Choose the correct answer. Write your answers on the answer sheet on the last page. Answers not on the answer sheet WILL NOT be graded.

1) In the figure above, $x - y =$

\[ (A) \ 45 \quad (B) \ 90 \quad (C) \ 135 \quad (D) \ 180 \]

2) In the figure above, $x =$

\[ (A) \ 30 \quad (B) \ 45 \quad (C) \ 60 \quad (D) \ 90 \]

3) In $ABC$ above, what is the length of side $AC$?

\[ (A) \ 4 \quad (B) \ 8 \quad (C) \ 12 \quad (D) \ 18 \]
4) In the figure above, O is the center of the circle. What is the ratio of the area of the shaded portion of the figure to the area of the unshaded portion of the figure?
   (A) 4:1 (B) π:1 (C) 3:1 (D) 5:2 (E) 2:1

5) In the figure above, what is the length of QS?
   (A) 25/3 (B) 20/3 (C) 15/4 (D) 12/5 (E) 7/5

6) In the figure above, O is the center of the circle. If PQ > OP, which of the following must be true?
   I. y = z   II. y < 60   III. x < y + z
   (A) I only   (B) II only   (C) I and II only   (D) I and III only   (E) I, II, and III
7) If $x$ and $y$ are consecutive integers, which of the following must be an even integer?

(A) $x$  (B) $y$  (C) $\frac{xy}{2}$  (D) $\frac{x}{y}$  (E) $xy$

8) If $\frac{x^2 - 4}{x + 2} = 5$, then $x =$?

(A) 3  (B) 5  (C) 6  (D) 7  (E) 9

9) What is two more than 3 times a certain number $x$?

(A) $3x - 2$  (B) $3x$  (C) $2x - 3$  (D) $2x + 3$  (E) $3x + 2$

10) If $\Delta x = x$ if $x$ is positive, or $2x$ if $x$ is negative, what is $\frac{\Delta 30}{\Delta (-5)}$?

(A) -12  (B) -6  (C) -3  (D) 6  (E) 30

11) If $(16) (3)^2 = x(2^3)$, then $x =$

(A) 81  (B) 72  (C) 18  (D) 16  (E) 8

12) $(165)^2 - (164)^2 =$

(A) 1  (B) 2  (C) 4  (D) 325  (E) 329

13) If $y$ is an odd integer, which of the following must be an even integer?

(A) $y + 2$  (B) $y + 6$  (C) $2y - 1$  (D) $3y$  (E) $3y + 1$

14) If $x$ is a positive number such that $x^2 + 5x - 14 = 0$, what is the value of $x$?

(A) -7  (B) -5  (C) 0  (D) 2  (E) 5
15) If \( x = \frac{5}{6} + \frac{15}{18} - \frac{10}{12} \), then \((x - 1)^3 = \)

(A) \-1/216 \quad (B)\-1/6 \quad (C) 1/6 \quad (D) 27/216 \quad (E) 125/216

16) The cost of a one-family home was $1,200,000 in 1980. In 1988, the price had increased to $1,800,000. What was the percent increase in the cost of the home?

(A) 60% \quad (B) 50% \quad (C) 55% \quad (D) 40% \quad (E) 33.3%

17) Mr. Huang deposits $100 in an account that pays 20% interest, compounded semiannually. How much money will there be in the account at the end of one year?

(A) $118.00 \quad (B) $120.00 \quad (C) $121.00 \quad (D) $122.00 \quad (E) $140.00

18) \[ \left[ 1 - \left(\frac{2}{3}\right)^2 \right]^2 = \]

(A) -1/3 \quad (B) 1/27 \quad (C) 125/729 \quad (D) 25/81 \quad (E) 5/9

19) If \( x \neq 1 \), then \[ \frac{3x^2 + 6x - 9}{3x - 3} = \]

(A) \( x + 1 \) \quad (B) \( x - 1 \) \quad (C) \( 3x + 1 \) \quad (D) \( x + 3 \) \quad (E) \( 3x + 3 \)

20) At a photocopy center, the first 10 copies cost \( x \) cents each. Each of the next 50 copies costs 5 cents less per copy. From the 61st copy on, the cost is 2 cents per copy. In terms of \( x \), how much does it cost in cents to have 200 copies made?

(A) 60x + 30 \quad (B) 50x - 10 \quad (C) 50(x - 5) \quad (D) 60x - 110 \quad (E) 10x + 490
21) If Jim can drive the distance $k$ miles in 50 minutes, how many minutes, in terms of $k$, will it take him to drive 10 miles at the same speed?

(A) $\frac{500}{k}$   (B) $k/50$   (C) $60k$   (D) $10k$   (E) $50/k$

22) $a = \left(\frac{1}{10}\right)^2$, $b = \frac{1}{5}$, $c = \sqrt{\frac{1}{100}}$

The values of $a$, $b$, and $c$ are shown above. Which of the following is correct?

(A) $a < b < c$   (B) $a < c < b$   (C) $b < c < a$   (D) $c < a < b$   (E) $c < b < a$

23) If $\frac{1}{y} = 3\frac{1}{2}$, then $\frac{1}{y + 2} =$

(A) $\frac{7}{16}$   (B) $\frac{4}{7}$   (C) $\frac{7}{9}$   (D) $\frac{7}{8}$   (E) $\frac{7}{15}$

24) Half the graduating class of a college was accepted by a business school. One third of the class was accepted by a law school. If one fifth of the class was accepted to both types of school, what fraction of the class was accepted only by a law school?

(A) $\frac{1}{6}$   (B) $\frac{2}{15}$   (C) $\frac{1}{3}$   (D) $\frac{1}{2}$   (E) $\frac{4}{5}$

25) The formula $E = \frac{\sqrt{a}}{\sqrt[6]{a}}$ describes the relationship between the length of the edge $E$ of a cube and the surface area $a$ of the cube. How much longer is the edge of a cube with a surface area of 1350 than the edge of one with a surface area of 600?

(A) 5   (B) 15   (C) 150   (D) 250   (E) 750

26) A company's profits have doubled for each of the 4 years it has been in existence. If the total profits for the last 4 years were $30 million, what were the profits in the first year of operation?

(A) $1$ million   (B) $2$ million   (C) $4$ million   (D) $4.5$ million   (E) $6$ million
27) Today Jim is twice as old as Fred, and Sam is 2 years younger than Fred. Four years ago Jim was 4 times as old as Sam. How old is Jim now?
(A) 8 (B) 12 (C) 16 (D) 20 (E) 24

28) There are 240 doctors and nurses at a hospital. If the ratio of doctors to nurses is 5 to 7, how many nurses are at the hospital?
(A) 20 (B) 60 (C) 100 (D) 140 (E) 180

29) If the temperature rises 25 percent from $d$ degrees to 60 degrees, then $60 - d =$
(A) 12 (B) 30 (C) 35 (D) 48 (E) 85

30) A computer is programmed to generate a list of multiples of prime numbers 2, 3 and 5, as shown below:

Program 1- List multiples of 2
Program 2- List multiples of 3
Program 3- List multiples of 5

How many integers between 1 and 100 will appear on all three of the lists of programs produced above?
(A) None (B) 1 (C) 3 (D) 5 (E) An infinite number of integers

31) A grocer is storing small cereal boxes in large cartons that measure 25 inches by 45 inches by 60 inches. If the measurement of each small cereal box is 7 inches by 6 inches by 5 inches, then what is the maximum number of small cereal boxes that can be placed in each large carton?
(A) 25 (B) 210 (C) 252 (D) 300 (E) 420

32) Sue is now 10 years younger than Jane. If in 5 years, Jane will be twice as old as Sue, how old will Sue be in 3 years?
(A) 6 (B) 8 (C) 11 (D) 14 (E) 18
33) The price for a pair of cuff links is $10. The price for a 5-pair package of cuff links is $34. The 5-pair package is what percent cheaper per pair than 5 pairs purchased separately?
(A) 63%  (B) 62%  (C) 47%  (D) 32%  (E) 20%

34) If x, y, and z are non-zero numbers such that \(1 \geq y > x\) and \(xy = z\), which of the following cannot be true?
(A) \(y > z\)  (B) \(y = z\)  (C) \(z = x\)  (D) \(x > z\)  (E) \(z > 0\)

35) A company bought a total of 60 computers and 20 printers to modernize billing operations. If the price of each computer was three times the price of each printer, what percent of the total cost of the purchase was the total cost of the printers?
(A) 10%  (B) 11%  (C) 15%  (D) 20%  (E) 25%

36) A machine costs m dollars per day to maintain and a cents for each unit it produces. If the machine is operated 7 days a week and produces r units in a week, which of the following is the total cost, in dollars, of operating the machine for week?
(A) \(7m + 100nr\)  (B) \(\frac{700m + nr}{100}\)  (C) \(m + nr\)  (D) \(\frac{7m + 100nr}{100}\)  (E) 700mnr

37) The owner of a boutique decides to calculate the percentage of customers who purchase hats. If 40 percent of the store’s customers decide to purchase items, and of those customers 15 percent purchase hats, what percent of the store’s customers purchase hats?
(A) 4%  (B) 6%  (C) 15%  (D) 24%  (E) 55%

38) Pam and Sue drove to a business meeting 120 miles away in the same car. Pam drove to the meeting and Sue drove back along the same route. If Pam drove at 60 miles per hour and Sue drove at 50 miles per hour, how much longer, in minutes, did it take Sue to travel the distance than it did Pam?
(A) 4  (B) 10  (C) 20  (D) 24  (E) 30
39) The result obtained when \( x \) is multiplied by \( y \) is equal to ten times the result obtained when \( y \) is subtracted from \( x \). If \( y \) equals 5, what does \( x \) equal?
(A) 50 (B) 25  (C) 15  (D) 10  (E) 5

40) After reading \( \frac{3}{5} \) of his biology homework on Monday night, Bernie read \( \frac{1}{3} \) of his remaining homework on Tuesday night. What fraction of his original homework would Bernie have to read on Wednesday night to complete his biology assignment?
(A) 1/15  (B) 2/15  (C) 4/15  (D) 2/5  (E) 4/5

41) If Sam can finish a job in 3 hours and Mark can finish a job in 12 hours, in how many hours could they finish the job if they worked on it together at their respective rates?
(A) 1  (B) 2  \( \frac{2}{5} \)  (C) \( \frac{2}{8} \)  (D) \( \frac{1}{4} \)  (E) \( \frac{1}{4} \)

42) Starting at 9 a.m. on a certain day, snow began to fall at a rate of \( \frac{1}{4} \) inches every two hours until 3 p.m. If there were already \( 2 \frac{1}{4} \) inches of snow on the ground at 9 a.m., how many inches of snow were on the ground at 3 p.m. that day?
(A) \( \frac{3}{4} \)  (B) 6  (C) 7  (D) \( \frac{1}{2} \)  (E) \( \frac{3}{4} \)

43) At a Wall Street company, 70 percent of this year's new employees are graduates of business schools and the remainder are graduates of liberal arts college. If 550 new employees were hired this year, what is the difference between the number of new business school employees and the number of new liberal arts employees?
(A) 55  (B) 220  (C) 240  (D) 385  (E) 440
Laura borrowed $240, interest free, from her parents to pay for her college education. If she pays back $\frac{1}{2}$ percent of this amount quarterly, and has already paid $42.00, for how many months has she been paying back her loan?

(A) 6 (B) 7 (C) 19 (D) 21 (E) 24

45) The function $\otimes$ is defined by the equation $a \otimes b = \frac{ab}{b-a}$, where $a \neq b$. Which of the following has a value of 3?

(A) $1 \otimes 3$ (B) $3 \otimes 0$ (C) $2 \otimes 6$ (D) $6 \otimes 2$ (E) $4 \otimes -1$

46) A store raised the price of an item by exactly 10 percent. Which of the following could NOT be the resulting price of the item?

(A) $5.50$ (B) $7.60$ (C) $11.00$ (D) $12.10$ (E) $75.90$

47) If when a certain integer is divided by 5 the remainder is 2, then each of the following could also be an integer EXCEPT

(A) $x/17$ (B) $x/11$ (C) $x/10$ (D) $x/6$ (E) $x/3$

48) In a certain flower shop, which stocks four types of flowers, there are $\frac{1}{3}$ as many violets as carnations, and $\frac{1}{2}$ as many tulips as violets. If there are equal numbers of roses and tulips, what percent of the flowers in the shop are carnations?

(A) 10% (B) 33% (C) 40% (D) 50% (E) 60%
49) A car averages 40 miles per hour for the first 6 hours of a trip and averages 60 miles per hour for each additional hour of travel time. If the average speed for the entire trip is 55 miles per hour, how many hours long is the trip?
(A) 8  (B) 12  (C) 16  (D) 18  (E) 24

50) How many integers between 100 and 150, inclusive, can be evenly divided by neither 3 nor 5?
(A) 33  (B) 28  (C) 27  (D) 26  (E) 24