

MATH

ACT PRACTICE TEST

17B

**MATHEMATICS TEST**

60 Minutes—60 Questions

DIRECTIONS: Once you have solved each problem, select your answer from the choices and fill in the matching bubble on your answer sheet.

Your time is limited, so do not remain too long on any single question. Answer as many questions as you can, marking the more difficult ones to return to if you have extra time at the end of the test. You are not penalized for guessing.

You may use your calculator during the entire math portion of the test.

Note: Unless told otherwise, assume the following:

1. The word *line* refers to a straight line.
2. The word *average* refers to an arithmetic mean.
3. Geometric figures lie in a plane.
4. Figures illustrated in questions are NOT necessarily drawn to scale.

1. Conor has \$200 available to buy software packages to run updates on his employee computers. Each software package has a price of \$12, and Conor will pay a sales tax of 8% of the total price of the software. What is the maximum number of software packages Conor can buy?

- A. 15
- B. 16
- C. 17
- D. 18
- E. 19

DO YOUR FIGURING HERE.

2. For all real numbers q , r , and s , the expression $qy + ry - sy$ can be written as the product of y and which of the following?

- F. $-q - r + s$
- G. $q - r - s$
- H. $q - r + s$
- J. $q + r - s$
- K. $q + r + s$

3. $|4(-3) + 2| = ?$

- A. -10
- B. 3
- C. 9
- D. 10
- E. 14



4. The table below shows the amount of money raised by 5 players from selling magazines for a basketball team fund-raiser. Each player earned the same amount for each magazine sold.

DO YOUR FIGURING HERE.

Player	Number of magazines sold	Income earned
Donelle	8	\$ 46.00
Jaylen	25	\$143.75
Reynold	19	\$109.25
Earnest	11	\$ 63.25
Quinn	16	\$ 92.00

Another player, Harvey, also earned the same amount for each magazine sold, for an income earned of \$178.25 from selling magazines. How many tickets did Harvey sell?

- F. 24
- G. 27
- H. 31
- J. 34
- K. 39

5. What is the value of the expression $\sqrt{\frac{s}{x-3}}$ when

$s = -36$ and $x = -1$?

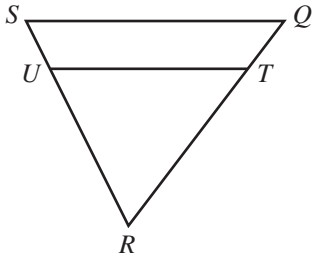
- A. -3
- B. 3
- C. $3\sqrt{3}$
- D. $3i$
- E. $3i\sqrt{3}$

6. On the real number line, point E is at -18 and point F is at -9 . What is the distance between point E and point F ?

- F. -27
- G. -9
- H. 9
- J. $13\frac{1}{2}$
- K. 27



7. In $\triangle QRS$ below, T is on \overline{QR} , U is on \overline{SR} , and $\overline{TU} \parallel \overline{QS}$. If it can be determined, what is the ratio of the area of $\triangle QRS$ to the ratio of $\triangle TRU$?



DO YOUR FIGURING HERE.

- A. 3:1
 B. 3:2
 C. 4:1
 D. 5:3
 E. Cannot be determined from the given information
8. A right triangle has leg lengths that are 5 meters and 6 meters, respectively. Which of the following lengths, in meters, is closest to that of the hypotenuse of the right triangle?
- F. 3.3
 G. 5.5
 H. 7.8
 J. 10.4
 K. 11.0
9. A system of equations is given below. What is the value of y in the (x,y) solution to the system?
- $$x = 4y - 13$$
- $$x = y + 2$$
- A. -5
 B. -3
 C. -2
 D. 3
 E. 5



10. The table below gives the total charge to rent a scooter from each of two companies for various numbers of miles. For what number of miles would the total charge for renting a scooter from Scott's be the same as the total charge for renting a scooter from Seth's?

(Note: There is a linear relationship between the number of miles and the total charge for both Scott's and Seth's).

Number of miles	Total charge	
	Scott's	Seth's
5	\$ 5	\$15
10	\$10	\$18
15	\$15	\$21
20	\$20	\$24
25	\$25	\$27

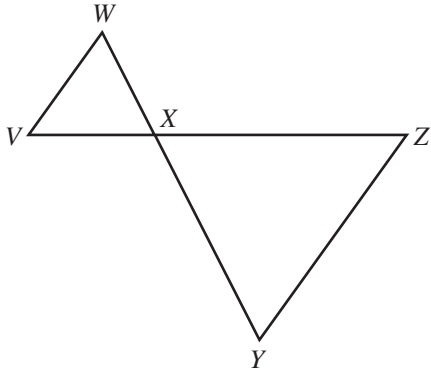
- F. 30
G. 35
H. 40
J. 45
K. 50
11. What is the least common multiple of 30, 40, and 70 ?
- A. 40
B. 160
C. 840
D. 8,400
E. 84,000
12. Once a week, Dianne spends 5 hours making windchimes. It takes her 30 minutes to make a small windchime and 40 minutes to make a large windchime. This week, Dianne will make twice as many small windchimes as large windchimes. How many of the small windchimes will Dianne make this week?
- F. 1
G. 3
H. 4
J. 5
K. 6
13. A certain space shuttle travels at a speed of 3.6×10^4 miles per hour. How many hours would it take this space shuttle to travel 7.2×10^8 miles?
- A. 5.0×10^{-5}
B. 25.9×10^0
C. 2.0×10^2
D. 2.0×10^4
E. 25.9×10^{12}

DO YOUR FIGURING HERE.



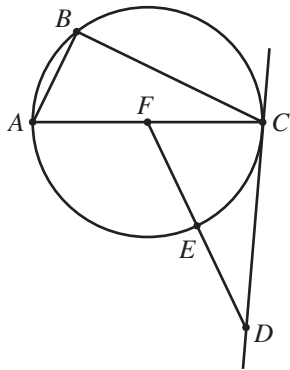
14. In the figure below, \overline{VZ} and \overline{WY} intersect at X , and $\overline{VW} \parallel \overline{YZ}$. Which of the following angles *must* have the same measure as $\angle VWX$?

DO YOUR FIGURING HERE.



- F. $\angle VXW$
- G. $\angle VXY$
- H. $\angle WXZ$
- J. $\angle XYZ$
- K. $\angle XZY$

15. In the figure below, F is the center of the circle, \overline{AC} is a diameter, B lies on the circle, D lies outside the circle on \overleftrightarrow{FD} , and \overline{DC} is tangent to the circle at C . Which of the following angles or minor arcs has the greatest degree measure?



- A. \widehat{AE}
- B. \widehat{EC}
- C. $\angle ABC$
- D. $\angle FDC$
- E. $\angle DFC$

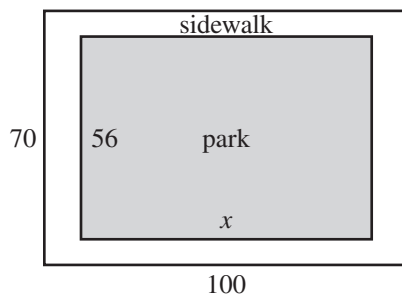


16. A jar contains 7 orange marbles, 6 blue marbles, and a number of yellow marbles. There are no other marbles in the jar. The probability of randomly selecting a blue marble from the jar is $\frac{1}{4}$. How many yellow marbles are in the jar?

F. 8
 G. 11
 H. 15
 J. 21
 K. 24

DO YOUR FIGURING HERE.

17. In the figure below, the border of a park and the border of a sidewalk surrounding that park are similar rectangles. The given dimensions are in meters. What is the unknown length of the park, in meters?

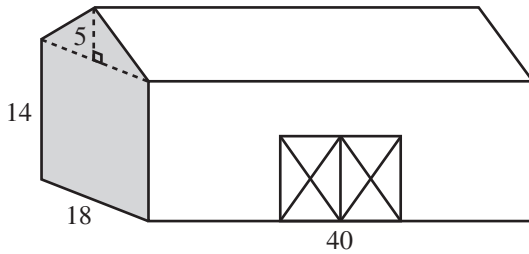


A. 50
 B. 70
 C. 76
 D. 80
 E. 86



18. Zoe will be painting the shaded region (one 5-sided wall) of the outside of the barn shown in the figure below. All given dimensions are in feet. Each quart of paint will cover 100 square feet of the wall, and only 1 coat of paint will be needed. How many quarts of paint will Zoe need to paint the shaded region of the barn?

DO YOUR FIGURING HERE.



- F. 1
G. 2
H. 3
J. 4
K. 5
19. A set of numbers consists of all the even integers that are greater than 2 and less than 28. What is the probability that a number randomly picked from this set will be divisible by 4 ?
- A. $\frac{1}{4}$
B. $\frac{1}{3}$
C. $\frac{1}{2}$
D. $\frac{2}{3}$
E. $\frac{3}{4}$
20. Ike had 3 tests in his biology class this semester. He scored 10 points higher on the second test than he did on the first test. On the third test, he scored 10 points higher than he did on the second test. His average test score was 85 for the 3 games. What did Ike score on the *third* biology test?
- F. 65
G. 75
H. 85
J. 95
K. 100



21. In the standard (x,y) coordinate plane, the point $(5,-3)$ is the midpoint of the line segment with endpoints $(11,-7)$ and:
- A. $(-1,-14)$
 - B. $(-1, 1)$
 - C. $(1, 1)$
 - D. $(6,-11)$
 - E. $(8, -5)$
22. The product of 2 positive integers is 70. The greater integer is 1 less than three times the lesser integer. What is the greater integer?
- F. 4
 - G. 5
 - H. 10
 - J. 14
 - K. 19
23. Joshua is picking out his clothes for the first day of school. Joshua will wear 1 of the 4 pairs of pants that he has, 1 of the 5 shirts that he has, and 1 of the 2 pairs of shoes that he has. From among these 11 articles of clothing, how many possibilities are there for Joshua's outfits for the first day of school?
- A. 11
 - B. 22
 - C. 40
 - D. 55
 - E. 110
24. Santiago just finished painting a mural that has a width of 6 feet and a length of 9 feet. Santiago decides to add to the mural by increasing both the length and width by the same amount. The area of his new mural is twice the area of his original mural. What is the length, in feet, of Santiago's new mural?
- F. 3
 - G. 9
 - H. 12
 - J. 18
 - K. 27
25. Ariana is trying to save up money to buy a new bike. She sets a goal to save an average of \$10.00 per week for the next 8 weeks. She saved an average of \$8.00 per week for the first 7 weeks and saved \$20.00 for 8th week. On average, how much more should Ariana have saved each week to reach her goal?
- A. \$0.30
 - B. \$0.40
 - C. \$0.50
 - D. \$0.80
 - E. \$0.90

DO YOUR FIGURING HERE.



26. A scientist is performing an experiment on the doubling time of a population of yeast. She found the population of yeast doubles every 2 hours. If the initial population of yeast in this colony is about 3 million, which of the following values, in millions, would be closest to the number of yeast cells in the population after 10 hours?
- F. 15
G. 30
H. 32
J. 48
K. 96

DO YOUR FIGURING HERE.

27. For what 2 values of y is the equation $y^2 - 7y + 12 = 0$ true?
- A. -12 and 1
B. -4 and 3
C. -3 and 4
D. -1 and 12
E. 3 and 4

28. What value of g satisfies the matrix equation below?

$$3 \begin{bmatrix} 1 & g \\ 0 & 7 \end{bmatrix} + \begin{bmatrix} -4 & 2 \\ -3 & 10 \end{bmatrix} = \begin{bmatrix} -1 & 17 \\ -3 & 31 \end{bmatrix}$$

- F. 4
G. 5
H. 6
J. 12
K. 15
29. For which of the equations below is its solution an integer?
- I. $4x + 7 = 21$
II. $7x + 4 = 32$
III. $7(x + 4) = 42$
- A. I only
B. II only
C. III only
D. I and II only
E. II and III only



30. Whenever a and b are nonzero, $\frac{(8a^3b^7)(9a^{10}b^2)}{12a^5b^{11}} = ?$

F. $6a^6b^3$

G. $6a^{30}b^3$

H. $\frac{6a^5}{12b^{20}}$

J. $\frac{6a^6}{b^3}$

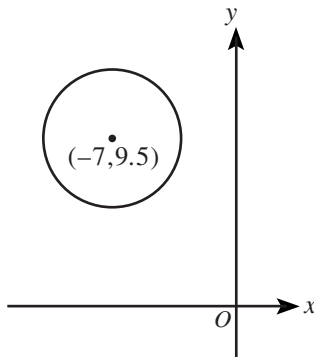
K. $\frac{6a^8}{b^2}$

DO YOUR FIGURING HERE.

31. In a plane, the distinct lines \overleftrightarrow{WX} and \overleftrightarrow{YZ} intersect at W , where W is between Y and Z . The measure of $\angle XWY$ is 58° . What is the measure of $\angle XWZ$?
- A. 58°
 B. $(58 + 58)^\circ$
 C. $(90 - 58)^\circ$
 D. $(90 + 58)^\circ$
 E. $(180 - 58)^\circ$

Use the following information to answer questions 32–34.

The circle in the standard (x,y) coordinate plane shown below has center $(-7,9.5)$ and has radius 4 coordinate units.



32. Which of the following is an equation of this circle?
- F. $(x - 7)^2 + (y + 9.5)^2 = 8$
 G. $(x + 7)^2 + (y - 9.5)^2 = 8$
 H. $(x - 7)^2 + (y + 9.5)^2 = 16$
 J. $(x + 7)^2 + (y - 9.5)^2 = 16$
 K. $(x + 7)^2 + (y + 9.5)^2 = 16$

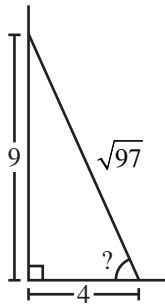


33. What is the circle's area, in square coordinate units?
- A. 2π
 - B. 4π
 - C. 8π
 - D. 16π
 - E. 64π

DO YOUR FIGURING HERE.

34. If the circle is reflected across the x -axis, what will be the coordinates of the center of the reflected circle?
- F. $(-7, -9.5)$
 - G. $(-3, 5.5)$
 - H. $(3, -5.5)$
 - J. $(7, -9.5)$
 - K. $(7, 9.5)$

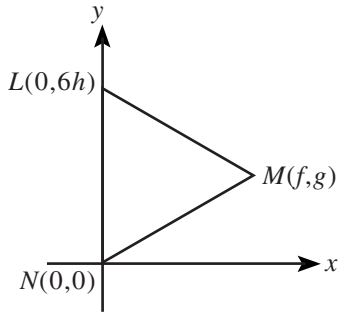
35. Chelsea is setting up a tent for a party and needs to tie it down to the ground. She stakes the rope into the ground 4 feet away from the base of the tent and attaches the other end of the rope at a point on the tent 9 feet above the ground, as shown in the figure below. When taut, the length of the exposed rope will be $\sqrt{97}$ feet. Which of the following expressions represents the measure of the angle created by the rope and the level ground?



- A. $\tan^{-1}\left(\frac{4}{9}\right)$
- B. $\tan^{-1}\left(\frac{4}{\sqrt{97}}\right)$
- C. $\tan^{-1}\left(\frac{9}{4}\right)$
- D. $\tan^{-1}\left(\frac{9}{\sqrt{97}}\right)$
- E. $\tan^{-1}\left(\frac{\sqrt{97}}{9}\right)$



36. Shown in the standard (x,y) coordinate plane below is equilateral triangle $\triangle LMN$ with coordinates $M(f,g)$, $L(0,6h)$, and $N(0,0)$. In terms of h , what is g ?



- F. h
 G. $2h$
 H. $3h$
 J. $6h$
 K. $8h$

DO YOUR FIGURING HERE.

37. One day, Rodrigo and Nicole opened separate checking accounts with initial deposits of \$143.00 and \$31.00, respectively. On the first of every month after opening their accounts, Rodrigo will withdraw \$16.50 from his account and Nicole will add \$10.00 to her account. Which of the following equations, when solved, gives the number of months (m) after opening the accounts that Rodrigo and Nicole will have the same amount of money in their respective accounts?

(Note: No interest is applied to the money in their accounts, and they make no other deposits or withdrawals to their accounts.)

- A. $-16.5m + 143 = -10m + 31$
 B. $-16.5m + 143 = 10m + 31$
 C. $16.5m - 143 = 10m + 31$
 D. $16.5m + 143 = 10m + 31$
 E. $143m - 16.5 = 31m + 10$



38. For an angle with measure θ in a right triangle,

$\sin \theta = \frac{144}{145}$ and $\cos \theta = \frac{17}{145}$. What is the value of $\tan \theta$?

F. $\frac{17}{\sqrt{41,761}}$

G. $\frac{17}{144}$

H. $\frac{145}{\sqrt{20,477}}$

J. $\frac{144}{17}$

K. $\frac{145}{17}$

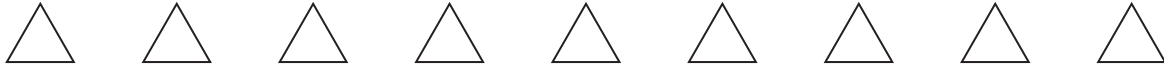
DO YOUR FIGURING HERE.

39. Consider all products qr such that q is divisible by 9 and r is divisible by 12. Which of the following whole numbers is NOT a factor of each product qr ?

- A. 3
 B. 9
 C. 21
 D. 36
 E. 108

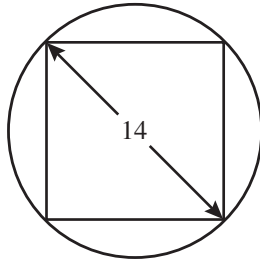
40. In the standard (x,y) coordinate plane, what is the slope of the line perpendicular to the line $5x - 6y = 97$?

- F. -5
 G. $-\frac{6}{5}$
 H. $-\frac{1}{5}$
 J. $\frac{5}{6}$
 K. $\frac{6}{5}$



41. The figure below shows a circle with the diameter given in meters. Which of the following is closest to the area, in square meters, of the square inscribed in the circle?

DO YOUR FIGURING HERE.



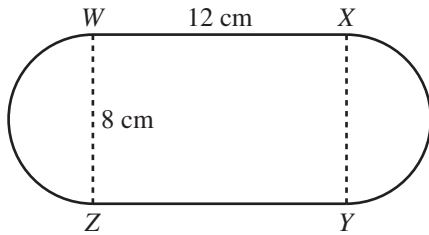
- A. 44
 B. 88
 C. 98
 D. 154
 E. 196
42. Let x and y be real numbers such that $x + y = 3$, $-xy = 18$, and $x > y$. What is x ?
- F. 2
 G. 3
 H. 6
 J. 9
 K. 15
43. The table below gives the weights, rounded to the nearest pound, at 4 weeks and 52 weeks for 5 English mastiffs. A breeder models these weights as a linear function where the weight at 52 weeks is dependent on the weight at 4 weeks. Which of the following models is most accurate?

Name	Weight at 4 weeks (x pounds)	Weight at 52 weeks (y pounds)
Pepper	11	98
Kali	17	151
Angel	14	126
Luna	12	108
Willow	15	133

- A. $y = 8x$
 B. $y = 9x$
 C. $y = 4x + 73$
 D. $y = 5x + 43$
 E. $y = 6x + 36$



44. The figure below is composed of a rectangle and two semicircles. Points W , X , Y , and Z are endpoints of both the sides of the rectangle and the diameters of the semicircles. What is the perimeter, in centimeters, of the figure?



DO YOUR FIGURING HERE.

- F. $4\pi + 20$
 G. $8\pi + 24$
 H. $8\pi + 40$
 J. $16\pi + 16$
 K. $16\pi + 96$
45. The domain of $g(x) = \frac{3}{x^3 - 16x}$ is the set of all real numbers EXCEPT:
- A. $-\frac{3}{16}$
 B. 4
 C. -4 and 4
 D. 0 and 4
 E. -4, 0, and 4
46. What is the seventh term of the geometric sequence whose first term is -2 and whose sixth term is 64 ?
- F. -256
 G. -128
 H. 77
 J. 256
 K. 512



47. Given $\frac{4}{a} = 20$ and $\frac{a}{b} = 3$, what is the value of b ?

- A. $\frac{1}{20}$
- B. $\frac{1}{15}$
- C. $\frac{1}{5}$
- D. 15
- E. 27

48. The water in a small fish tank in the shape of a rectangular prism with length 6 inches and width 12 inches reaches a height of 7 inches. A larger fish tank has length 8 inches and width 18 inches. When the water from the small fish tank is poured into the large fish tank, what is the height, in inches, of the water in the large fish tank?

(Note: The volume of a rectangular prism is given by $V = lwh$.)

- F. $1\frac{3}{5}$
- G. $3\frac{1}{2}$
- H. $6\frac{1}{5}$
- J. $6\frac{1}{2}$
- K. 14

49. What are the values of θ , between 0 and 2π , when

$$\cos \theta = -\frac{\sqrt{2}}{2} ?$$

- A. $\frac{\pi}{4}$ and $\frac{3\pi}{4}$ only
- B. $\frac{3\pi}{4}$ and $\frac{5\pi}{4}$ only
- C. $\frac{3\pi}{4}$ and $\frac{7\pi}{4}$ only
- D. $\frac{5\pi}{4}$ and $\frac{7\pi}{4}$ only
- E. $\frac{\pi}{4}$, $\frac{3\pi}{4}$, $\frac{5\pi}{4}$, and $\frac{7\pi}{4}$

DO YOUR FIGURING HERE.

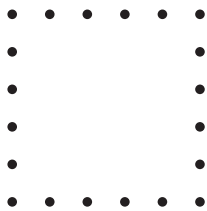


50. Temperatures measured in degrees Kelvin (K) are related to temperatures measured in degrees Fahrenheit (F) by the formula $K = \frac{5}{9}F + 256$. For which value of x is x degrees Kelvin equal to x degrees Fahrenheit?

F. -256
 G. 0
 H. 256
 J. 320
 K. 576

DO YOUR FIGURING HERE.

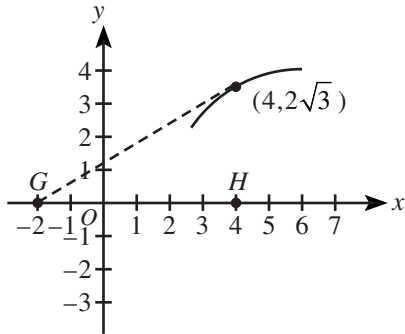
51. Suppose a regular polygon is marked on each side with equally spaced dots, the distance between consecutive dots being the same for every side, and that there are dots at each vertex. In the figure below, 6 equally spaced dots, including one dot at each vertex, form the four sides of a square. Which of the following expressions represents the number of dots for any such regular polygon with x equally spaced dots for each side, including one at each vertex of its y sides?



A. xy
 B. $xy - 2$
 C. $xy - x$
 D. $xy - y$
 E. $xy + y$

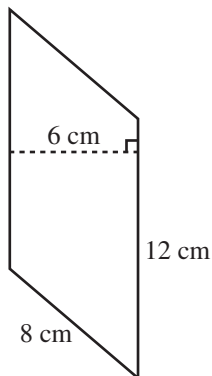


52. In the figure shown below, points $G(-2,0)$ and $H(4,0)$ are on the standard (x,y) coordinate plane. The collection of all points such that each is twice as far from point G as from point H forms a circle. What are the coordinates of the center of this circle?



DO YOUR FIGURING HERE.

- F. $(-1, \sqrt{3})$
 G. $(0, 0)$
 H. $(2, 0)$
 J. $(6, 0)$
 K. $(10, 0)$
53. What is the area, in square centimeters, of the parallelogram shown below?



- A. 48
 B. 52
 C. 72
 D. 96
 E. 108
54. The equation $y = \frac{3x^2 + x - 6}{x^2 + 3x}$ has 1 vertical asymptote and 1 horizontal asymptote. What is the horizontal asymptote?
- F. $x = 0$
 G. $x = 2$
 H. $x = 3$
 J. $y = 0$
 K. $y = 3$



55. Which of the following polar coordinates represents the same location as $(7, 125^\circ)$?
- A. $(7, -235^\circ)$
 - B. $(7, -125^\circ)$
 - C. $(7, -55^\circ)$
 - D. $(7, 135^\circ)$
 - E. $(7, 235^\circ)$

DO YOUR FIGURING HERE.

Use the following information to answer questions 56–58.

Rad Games is currently offering a special to customers who purchase 5 or more game boards. According to this special, the cost of the first game board is \$2 while each additional game board costs the normal amount. The table below shows the dimensions and costs of available game boards.

Layout	Dimensions (inches)	Cost (dollars)
1 (Micro)	1×3	\$ 3
2 (Small)	3×3	\$ 5
3 (Medium)	9×3	\$ 8
4 (Large)	9×9	\$12
5 (Mega)	27×9	\$18

56. Jessie purchases 8 Large game boards and benefits from the special offer. The amount Jessie pays with the special offer for these 8 game boards is what percent decrease from the normal cost of the game boards?
- F. 8.75%
 - G. 9.58%
 - H. 10.42%
 - J. 11.90%
 - K. 14.20%
57. Mega game boards can be partitioned into other game board layouts. What is the greatest number of Medium game boards that can be formed from a single Mega game board?
- A. 2
 - B. 3
 - C. 6
 - D. 9
 - E. 27



58. Valencia, the CEO of Rad Games, is considering developing a layout 6 (Ultra) game board, larger than the other currently available game board layouts. She will use the Ultra game board area to advertise the number of players able to play on a single board at one time. To remain compatible with the other game board layouts, the same relationship between layouts of the other game boards must be used. Which of the following expressions gives the area, in square inches, of a layout x game board?

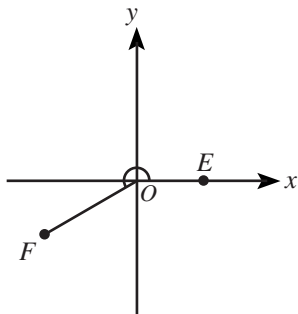
F. 3^x
 G. 3^{3x}
 H. $3^{(3x+1)}$
 J. $3x^3$
 K. $(x+3)^3$

DO YOUR FIGURING HERE.

59. For how many integers x is the equation $2^{2x+1} = 8^{x-3}$ true?

A. 0
 B. 1
 C. 2
 D. 3
 E. Infinitely many

60. In the standard (x,y) coordinate plane below, point E is on the positive x -axis, the measure of $\angle EOF$ is 210° , and the length of \overline{FO} is 1 coordinate unit. What are the coordinates of point F ?



F. $\left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$
 G. $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$
 H. $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
 J. $\left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$
 K. $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

END OF TEST 2

STOP! DO NOT GO ON TO THE NEXT PAGE UNTIL TOLD TO DO SO.
 DO NOT RETURN TO A PREVIOUS TEST.

17B Conversion Table

Scale Score	Raw Scores				Scale Score
	Test 1 English	Test 2 Mathematics	Test 3 Reading	Test 4 Science	
36	74-75	59-60	40	40	36
35	72-73	58	38-39	–	35
34	71	56-57	37	39	34
33	69-70	55	36	38	33
32	68	54	34-35	–	32
31	67	53	33	37	31
30	66	52	32	36	30
29	65	50-51	31	–	29
28	63-64	47-49	30	35	28
27	61-62	44-46	–	34	27
26	59-60	42-43	29	32-33	26
25	57-58	39-41	28	31	25
24	55-56	36-38	26-27	29-30	24
23	52-54	33-35	25	26-28	23
22	50-51	31-32	23-24	24-25	22
21	47-49	30	22	22-23	21
20	44-46	28-29	20-21	20-21	20
19	42-43	26-27	19	18-19	19
18	40-41	24-25	18	17	18
17	37-39	20-23	16-17	15-16	17
16	34-36	16-19	15	14	16
15	31-33	13-15	14	13	15
14	28-30	10-12	12-13	11-12	14
13	26-27	8-9	11	10	13
12	24-25	7	10	9	12
11	21-23	5-6	8-9	8	11
10	18-20	4	7	7	10
9	15-17	–	6	6	9
8	13-14	3	5	5	8
7	11-12	–	–	4	7
6	8-10	2	4	3	6
5	7	–	3	–	5
4	5-6	1	2	2	4
3	3-4	–	–	1	3
2	2	–	1	–	2
1	0-1	0	0	0	1