(E) $\frac{1}{6}$

8. If P dollars is invested at an annual interest rate of 5 percent, which of the following gives the amount of simple

interest, in dollars, earned after n months?

(A) $0.05P + n$

(B) $0.05P + \frac{n}{12}$

(C) $0.05P \times n$

(D) $0.05P \times \frac{1}{12n}$

(E) $0.05P \times \frac{n}{12}$

9. If a person purchases 15 of the 3,000 tickets sold in a raffle that awards one prize, what is the probability that this person will not win?

- (A) 0
(B) $\frac{1}{200}$
(C) $\frac{1}{2}$
(D) $\frac{199}{200}$
(E) 1

10. Virginia, Adrienne, and Dennis have taught history for a combined total of 96 years. If Virginia has taught for 9 more years than Adrienne and for 9 fewer years than Dennis, for how many years has Dennis taught?

- (A) 23
(B) 32
(C) 35
(D) 41
(E) 44

11. Approximately 90 percent of the volume of a certain cube that is floating in a tank of water is beneath the surface. If 6.4 cubic centimeters of the cube is above the surface of the water, what is the approximate length, in centimeters, of an edge of the cube?

- (A) 10
(B) 8
(C) 6
(D) 4
(E) 2

12. If $x = 2u$, then the average (arithmetic mean) of x and u , in terms of u , is

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

13. If the sum of a set of ten different positive prime numbers is an even number, which of the following prime numbers CANNOT be in the set?

- (A) 2
(B) 3
(C) 5
(D) 7
(E) 11

14. A book dealer buys used books for prices ranging from \$0.75 to \$1.50 and then sells them for prices ranging from \$3.00 to \$5.50. If the dealer were to sell 20 of these books, the minimum gross profit from this sale would be

- (A) \$15
(B) \$30
(C) \$45
(D) \$50
(E) \$80

15. If $x(a + b) = y$, where $y \neq 0$ and $2a = 3b = 1$, then $\frac{y}{x} =$

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

- (D) $\frac{5}{6}$
(E) $\frac{6}{5}$

16. A certain Social Security recipient will receive an annual benefit of \$12,000 provided he has annual earnings of \$9,360 or less, but the benefit will be reduced by \$1 for every \$3 of annual earnings over \$9,360. What amount of total annual earnings would result in a 50 percent reduction in the recipient's annual Social Security benefit? (Assume Social Security benefits are not counted as part of annual earnings.)

- (A) \$15,360
(B) \$17,360
(C) \$18,000
(D) \$21,360
(E) \$27,360

17. $\frac{1}{2^{10}} + \frac{1}{2^{11}} + \frac{1}{2^{12}} + \frac{1}{2^{12}} =$

- (A) $\frac{1}{2^7}$
(B) $\frac{1}{2^8}$
(C) $\frac{1}{2^9}$
(D) $\frac{1}{2^{13}}$
(E) $\frac{1}{2^{45}}$

18. If it would take one machine 10 minutes to fill a large production order and another machine 12 minutes to fill the same order, how many minutes would it take both machines working together, at their respective rates, to fill the order?

- (A) $4\frac{1}{60}$
(B) 5
(C) $5\frac{5}{11}$

(D) $5\frac{1}{2}$

(E) 11

19. If $\frac{m}{7}$ is an integer, then each of the following must be an integer EXCEPT

(A) $\frac{m-28}{7}$

(B) $\frac{m+21}{7}$

(C) $\frac{14m}{98}$

(D) $\frac{m^2-49}{49}$

(E) $\frac{m+14}{14}$

20. Not Scored

Section 27**25 minutes 16 Questions**

1. A project scheduled to be carried out over a single fiscal year has a budget of \$12,600, divided into 12 equal monthly allocations. At the end of the 4th month of that fiscal year, the total amount actually spent on the project was \$4,580. By how much was the project over its budget ?

- (A) \$380
(B) \$540
(C) \$1,050
(D) \$1,380
(E) \$1,430

2. For which of the following values of n is

$$\frac{100+n}{n} \text{ NOT an integer ?}$$

- (A) 1
(B) 2
(C) 3
(D) 4
(E) 5

3. Rectangular floors X and Y have equal area. If floor X is 12 feet by 18 feet and floor Y is 9 feet wide, what is the length of floor Y , in feet ?

- (A) $13\frac{1}{2}$
(B) 18
(C) $18\frac{3}{4}$
(D) 21
(E) 24

4. A case contains c cartons. Each carton contains b boxes and each box contains 100 paper clips. How many paper clips are contained in 2 cases ?

- (A) $100bc$
(B) $\frac{100b}{c}$
(C) $200bc$
(D) $\frac{200b}{c}$

- (E) $\frac{200}{bc}$
5. In a certain city, 60 percent of the registered voters are Democrats and the rest are Republicans. In a mayoral race, if 75 percent of the registered voters who are Democrats and 20 percent of the registered voters who are Republicans are expected to vote for Candidate *A*, what percent of the registered voters are expected to vote for Candidate *A* ?
- (A) 50%
(B) 53%
(C) 54%
(D) 55%
(E) 57%
6. if $\left(\frac{3x-5}{2}\right)y = y$ and $y \neq 0$, then $x =$
- (A) $\frac{2}{3}$
(B) $\frac{5}{3}$
(C) $\frac{7}{3}$
(D) 1
(E) 4
7. If $x + 5 > 2$ and $x - 3 < 7$, the value of x must be between which of the following pairs of numbers ?
- (A) -3 and 10
(B) -3 and 4
(C) 2 and 7
(D) 3 and 4
(E) 3 and 10
8. A certain company retirement plan has a "rule of 70" provision that allows an employee to retire when the employee's age plus years of employment with the company total at least 70. In what year could a female employee hired in 1986 on her 32nd birthday first be eligible to retire under this provision ?
- (A) 2003
(B) 2004
(C) 2005
(D) 2006
(E) 2007
9. $\frac{1}{2} + \left[\left(\frac{2}{3} \times \frac{3}{8} \right) \div 4 \right] - \frac{9}{16} =$
- (A) $\frac{29}{16}$
(B) $\frac{19}{16}$
(C) $\frac{15}{16}$
(D) $\frac{9}{13}$
(E) 0
10. The sum of the prime numbers that are greater than 60 and less than 70 is
- (A) 67
(B) 128
(C) 191
(D) 197
(E) 260
11. Water consists of hydrogen and oxygen, and the approximate ratio, by mass, of hydrogen to oxygen is 2 : 16. Approximately how many grams of oxygen are there in 144 grams of water ?
- (A) 16
(B) 72
(C) 112
(D) 128
(E) 142
12. If $x(2x + 1) = 0$ and $(x + \frac{1}{2})(2x - 3) = 0$, then $x =$
- (A) -3
(B) $-\frac{1}{2}$
(C) 0
(D) $\frac{1}{2}$
(E) $\frac{3}{2}$

13. A rainstorm increased the amount of water stored in State J reservoirs from 124 billion gallons to 138 billion gallons. If the storm increased the amount of water in the reservoirs to 82 percent of total capacity, approximately how many billion gallons of water were the reservoirs short of total capacity prior to the storm?

(A) 9 (B) 14 (C) 25
(D) 30 (E) 44

14. If s_1, s_2, s_3, \dots is the sequence such that

$$s_n = \frac{n}{n+1} \text{ for all positive integers } n,$$

then the product of the first 10 terms of this sequence is

(A) $\frac{1}{(10)(11)}$ (B) $\frac{1}{11}$
(C) $\frac{1}{10}$ (D) $\frac{9}{10}$
(E) $\frac{10}{11}$

15. On a scale that measures the intensity of a certain phenomenon, a reading of $n + 1$ corresponds to an intensity that is 10 times the intensity corresponding to a reading of n . On that scale, the intensity corresponding to a reading of 8 is how many times as great as the intensity corresponding to a reading of 3?

(A) 5 (B) 50 (C) 10^5
(D) 5^{10} (E) $8^{10} - 3^{10}$

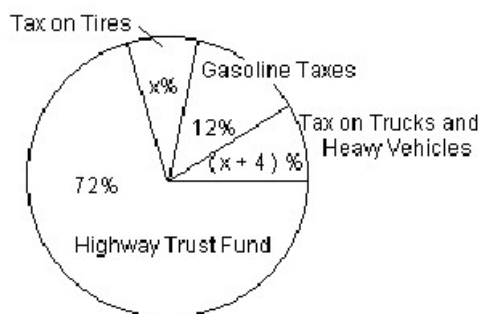
16. John and Mary were each paid x dollars in advance to do a certain job together. John worked on the job for 10 hours and Mary worked 2 hours less than John. If Mary gave John y dollars of her payment so that they would have received the same hourly wage, what was the dollar amount, in terms of y , that John was paid in advance?

(A) $4y$ (B) $5y$ (C) $6y$
(D) $8y$ (E) $9y$

Section 28

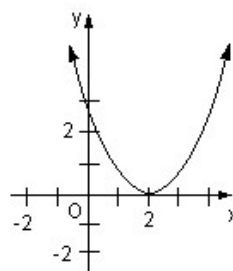
25 Minutes 16 Questions

SOURCES OF FUNDS FOR HIGHWAY MAINTENANCE IN STATE X IN 1983



1. According to the graph above, what percent of the funds for highway maintenance came from the tax on tires?

(A) 3 %
(B) 6 %
(C) 8 %
(D) 10%
(E) 16%



2. According to the graph above, when $x = 3$, y most nearly?

(A) -1
(B) $-\frac{1}{2}$
(C) 0
(D) $\frac{1}{2}$
(E) 1

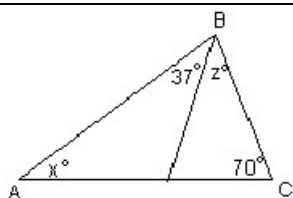
3. A gym class can be divided into 8 teams with an equal number of players on each

- team or into 12 teams with an equal number of players on each team. What is the least possible number of students in the class?
- (A) 20
(B) 24
(C) 36
(D) 48
(E) 96
4. At least $\frac{2}{3}$ of the 40 members of a committee must vote in favor of a resolution for it to pass. What is the greatest number of members who could vote against the resolution and still have it pass ?
- (A) 19
(B) 17
(C) 16
(D) 14
(E) 13
5. When $\frac{1}{10}$ percent of 5,000 is subtracted from $\frac{1}{10}$ of 5,000 the difference is
- (A) 0
(B) 50
(C) 450
(D) 495
(E) 500
6. A poll reveals that the average (arithmetic mean) income of 10 households is \$25,000. If 6 of the households have incomes of \$30,000 each, what is the average income of the other 4 households?
- (A) \$21,500
(B) \$20,000
(C) \$17,500
(D) \$7,500
(E) \$7,000
7. $1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{3}}} =$
- (A) $\frac{4}{7}$
(B) $\frac{4}{3}$
(C) $\frac{11}{8}$
(D) $\frac{11}{7}$
(E) $\frac{7}{4}$
8. If $T = \frac{5}{9}(k - 32)$, and if $T = 290$, then $K =$
- (A) $\frac{1,738}{9}$
(B) 322
(C) 490
(D) 554
(E) $\frac{2,898}{5}$
9. The water from one outlet, flowing at a constant rate, can fill a swimming pool in 9 hours. The water from a second outlet, flowing at a constant rate, can fill the same pool in 5 hours. If both outlets are used at the same time, approximately what is the number of hours required to fill the pool ?
- (A) 0.22
(B) 0.31
(C) 2.50
(D) 3.21
(E) 4.56
10. Diana bought a stereo for \$530, which was the retail price plus a 6 percent sales tax. How much money could she have saved if she had bought the stereo at the same retail price in a neighboring state where she would have paid a sales tax of 5 percent?
- (A) \$1.00
(B) \$2.65
(C) \$4.30
(D) \$5.00
(E) \$5.30

11. If a square mirror has a 20-inch diagonal, what is the approximate perimeter of the mirror, in inches?
- (A) 40
(B) 60
(C) 80
(D) 100
(E) 120
12. Which of the following is the value of $\sqrt[3]{0.000064}$?
- (A) 0.004
(B) 0.008
(C) 0.02
(D) 0.04
(E) 0.2
13. The present ratio of students to teachers at a certain school is 30 to 1. If the student enrollment were to increase by 50 students and the number of teachers were to increase by 5, the ratio of students to teachers would then be 25 to 1. What is the present number of teachers ?
- (A) 5
(B) 8
(C) 10
(D) 12
(E) 15
14. What is the smallest integer n for which $25^n > 5^{12}$?
- (A) 6
(B) 7
(C) 8
(D) 9
(E) 10
15. Raffle tickets numbered consecutively from 101 through 350 are placed in a box. What is the probability that a ticket selected at random will have a number with a hundreds digit of 2?
- (A) $\frac{2}{5}$
(B) $\frac{2}{7}$
(C) $\frac{33}{83}$
(D) $\frac{99}{250}$
(E) $\frac{100}{249}$
16. If x and y are different prime numbers, each greater than 2, which of the following must be true ?
- I. $x + y \neq 91$
II. $x - y$ is an even integer.
III. $\frac{x}{y}$ is not an integer.
- (A) II only
(B) I and II only
(C) I and III only
(D) II and III only
(E) I, II, and III

Section 29
25 Minutes 16 Questions

1. As a salesperson, Phyllis can choose one of two methods of annual payment: either an annual salary of \$35,000 with no commission or an annual salary of \$10,000 plus a 20 percent commission on her total annual sales. What must her total annual sales be to give her the same annual pay with either method ?
(A) \$100,000
(B) \$120,000
(C) \$125,000
(D) \$130,000
(E) \$132,000
2. A restaurant buys fruit in cans containing $3\frac{1}{2}$ cups of fruit each. If the restaurant uses $\frac{1}{2}$ cup of the fruit in each serving of its fruit compote, what is the least number of cans needed to prepare 60 servings of the compote ?
(A) 7
(B) 8
(C) 9
(D) 10
(E) 12
3. If $x > 3,000$, then the value of $\frac{x}{2x+1}$ is closest to
(A) $\frac{1}{6}$
(B) $\frac{1}{3}$
(C) $\frac{10}{21}$
(D) $\frac{1}{2}$
(E) $\frac{3}{2}$
4. Machine A produces 100 parts twice as fast as machine B does. Machine B produces 100 parts in 40 minutes. If each machine produces parts at a constant rate, how many parts does machine A produce in 6 minutes ?
(A) 30
(B) 25
(C) 20
(D) 15
(E) 7.5
5. If 18 is 15 percent of 30 percent of a certain number, what is the number ?
(A) 9
(B) 36
(C) 40
(D) 81
(E) 400
6. A necklace is made by stringing N individual beads together in the repeating pattern red bead, green bead, white bead, blue bead, and yellow bead. If the necklace design begins with a red bead and ends with a white bead, then N could equal.
(A) 16
(B) 32
(C) 41
(D) 54
(E) 68
7. If $x = (0.08)^2$, $y = \frac{1}{(0.08)^2}$, and $z = (1 - 0.08)^2 - 1$, which of the following is true ?
(A) $x = y = z$
(B) $y < z < x$
(C) $z < x < y$
(D) $y < x$ and $x = z$
(E) $x < y$ and $x = z$



8. In $\triangle ABC$ above, what is x in terms of z ?

- (A) $z + 73$
- (B) $z - 73$
- (C) $70 - z$
- (D) $z - 70$
- (E) $73 - z$

9. 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) $1 - \frac{m}{x}$

10. If $\frac{x+y}{xy} = 1$, then $y =$

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

11. If $\frac{1}{2}$ of the air in a tank is removed with each stroke of a vacuum pump, what fraction of the original amount of air has been removed after 4 strokes?

- (A) $\frac{15}{16}$
- (B) $\frac{7}{8}$
- (C) $\frac{1}{4}$
- (D) $\frac{1}{8}$
- (E) $\frac{1}{16}$

12. 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) $\frac{4}{5}$

13. How many integers n are there such that $1 < 5n + 5 < 25$?

- (A) Five
- (B) Four
- (C) Three
- (D) Two
- (E) One

14. If the two-digit integers M and N are positive and have the same digits, but in reverse order, which of the following CANNOT be the sum of M and N ?

- (A) 181

- (B) 163
(C) 121
(D) 99
(E) 44

15. 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) $\frac{11}{4}$

16. 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

Section 30

25 Minutes 16 Questions

1. $\frac{(3)(0.072)}{0.54} =$

- (A) 0.04
(B) 0.3
(C) 0.4
(D) 0.8
(E) 4.0

2. A car dealer sold x used cars and y new cars during May. If the number of used cars sold was 10 greater than the number of new cars sold. Which of the following expresses this relationship?

- (A) $x > 10y$
(B) $x > y + 10$
(C) $x > y - 10$
(D) $x = y + 10$
(E) $x = y - 10$

3. What is the maximum number of $1\frac{1}{4}$ -foot pieces of wire that can be cut from a wire that is 24 feet long?

- (A) 11
(B) 18
(C) 19
(D) 20
(E) 30

4. If each of the two lines λ_1 and λ_2 is parallel to line λ_3 , which of the following must be true?

- (A) Lines λ_1 , λ_2 , and λ_3 lie in the same plane.
(B) Lines λ_1 , λ_2 , and λ_3 lie in different planes.
(C) Line λ_1 is parallel to line λ_2 .
(D) Line λ_1 is the same line as line λ_2 .
(E) Line λ_1 is the same line as line λ_3 .

5. $\frac{61.24 \times (0.998)^2}{\sqrt{403}}$ The expression above is approximately equal to
(A) 1 (B) 3 (C) 4
(D) 5 (E) 6
6. Car X and car Y traveled the same 80-mile route. If car X took 2 hours and car Y traveled at an average speed that was 50 percent faster than the average speed of car X , how many hours did it take car Y to travel the route?
(A) $\frac{2}{3}$
(B) 1
(C) $1\frac{1}{3}$
(D) $1\frac{3}{5}$
(E) 3
7. If the numbers $\frac{17}{24}$, $\frac{1}{2}$, $\frac{3}{8}$, $\frac{3}{4}$, and $\frac{9}{16}$ were ordered from greatest to least, the middle number of the resulting sequence would be
(A) $\frac{17}{24}$
(B) $\frac{1}{2}$
(C) $\frac{3}{8}$
(D) $\frac{3}{4}$
(E) $\frac{9}{16}$
8. If a 10 percent deposit that has been paid toward the purchase of a certain product is \$110, how much more remains to be paid?
(A) \$880
(B) \$900
(C) \$1,000
(D) \$1,100
(E) \$1,210
9. Kim purchased n items from a catalog for \$8 each. Postage and handling charges consisted of \$3 for the first item and \$1 for each additional item. Which of the following gives the total dollar amount of Kim's purchase, including postage and handling, in terms of n ?
(A) $8n + 2$
(B) $8n + 4$
(C) $9n + 2$
(D) $9n + 3$
(E) $9n + 4$
10. $(\sqrt{7} + \sqrt{7})^2 =$
(A) 98
(B) 49
(C) 28
(D) 21
(E) 14
11. If the average (arithmetic mean) of the four numbers K , $2K + 3$, $3K - 5$, and $5K + 1$ is 63, what is the value of K ?
(A) 11
(B) $15\frac{3}{4}$
(C) 22
(D) 23
(E) $25\frac{3}{10}$
12. A rabbit on a controlled diet is fed daily 300 grams of a mixture of two foods, food X and food Y . Food X contains 10 percent protein and food Y contains 15 percent protein. If the rabbit's diet provides exactly 38 grams of protein daily, how many grams of food X are in the mixture?
(A) 100
(B) 140
(C) 150
(D) 160
(E) 200

13. A company that ships boxes to a total of (12) distribution centers uses color coding to identify each center. If either a single color or a pair of two different colors is chosen to represent each center and if each center is uniquely represented by that choice of one or two colors, what is the minimum number of colors needed for the coding? (Assume that the order of the colors in a pair does not matter.)
(A) 4 (B) 5 (C) 6 (D) 12 (E) 24
14. If $x + y = a$ and $x - y = b$, then $2xy =$
(A) $\frac{a^2 - b^2}{2}$
(B) $\frac{b^2 - a^2}{2}$
(C) $\frac{a - b}{2}$
(D) $\frac{ab}{2}$
(E) $\frac{a^2 + b^2}{2}$
15. A rectangular circuit board is designed to have width w inches, perimeter p inches, and area k square inches. Which of the following equations must be true?
(A) $w^2 + pw + k = 0$
(B) $w^2 - pw + 2k = 0$
(C) $2w^2 + pw + 2k = 0$
(D) $2w^2 - pw - 2k = 0$
(E) $2w^2 - pw + 2k = 0$
16. On a certain road, 10 percent of the motorists exceed the posted speed limit and receive speeding tickets, but 20 percent of the motorists who exceed the posted speed limit do not receive speeding tickets. What percent of the motorists on that road exceed the posted speed limit?
(A) $10\frac{1}{2}\%$ (B) $12\frac{1}{2}\%$
(C) 15% (D) 22%
(E) 30%