(SAT Prep
Packet #3)

1) Corrine drives D miles to her office at an average speed of 50mph. Returning home, she travels by the same route and averages 60mph. If her trip home is 10 minutes shorter than her trip to her office, what is the value of D?

2) Which expression is equivalent to $3(3^4 \times 5^3)$?

A) $3(3^4) \times 3(5^3)$

B) $9^4 * 15^3$

C) $9^4 \times 15^3$

D) $3^5 \times 5^3$

3) If $(2x+2)(x+a) = 2x^2 + bx + c$ for all values of x, which of the following must be equal to $b+c$?

a) $a+2$ c) $3a+2$

b) $2a+2$ d) $4a+2$

4) Three years ago, Nora was half as old as Mary is now. If Mary is 4 years older than Nora, how old is Mary now?

5) If $\dfrac{x^2-2x+1}{2-2x} = -3$, what is the value of $x-1$?

6) If the cost of living in a city increased by 20% in the 10 years from 1980 - 1990 and increased by 50% in the 20 years from 1980 - 2000, what was the percent increase in the cost of living from 1990 - 2000?

a) 15%   c) 25%

b) 20%   d) 30%

7)

x	2	3	4
f(x)	a	8	b

The table above shows several ordered pairs corresponding to the linear function f. What is the value of a + b?

a) 12   c) 20

b) 16   d) It cannot be determined from the information given

8) Jenny originally had twice as many friendship bracelets as Emilie. After Jenny gave Emilie 5 of her bracelets, Jenny still had 10 more than Emilie. How many friendship bracelets did Jenny have originally?

9) In the xy-plane, the line l is perpendicular to the line described by the equation

$$\frac{1}{x} + \frac{1}{2y} = \frac{1}{y}$$. What is the slope of line l?

a) -2   c) ½

b) -½   d) 2

10) If y varies inversely as the square of x, then when x is multiplied by 4, y will be

a) divided by 16   c) multiplied by 2

b) divided by 2   d) multiplied by 16

11) Let $f(x,y) = A x^2 y^3$ where A is a constant. If $f(a,b) = 10$ what is the value of $f(2a, 2b)$?

a) 100   c) 320

b) 260   d) 500

12) A set of four integers has a mode of 7 and a median of 4. What is the greatest possible average (arithmetic mean) of this set?

a) 3.50

b) 3.75

c) 4.00

d) 4.25

13) Maria completed an 80-mile bike race at an average speed of z miles per hour. If she had averaged 2 miles per hour faster, she would have completed the race in 10 fewer minutes. What is the value of z?

14) A water pump for a dredging project can remove 180 gallons of water per minute, but it can only work for 2.5 consecutive hours, at which time it requires 20 minutes of maintenance before it can be brought back online. While it is offline, a smaller pump is used in its place, which can pump 80 gallons per minute. Using this system, which is the least amount of time it would take to pump 35,800 gallons of water?

a) 3 hours 15 minutes   c) 3 hours 25 minutes
b) 3 hours 20 minutes   d) 3 hours 30 minutes

15) Bronze is an alloy consisting of copper and tin. If 50 kg of a bronze alloy of 20% tin and 80% copper is mixed with 70 kg of a bronze alloy of 5% tin and 95% copper, what fraction, by weight, of the combined bronze alloy is tin?

a) 5/48   c) 1/8
b) 9/80   d) 1/4

16) Two cars leave the same point simultaneously, going in the same direction along a straight, flat road, one at 35 miles per hour and the other at 50 miles per hour. After how many minutes will the cars be 5 miles apart?

17) If a $6000 contribution is divided among charities A, B, and C in a ratio of 8:5:2, respectively, how much more, in dollars, does charity A receive than charity C?

18) Janice can edit 700 words per minute and Edward can edit 500 words per minute. If each page of text contains 800 words, how many pages can they edit, working together, in 20 minutes?
   a) 10 pages
   b) 25 pages
   c) 30 pages
   d) 35 pages

19) If a cyclist races at 30 miles per hour for ½ of the distance of a race, and 45 miles per hour for the final ½ of the distance, what is her average speed, in miles per hour, for the entire race?

(20) In three separate 1-mile races, Ellen finished with times of X minutes, y minutes, and z minutes, respectively. What was her average speed, in miles per hour, for all three races?

a) $\dfrac{x+y+z}{3}$ b) $\dfrac{3}{x+y+z}$ c) $\dfrac{x+y+z}{180}$ d) $\dfrac{180}{x+y+z}$

21) On the day it was issued, one share of a stock in Consolidated Energy was priced at $150. If the share price increased by 120% in its first 5 years and by 150% in its next five years, what was the share price, in dollars, after 10 years?

22) The final cost of a phone charger is $10.07. If this cost includes a 6% sales tax, what is the cost, in dollars, of the phone charger before the tax?

23) How many liters of a 40% saline solution must be added to 4 liters of a 10% saline solution to make a 20% saline solution?

A) 1.0   c) 2.0
B) 1.6   d) 3.2

24) If x is $\dfrac{2}{3}$% of 90, what is the value of $\dfrac{2}{3} - x$?

25) Three numbers, a, b, and c are all positive. If b is 30% greater than a, and c is 40% greater than b, what is the value of $\frac{c}{a}$?

26) The minimum value of the function $y = h(x)$ corresponds to the point $(-3, 2)$ on the xy-plane. What is the maximum value of $g(x) = 6 - h(x+2)$?

27) A rectangular playing field is twice as long as it is wide. If the length of the field were to be increased by 10% and the width were increased by 10 meters, the total area of the playing field would increase by 1,395 square meters. Which of the following quadratics could be solved to find the width of the playing field?

a) $2x^2 + 220x - 13,950 = 0$
b) $2x^2 + 22x + 13,950 = 0$
c) $2x^2 + 220x + 13,950 = 0$
D) $2x^2 + 22x - 13,950 = 0$

28) If $f(x) = x^2 + mx - 12$, where m is a constant, and $f(-3) = 0$, which of the following is the correct factorization of f?

A) $f(x) = (x+3)(x-4)$
B) $f(x) = (x-3)(x+4)$
c) $f(x) = (x+3)(x+4)$
d) $f(x) = (x-3)(x-4)$

29) What is the sum of the solutions of the equation

$$x^2 + x + 7 = 4x$$

30) $$y = -3(x+4)(x-2)$$

The graph of the equation above in the xy-plane is a parabola. What are the coordinates of the vertex of this parabola?

A) $(-1, 27)$

c) $(-1, -27)$

b) $(1, 15)$

d) $(1, -15)$

31) If the function $y = 3x^2 - kx - 12$ has a zero at $x = 3$, what is the value of k?

32) When the function $y = h(x) = ax^2 + bx + c$ is graphed in the xy-plane, the result is a parabola with vertex at $(4, 7)$. If $h(2) = 0$ which of the following must also equal 0?

A) $h(5)$

c) $h(8)$

b) $h(6)$

d) $h(9)$

33) Which of the following has no real solutions?

a) $x^2 - 3x + 2 = 0$

b) $x^2 - 3x - 2 = 0$

c) $x^2 + 2x - 3 = 0$

d) $x^2 + 2x + 3 = 0$

34) $(2x^2 + kx + 9)(x-3) = 2x^3 - 9x - 27$

In the equation above, k is a constant. If this equation is true for all values of x, what is the value of k?

a) 2   c) 6

b) 4   d) 8

35) $3x^2 - 3xy + 9x - 9y = 0$

If $x \neq y$ in the equation above, what is the value of x?

a) -3   c) 3

b) 1   d) 9

36) For how many distinct values of x does $(x^2-4)(x-4)^2(x^2+4)$ equal 0?

A) Three   c) Five

B) Four   d) Six

37) If $a - 3b = 6$ which of the following is equivalent to $\dfrac{3^a}{27^b}$?

a) 3^6

b) $\left(\dfrac{1}{9}\right)^3$

c) $(3^{-2})^2$

d) 3^{-6}

(38) No calculator

which of the following is equal to $8^{-\frac{5}{3}}$?

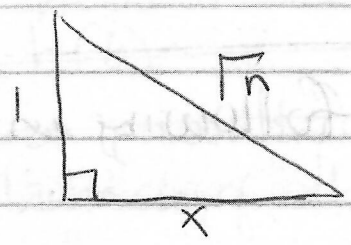A) -2^5 B) $-\frac{1}{2^3}$ c) $\frac{1}{10}$ d) $\frac{1}{2^5}$

(39) Which of the following expressions is equivalent to $\frac{(3)(3^{2n})}{9^n}$ for all values of n?

A) $\left(\frac{2}{3}\right)^n$ c) 3^n

B) 3 d) 9^{2n}

(40) If $\left(\frac{1}{\sqrt{x}}\right)^{-n} = y^{\frac{n}{5}}$ and $n \neq 0$ which of th following expresses x in terms of y?

A) $\sqrt{y^5}$ B) $\sqrt[3]{y^2}$ c) $\frac{1}{\sqrt{y^5}}$ D) $\frac{1}{\sqrt[5]{y^2}}$

(41)

In the figure, if $n > 1$ which of the following expresses x in terms of n?

a) $\sqrt{n^2-1}$

b) $\sqrt{n-1}$

c) $\sqrt{n+1}$

D) $\frac{\sqrt{n-1}}{2}$

Packet #3 Answer Key

1.) 50
2.) D
3.) D
4.) 14
5.) 6
6.) C
7.) 16
8.) 40
9.) A
10.) A
11.) C
12.) B
13.) 30
14.) D
15.) B
16.) 20
17.) 2400
18.) C
19.) 36
20.) D
21.) 275
22.) 9.50
23.) C
24.) 1/15
25.) 1.82
26.) 4
27.) A
28.) A

29.) 3

$Ax^2 + Bx + C = 0$

sum of solutions $= \dfrac{-b}{a}$ ⎫
⎬ (A)
product of solutions $= \dfrac{c}{a}$ ⎭

30.) A

vertex of parabola $\left(\dfrac{-b}{2a}, \ C - \dfrac{b^2}{4a} \right)$

31.) 5
32.) B
33.) D
34.) C
35.) A
36.) A
37.) A
38.) D
39.) B
40.) B
41.) B