Exercises on Basic Arithmetic

Multiple-Choice Questions

1. For how many positive integers, a, is it true that $a^2 \leq 2a$??

(A) None   (B) 1   (C) 2   (D) 4   (E) More than 4

2. If $0 < a < b < 1$, which of the following is (are) true?

   I. $a - b$ is negative .

   II. $\frac{1}{ab}$ is positive.

   III. $\frac{1}{b} - \frac{1}{a}$ is positive.

(A) I only   (B) II only   (C) III only   (D) I and II only   (E) I, II, and III

3. How many of the numbers in the following list are NOT even numbers?

$$-64, \frac{0}{64}, \frac{192}{64}, 6.4, \sqrt{64}, 64^2, \frac{64}{1.6}, 64\sqrt{2}, 0.64646464 \dots$$

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

4. If a and b are negative, and c is positive, which of the following is (are) true?

   I. $a - b < a - c$.

   II.   if $a < b$, then $\frac{a}{c} < \frac{b}{c}$

   III. $\frac{1}{b} < \frac{1}{c}$

(A) I only   (B) II only   (C) III only   (D) II and III only   (E) I, II and III

5. At 3:00 A.M. the temperature was 13° below zero. By noon it had risen to 32°. What was the average hourly increase in temperature?

(A) $(\frac{19}{9})^0$ (B) $(\frac{19}{6})^0$ (C) 5^0 (D) 7.5^0 (E) 45^0

6. If $(7^a)(7^b) = \frac{7^c}{7^d}$, what is d in terms of a, b, and c?

(A) $\frac{c}{ab}$ (B) $c - a - b$ (C) $a + b - c$ (D) $c - ab$ (E) $\frac{c}{a+b}$

7. A number is "nifty" if it is a multiple of 2 or 3. How many nifty numbers are there between -11 and 11?

(A) 6   (B) 7   (C) 11   (D) 15   (E) 17

8. If p and q are primes greater than 2, which of the following *must* be true?

I. $p + q$ is even.

II. pq is odd.

III. $p^2 - q^2$ is even.

(A) I only   (B) II only   (C) I and II only   (D) I and III only   (E) I, II and III

9. What is the value of $2^{\frac{3}{2}} - 2^{\frac{1}{2}}$?

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

Questions 10 and 11 refer to the following definition.

For any positive integer n, $\tau\,(h)$ represents the number of positive divisors of n.

10. Which of the following is (are) true?

I. $\tau(5) = \tau(7)$

II. $\tau(5) \cdot \tau(7) = \tau(35)$

III. $\tau(5) + \tau(7) = \tau(12)$

(A) I only   (B) II only   (C) I and II only   (D) I and III only (E) I, II and III

11. What is the value of $\tau(\tau(\tau(12)))$?

(A) 1   (B) 2   (C) 3   (D) 4   (E) 6

12. Which of the following is equal to $(7^8 \times 7^9)^{10}$?

(A) 7^{27} (B) 7^{82} (C) 7^{170} (D) 49^{170} (E) 49^{720}

13. If $x * y$ represents the number of integers greater than x and less than y, what is the value of $-\pi * \sqrt{2}$?

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

14. If $0 < x < 1$, which of the following lists the numbers in increasing order?

(A) $\sqrt{x}, x, x^2$ (B) $x^2, x, \sqrt{x}$ (C) $x^2, \sqrt{x}, x$ (D) $x, x^2, \sqrt{x}$ (E) $x, \sqrt{x}, x^2$

15. If $50^{100} = k(100^{50})$, what is the value of k?

(A) 2^{50} (B) 25^{50} (C) 50^{50} (D) $(\frac{1}{2})^{50}$ (E) $(\frac{1}{2})^{100}$

Grid-in Questions

16. If 25¢ buys 1.3 French francs, how many francs can be bought for $1.60?

17. At Ben's Butcher Shop 99 pounds of chopped meat is being divided into packages each weighing 2.5 pounds. How many pounds of meat are left when there isn't enough to make another whole package?

18. Maria has two electronic beepers. One of them beeps every 4 seconds; the other beeps every 9 seconds. If they are turned on at exactly the same time, how many times during the next hour will both beepers beep at the same time?

19. If $-7 \leq x \leq 7$ and $0 \leq y \leq 12$, what is the greatest possible value of $y - x$?

20. If x is an integer less than 1000 that has a remainder of 1 when it is divided by 2,3,4,5,6, or 7, what is one possible value of x?

21. What is the value of $2^4 \div 2^{-4}$?

22. What is the value of $|(-2 - 3) - (2 - 3)|$?

23. For any integer, a, greater than 1, let $\uparrow a \downarrow$ be the greatest prime factor of a. What is $\uparrow 132 \downarrow$?

24. If the product of four consecutive integers is equal to one of the integers, what is the largest possible value of one of the integers?

25. If x and y are positive integers, and $(13^x)^y = 13^{13}$, what is the average (arithmetic mean) of x and y?

Exercises on Fractions and Decimals

Multiple-Choice Questions

1. A French class has 12 boys and 18 girls. Boys are what fraction of the class?

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

2. For how many integers, a, between 30 and 40 is it true that $\frac{5}{a}, \frac{8}{a}$, and $\frac{13}{a}$ are all in lowest terms?

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

3. What is the value of the product

    $\frac{5}{5} \times \frac{5}{10} \times \frac{5}{15} \times \frac{5}{20} \times \frac{5}{25}$?

    (A) $\frac{1}{120}$ (B) $\frac{1}{60}$ (C) $\frac{1}{30}$ (D) $\frac{5}{30}$ (E) $\frac{1}{2}$

4. Billy won some goldfish at the state fair. During the first week, $\frac{1}{5}$ of them died; and during the second week, $\frac{3}{8}$ of those still alive at the end of the first week died. What fraction of the original goldfish were still alive after 2 weeks?

    (A) $\frac{3}{10}$ (B) $\frac{17}{40}$ (C) $\frac{1}{2}$ (D) $\frac{23}{40}$ (E) $\frac{7}{10}$

5. $\frac{1}{4}$ is the average (arithmetic mean) of $\frac{1}{5}$ and what number?

    (A) $\frac{1}{20}$ (B) $\frac{3}{10}$ (C) $\frac{1}{3}$ (D) $\frac{9}{20}$ (E) $\frac{9}{40}$

6. If $\frac{3}{11}$ of a number is 22, what is $\frac{6}{11}$ of that number?

(A) 6   (B) 11   (C) 12   (D) 33   (E) 44

7. What fractional part of a week is 98 hours?

(A) $\frac{7}{24}$ (B) $\frac{24}{98}$ (C) $\frac{1}{2}$ (D) $\frac{4}{7}$ (E) $\frac{7}{12}$

8. $\frac{5}{8}$ of 24 is equal to $\frac{15}{7}$ of what number?

(A) 7   (B) 8   (C) 15   (D) $\frac{7}{225}$ (E) $\frac{225}{7}$

9. Which of the following is less than $\frac{5}{9}$?

(A) $\frac{5}{8}$ (B) $\frac{21}{36}$ (C) $\frac{25}{45}$ (D) $\frac{55}{100}$ (E) .565

10. Which of the following is (are) greater than x when $x = \frac{9}{11}$?

    I. $\frac{1}{x}$

    II. $\frac{x+1}{x}$

    III. $\frac{x+1}{x-1}$

(A) I only   (B) I and II only   (C) II and III only (D) II and III only   (E) I, II and III

11. Which of the following statements is true?

(A) $\frac{3}{8} < \frac{4}{11} < \frac{5}{13}$ (B) $\frac{4}{11} < \frac{3}{8} < \frac{5}{13}$ (C) $\frac{5}{13} < \frac{4}{11} < \frac{3}{8}$ (D) $\frac{4}{11} < \frac{5}{13} < \frac{3}{8}$

     (E) $\frac{3}{8} < \frac{5}{13} < \frac{4}{11}$

12. If $a = 0.99$, which of the following is (are) less than a?

I. $\sqrt{a}$

II. a^2

III. $\frac{1}{a}$

(A) None   (B) I only   (C) II only   (D) III only   (E) II and III only

13. Let a, b, c, and d be the result of rounding off 7382.196 to the nearest thousand, hundred, ten, and one, respectively. Which of the following statements is true?

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

14. For what value of x does
$\frac{(34.56)(7.89)}{x} = (0.3456)(78.9)$?

(A) 0.001   (B) 0.01   (C) 0.1   (D) 10   (E) 100

15. For the final step in a calculation, Paul accidentally divided by 1000 instead of multiplying by 1000. What should he do to his answer to correct it?

(A) Multiply it by 1000.

(B) Multiply it by 100,000.

(C) Multiply it by 1,000,000.

(D) Square it.

(E) Double it.

Grid-in Questions

16. One day at Central High School, $\frac{1}{12}$ of the students were absent, and $\frac{1}{5}$ of those present went on a field trip. If the number of students staying in school was 704, how many students are enrolled at Central High?

17. What is a possible value of x if $\frac{3}{5} < \frac{1}{x} < \frac{7}{9}$?

18. What is the value of

$$\frac{\frac{7}{9} \times \frac{7}{9}}{\frac{7}{9} + \frac{7}{9} + \frac{7}{9}}?$$

19. If $7a=3$ and $3b=7$, what is the value of $\frac{a}{b}$?

20. If $A = \{1,2,3\}$, $B = \{2,3,4\}$, C is the set consisting of all the fractions whose numerators are in A and whose denominators are in B, what is the product of all of the numbers in C?

Exercises on Percents

Multiple-Choice Questions

1. Charlie bought a $60 radio on sale at 5% off. How much did he pay, including 5% sales tax?

    (A) $54.15   (B) $57.00   (C) $57.75   (D) $59.85   (E) $60.00

2. If a is a positive number, 400% of a is what percent of $400a$?

    (A) 0.01   (B) 0.1   (C) 1   (D) 10   (E) 100

3. What percent of 50 is b ?

    (A) $\frac{b}{50}$ (B) $\frac{b}{2}$ (C) $\frac{50}{b}$ (D) $\frac{2}{b}$ (E) 2b

4. At Harry's Discount Hardware everything is sold for 20% less than the price marked. If Harry buys tool kits for $80, what price should be mark them if he wants to make a 20% profit on his cost?

    (A) $96   (B) $100   (C) $112   (D) $120   (E) $125

5. 9 is $\frac{1}{3}$ % of what number?

    (A) 0.03   (B) 0.27   (C) 3   (D) 300   (E) 2700

6. Mr. Howard was planning on depositing a certain amount of money each month into a college fund for his children. He then decided not to make any contributions during June and July. To make the same annual contribution that he had originally planned, by what percent should he increase his monthly deposits?

(A) $16\frac{2}{3}$%   (B) 20%   (C) 25%   (D) $33\frac{1}{3}$%   (E) It cannot be
determined from the information given.

7. During his second week on the job, Jason earned $110. This represented a 25%
    increase over his earnings of the previous week. How much did he earn during his
    first week of work?

(A) $82.50   (B) $85.00   (C) $88.00   (D) $137.50   (E) $146.67

8. What is 10% of 20% of 30%?

(A) 0.006%   (B) 0.6%   (C) 6%   (D) 60%   (E) 6000%

9. If 1 micron = 10,000 angstroms, then 100 angstroms is what percent of 10 microns?

(A) 0.0001%   (B) 0.001%   (C) 0.01%   (D) 0.1%   (E) 1%

10. On a test consisting of 80 questions, Marie answered 75% of the first 60 questions
    correctly. What percent of the other 20 questions did she need to answer correctly
    for her grade on the entire exam to be 80%?

(A) 85%   (B) 87.5%   (C) 90%   (D) 95%   (E) 100%

Grid-in Questions

11. A jar contains 2000 marbles. If 61.5% of them are red, 27.2% of them are white, and
    10% of them are blue, how many are neither red, white, nor blue?

12. If 25 students took an exam and 4 of them failed, what percent of them passed?

13. There are twice as many girls as boys in an English class. If 30% of the girls and 45% of the boys have already handed in their book reports, what percent of the students have not yet handed in their reports?

14. During a sale a clerk was putting a new price tag on each item. On one radio, he accidentally raised the price by 15% instead of lowering the price by 15%. As a result the price on the tag was $45 too high. What was the original price, in dollars, of the radio?

15. If a person has an income of $100,000, what percent of his income does he pay in federal income tax if the tax rate is as given below?

    15% of the first $30,000 of income,

    28% of the next $30,000 of income, and

    31% of all income in excess of $60,000.

16. The price of a can of soup was increased by 20%. How many cans can be purchased for the amount of money that used to buy 300 cans?

17. Jar B has 20% more marbles than jar A. What percent of the marbles in jar B have to be moved to jar A, in order that the number of marbles in each jar will be the same?

18. An art dealer bought a painting for $1000 and later sold it for $10,000. By what percent did the value of the painting increase?

19. Wendy drew a square. She then erased it and drew a second square whose sides were 3 times the sides of the first square. By what percent was the area of the square increased?

20. In a large jar full of jelly beans, 30% of them are red, and 40% of the red jelly beans are cherry. If 25% of the non-cherry-flavored red jelly beans are raspberry, what percent of all the jelly beans are either cherry or raspberry?

Exercises on Ratios and Proportions

Multiple-Choice Questions

1. If $\frac{2}{3}$ of the workers in an office are nonsmokers, what is the ratio of smokers to nonsmokers?

   (A) 2:5   (B) 1:2   (C) 3:5   (D) 2:3   (E) 3:2

2. If the ratio of Republicans to Democrats on a committee is 3:5, what percent of the committee members are Democrats?

   (A) 37.5%   (B) 40%   (C) 60%   (D) 62.5%   (E) It cannot be determined from the information given.

3. If 80% of the applicants to a program were rejected, what is the ratio of the number accepted to the number rejected?

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

4. The measures of the three angles in a triangle are in the ratio 1:1:2. Which of the following *must* be true?

   I.   The triangle is isosceles.
   II. The triangle is a right triangle.
   III. The triangle is equilateral.

   (A) None   (B) I only   (C) II only   (D) I only and II only   (E) I only and III only

5. A jar contains 50 marbles, each of which is blue or red. If 35 of the marbles are red, which of the following does NOT represent the ratio of the number of red marbles to the number of blue marbles?

   (A) 35:15   (B) $\frac{35}{15}$ (C) $\frac{7}{3}$ (D) 7:3   (E) $\frac{35}{50}$

6. What is the ratio of the circumference of a circle to its radius?

(A) 1   (B) $\frac{\pi}{2}$ (C) $\sqrt{\pi}$ (D) π (E) 2π

7. At Bayview High the ratio of the number of students taking Spanish to the number taking French is 7:2. If 140 students are taking French, how many are taking Spanish?

(A) 40   (B) 140   (C) 360   (D) 490   (E) 630

8. If a:b =3:5 and a:c=5:7, what is the value of b:c?

(A) 3:7   (B) 21:35   (C) 21:25   (D) 25:21   (E) 7:3

9. If x is a positive number and $\frac{x}{3} = \frac{12}{x}$, then x=

(A) 3   (B) 4   (C) 6   (D) 12   (E) 36

10. A snail can move i inches in m minutes. At this rate, how many feet can it move in h hours?

(A) $\frac{5hi}{m}$ (B) $\frac{60hi}{m}$ (C) $\frac{hi}{12m}$ (D) $\frac{5m}{hi}$ (E) $5him$

11. Barbra can grade t tests in $\frac{1}{x}$ hours. At this rate, how many tests can she grade in x hours?

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

12. If you can buy b bananas for n nickels, how many bananas can you buy for d dimes and q quarters?

(A) $\frac{b}{n}(2d + 5q)$ (B) $\frac{b(d+q)}{n}$ (C) $\frac{b}{n}(10d + 25q)$ (D) $\frac{10d+25q}{bn}$ (E) $\frac{d+q}{bn}$

13. A club had 3 boys and 5 girls. During a membership drive the same number of boys and girls joined the club. How many members does the club have now if the ratio of boys to girls is 3:4?

(A) 12   (B) 14   (C) 16   (D) 21   (E) 28

14. If 500 pounds of mush will feed 20 pigs for a week, for how many days will 200 pounds of mush feed 14 pigs?

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

Grid-in Questions

15. If $\frac{a}{9} = \frac{10}{2a}$, what is the value of a^2?

16. Michael drove 135 miles in 2 hours and 30 minutes. At this rate, how many hours will he take to drive 1098 miles?

17. John can read 72 pages per hour. At this rate, how many pages can he read in 72 minutes?

18. If $3a=2b$ and $3b=5c$, what is the ratio of a to c?

19. If $\frac{3x-1}{25} = \frac{x+5}{11}$, what is the value of x?

20. The ratio of the number of freshmen to sophomores to juniors to seniors on a college football team is 4:7:6:8. What percent of the team are sophomores?

21. Three associates agreed to split the profit of an investment in the ratio of 2:5:8. If the profit was $3000, what is the difference between the largest share and the smallest?

22. A recipe for stew that feeds 4 people calls for $1\frac{1}{2}$ teaspoons of salt. If 3 teaspoons = 1 tablespoon, how many tablespoons of salt will be needed to make enough stew for 18 people?

23. If y is inversely proportional to x, and $y=8$ when $x=4$, what is the value of y when $x=5$?

24. If 4 boys can shovel a driveway in 2 hours, how many minutes will 5 boys take to do the job?

Exercises on Averages

Multiple-Choice Questions

1. Justin's average (arithmetic mean) on four tests is 80. What grade does he need on his fifth test to raise his average to 84?

   (A) 82   (B) 84   (C) 92   (D) 96   (E) 100

2. Judy's average (arithmetic mean) on four tests is 80. Assuming she can earn no more than 100 on any test, what is the least she can earn on her fifth test and still have a chance for an 85 average after seven tests?

   (A) 60   (B) 70   (C) 75   (D) 80   (E) 85

3. Adam's average (arithmetic mean) on four tests is 80. Which of the following CANNOT be the number of tests on which he earned exactly 80 points?

   (A) 0   (B) 1   (C) 2   (D) 3   (E) 4

4. If $x+y=6$, $y+z=7$, and $z+x=9$, what is the average (arithmetic mean) of x, y, z?

   (A) $\frac{11}{3}$ (B) $\frac{11}{2}$ (C) $\frac{22}{3}$ (D) 11   (E) 22

5. If $a+b=3(c+d)$, which of the following is the average (arithmetic mean) of a, b, c, and d?

   (A) $\frac{c+d}{4}$ (B) $\frac{3(c+d)}{8}$ (C) $\frac{c+d}{2}$ (D) $\frac{3(c+d)}{4}$ (E) $c+d$

6. If the average (arithmetic mean) of 5,6,7, *and w* is 8, what is the value of *w*?

   (A) 8   (B) 12   (C) 14   (D) 16   (E) 24

7. What is the average (arithmetic mean) of 2^{10} and 2^{20}?

(A) 2^{15} (B) 2^5+2^{10} (C) 2^9+2^{19} (D) 2^{29} (E) 30

8. Let M be the median, and m the mode, of the following set of numbers: 10, 70, 20,40.70.90. What is the average (arithmetic mean) of M and m?

(A) 50   (B) 55   (C) 60   (D) 62.5   (E) 65

9. Which of the following is the average (arithmetic mean) of x^2-10, 30-x^2, and 6x+10?

(A) 2x+10   (B) 2x+30   (C) 3x+15   (D) 2x^2+6x+30   (E) 6x+10

Grid-in Questions

10. What is the average (arithmetic mean) of the positive integers from 1 to 100, inclusive?

11. The average (arithmetic mean) weight of the students in the French Club is 150 pounds, and the average weight of the students in the Spanish Club is 130 pounds. If no one is a member of both clubs, if the average weight of all the students is 142 pounds, and if there are 30 members in the French club, how many members are there in the Spanish Club?

12. If 10a+10b=35, what is the average (arithmetic mean)of a and b?

13. What is the average (arithmetic mean) of the measures of the five angles in a pentagon?

14. Let (x) = the largest integer that is less than or equal to x. For example, (3.75) = 3 and (7) = 7. What is the average (arithmetic mean) of (2π) and (-π)?

Exercises on Polynomials

Multiple-Choice Questions

1. If $a^2-b^2=21$ and $a^2+b^2=29$, which of the following could be the value of ab?

    I.   -10

    II. $5\sqrt{2}$

    III.   10

    (A) I only   (B) II only   (C) III only   (D) I and III only   (E) II and III only

2. What is the average (arithmetic mean) of x^2+2x-3, $3x^2-2x-3$, and $30-4x^2$?

    (A) $\frac{(8x^2+4x+24)}{3}$ (B) $\frac{(8x^2+24)}{3}$ (C) $\frac{(24-4x)}{3}$ (D) -12   (E) 8

3. If $(a+b)^2=21$ and $a^2+b^2=4$, what is the value of ab?

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

4. If $\frac{1}{a}+\frac{1}{b}=\frac{1}{c}$, and $ab=c$, what is the average (arithmetic mean) of a and b?

    (A) 0   (B) $\frac{1}{2}$ (C) 1   (D) $\frac{c}{2}$ (E) $\frac{a+b}{2c}$

5. If $x \neq 2$ and $x \neq -2$, which of the following is equivalent to $\frac{(x^3+3x^2-10x)}{2x^2-8}$?

    (A) $\frac{x(x-5)}{2(x-2)}$ (B) $\frac{x(x+5)}{2(x+2)}$ (C) $\frac{x(x-5)}{2(x+2)}$ (D) $\frac{x(x+5)}{2(x-2)}$ (E) $\frac{x^2+5}{2x+4}$

Grid-in Questions

6. What is the value of $\frac{a^2-b^2}{a-b}$ when $a = 17.9$ and $b = 19.7$?

7. If x^2-y^2=28 and x-y=8, what is the average (arithmetic mean) of x and y?

8. What is the value of $(2x + 3)(x + 6) - (2x - 5)(x + 10)$?

9. What is the value of $x^2 + 12x + 36$ when $x = 64$?

10. If $\left(a + \frac{1}{a}\right)^2 = 100$, what is the value of $a^2 + \frac{1}{a^2}$?

Exercises on Equations

Multiple-Choice Questions

1. If $4x + 12 = 36$, what is the value of $x + 3$?

    (A) 3   (B) 6   (C) 9   (D) 12   (E) 18

2. If $4x + 13 = 7 - 2x$, what is the value of x?

    (A) $-\frac{10}{3}$ (B) -3   (C) -1   (D) 1   (E) $\frac{10}{3}$

3. If $ax - b = c - dx$, what is the value of x in terms of a, b, c, and d?

    (A) $\frac{b+c}{a+d}$ (B) $\frac{c-b}{a-d}$ (C) $\frac{b+c-d}{a}$ (D) $\frac{c-b}{a+d}$ (E) $\frac{c}{b} - \frac{d}{a}$

4. If $\frac{1}{3}x + \frac{1}{6}x + \frac{1}{9}x = 33$, what is the value of x?

    (A) 3   (B) 18   (C) 27   (D) 54   (E) 72

5. If $17 - 2\sqrt{x} = 14$, what is the value of x?

    (A) $\frac{9}{4}$ (B) $\frac{29}{4}$ (C) 36   (D) 196   (E) There is no value of x that
    satisfies the equation.

6. If $32^{a+b} = 16^{a+2b}$, then $a =$

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

7. If the average (arithmetic mean) of $3a$ and $4b$ is less than 50, and a is twice b, what is
    the largest integer value of a?

(A) 9   (B) 10   (C) 11   (D) 19   (E) 20

8. If $\frac{1}{a-b} = 5$, then a =?

(A) $b + 5$ (B) $b - 5$ (C) $b + \frac{1}{5}$ (D) $b - \frac{1}{5}$ (E) $\frac{1-5b}{5}$

9. If $x = 3a + 7$, and $y = 9a^2$, what is y in terms of x?

(A) $(x - 7)^2$ (B) $3(x - 7)^2$ (C) $\frac{(x-7)^2}{3}$ (D) $\frac{(x+7)^2}{3}$ (E) $(x + 7)^2$

10. Which of the following is a solution of $3|x + 1| - 5 = -2$?

(A) -2   (B) 1   (C) $\frac{4}{3}$ (D) 2   (E) The equation has no solution.

Grid-in Questions

11. If $x - 4 = 9$, what is the value of $x^2 - 4$?

12. If $\frac{a+5b}{2b} = a - 2b$, what is the value of a when $b = -1$?

13. If $7x + 10 = 44$, what is the value of $7x - 10$?

14. If $a^2 + b^2 = 0$, what is the value of $a^2 - b^2$?

15. If $3x - 4 = 9$, what is the value of $(3x - 4)^2$?

16. If $x^{-3} = \frac{1}{4x}$, what is one possible value of x?

17. If $64^{12} = 2^{a-3}$, what is the value of a?

18. $4y - 3x = 5$, what is the smallest integer value of x for which $y > 100$?

19. If $5^{3x-5} = 25^{x+1}$, what is the value of x?

20. If $x^2 + 3 < 4$ and $2x^2 + 3 > 4$, what is one possible value of x?

Exercises on on Word Problems

Multiple-Choice Questions

1. In the afternoon, Judy read 100 pages at the rate of 60 pages per hour, in the evening, when she was tired, she read another 100 pages at the rate of 40 pages per hour. In pages per hour, what was her average rate of reading for the day?

   (A) 45   (B) 48   (C) 50   (D) 52   (E) 55

2. If the sum of five consecutive integers is S, what is the largest of those integers in terms of S?

   (A) $\frac{S-10}{5}$ (B) $\frac{S+4}{4}$ (C) $\frac{S+5}{4}$ (D) $\frac{S-5}{2}$ (E) $\frac{S+10}{5}$

3. A jar contains only red, white, and blue marbles. The number of red marbles is $\frac{4}{5}$ the number of white ones, and the number of white ones is $\frac{3}{4}$ the number of blue ones. If there are 470 marbles in all, how many of them are blue?

   (A) 120   (B) 135   (C) 150   (D) 184   (E) 200

4. As a fund-raiser, the Key Club was selling two types of candy: lollipops at 40 cents each and chocolate bars at 75 cents each. On Monday, the members sold 150 candies and raised 74 dollars. How many lollipops did they sell?

   (A) 75   (B) 90   (C) 96   (D) 110   (E) 120

5. On a certain project the only grades awarded were 75 an 100. If 85 students completed the project and the average of their grades was 85, how many earned 100?

   (A) 34   (B) 40   (C) 45   (D) 51   (E) 60

6. Aaron has 3 times as much money as Josh. If Aaron gives Josh $50, Josh will then have 3 times as much money as Aaron. How much money do the two of them have together?

(A) $75   (B) $100   (C) $125   (D) $150   (E) $200

7. If $\frac{1}{2}x$ years ago Jason was 12, and $\frac{1}{2}x$ years from now he will be $2x$ years old, how old will he be $3x$ years from now?

(A) 18   (B) 24   (C) 30   (D) 54   (E) His age cannot be determined from the information given.

8. Two printing presses working together can complete a job in 2.5 hours. Working alone, press A can do the job in 10 hours. How many hours will press B take to do the job by itself?

(A) $3\frac{1}{3}$ (B) 4   (C) 5   (D) $6\frac{1}{4}$ (E) $7\frac{1}{2}$

9. Henry drove 100 miles to visit a friend. If he had driven 8 miles per hour faster than he did, he would have arrived in $\frac{5}{6}$ of the time he actually took. How many minutes did the trip take?

(A) 100   (B) 120   (C) 125   (D) 144   (E) 150

10. Since 1950, when Martin graduated from high school, he has gained 2 pounds every year. In 1980 he was 40% heavier than in 1950. What percent of his 1995 weight was his 1980 weight?

(A) 80   (B) 85   (C) 87.5   (D) 90   (E) 95

Grid-in Questions

11. What is the greater of two numbers whose product is 900, if the sum of the two numbers exceeds their difference by 30?

12. The number of shells in Fred's collection is 80% of the number in Phil's collection. If Phil has 80 more shells than Fred, how many do they have altogether?

13. Karen played a game several times. She received $5 every time she won and had to pay $2 every time she lost. If the ratio of the number of times she won to the number of times she lost was 3:2, and if she won a total of $66, how many times did she play this game?

14. Each of the 10 players on the basketball team shot 100 free throws, and the average number of baskets made was 75. When the highest and lowest scores were eliminated, the average number of baskets for the remaining 8 players was 79. What is the smallest number of baskets anyone could have made?

15. In an office there was a small cash box. One day Ann took half of the money plus $1 more. Then Dan took half of the remaining money plus $1 more. Stan then took the remaining $11. How many dollars were originally in the box?