Chapter 14
Practice Test 4

ACT MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then darken the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

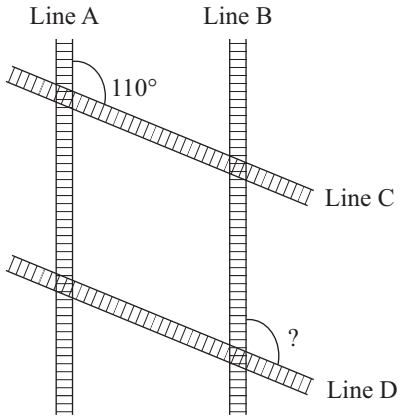
You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed:

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

DO YOUR FIGURING HERE.

1. Four railroad lines, A, B, C, and D, are pictured below, such that the pair of lines A and B and C and D run parallel to each other, respectively. If the obtuse angle created by the intersection of line A and C measures 110°, what is the measure of the obtuse angle at which line B intersects line D ?



A. 110°
B. 120°
C. 170°
D. 210°
E. 250°

2. Which of the following is the simplified form of the expression $5(x-3)-3x+10$?

F. $2x-5$
G. $5x+7$
H. $8x-5$
J. $12x+10$
K. $22x$

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DO YOUR FIGURING HERE.

3. In the standard (x,y) coordinate plane, a point lies at (4,–7). If the point is shifted up 4 units and left 10 units, what are the new coordinates of the point?

A. (–14,–9)
B. (–3,–9)
C. (–6,–9)
D. (–6,–3)
E. (0, 3)

4. At a certain golf club, participants in a tournament must pay \$13 if they belong to the club and \$15 if they do not belong to the club. What is the total cost, in dollars, for x participants who belong to the club and 30 members who do not belong to the club?

F. $13x + 15(30)$
G. $(13 + 15)x$
H. $13(x + 15)$
J. $13(x + 30)$
K. $x + 30$

5. If a new computer has its price increased from \$500 to \$650, by what percent did the computer's price increase?

A. 5%
B. 15%
C. 23%
D. 28%
E. 30%

6. In the parallelogram $WXYZ$, $\angle W$ and $\angle Y$ are congruent, the measure of $\angle X$ is 112°. What is the measure of $\angle Y$?

F. 56°
G. 68°
H. 90°
J. 112°
K. 136°

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DO YOUR FIGURING HERE.

7. Nathan will choose one marble randomly from a sack containing 32 marbles that are in the colors and quantities shown in the table below. Each of the marbles is one color only.

Color	Quantity
White	5
Purple	1
Indigo	2
Cyan	8
Maroon	6
Tan	10

What is the probability that Nathan will choose a tan or maroon marble?

A. $\frac{3}{16}$

B. $\frac{5}{16}$

C. $\frac{7}{16}$

D. $\frac{1}{2}$

E. $\frac{1}{3}$

8. If a speedboat is traveling 100 miles in the span of $1\frac{1}{3}$ hours, what is the speedboat's average speed, in miles per hour?

F. 25
G. 33
H. 75
J. 100
K. 133

9. In order to calculate an employee's overall performance review value, Mr. Donovan removes the lowest value and then averages the remaining values. Shawna was evaluated 6 times with the following results: 22, 23, 26, 31, 35, and 43. What was Shawna's overall performance review value as determined by Mr. Donovan?

A. 27.4
B. 30.0
C. 31.0
D. 31.4
E. 31.6

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10. Which of the following gives x in terms of p and q, given the equation $\frac{3x}{p} = q$?

F. $\frac{q}{3p}$

G. $\frac{p}{3q}$

H. $\frac{pq}{3}$

J. $pq - 3$

K. $q + p - 3$

11. What is the value of $5x$ if $3x - 16 = 5$?

A. 7
B. 21
C. 35
D. 56
E. 72

12. If the area of a square is 25 square feet, what is the perimeter of the square, in feet?

F. 5
G. 10
H. 20
J. 25
K. 100

13. What is 11% of 3.22×10^4 ?

A. 354,200
B. 3,542
C. 35.42
D. 1.123
E. 0.1123

14. Of the following expressions, which is a factor of the expression $x^2 + 3x - 18$?

F. $x - 6$
G. $x + 3$
H. $x + 6$
J. $x + 9$
K. $x + 15$

15. Of the following real numbers, v, w, x, y, and z such that $v < w$, $y > x$, $y < v$, and $z > w$, which of the numbers is the smallest?

A. v
B. w
C. x
D. y
E. z

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DO YOUR FIGURING HERE.

16. A new operation, ♣, is defined as follows: $(w,x) \clubsuit (y,z) = (wz - yx)(wx - yz)$. What is the value of (3,2) ♣ (5,0) ?

F. –120
G. –60
H. 0
J. 6
K. 60

17. A team of artists requires 2 types of structures—spheres and pyramids—for a collaborative art piece. The 2 types of structures are created by overlapping 5-inch squares made of 3 different materials. The team will consist of three artists. The requirements for each structure type are provided in the tables below. The table with material types indicates how many squares are required for each type of structure, and the table with the artists indicates how many of each structure type each artist is to create.

	Wood	Iron	Plastic
Sphere	10	5	12
Pyramid	5	14	10

	Sphere	Pyramid
Suzuki	5	5
Mona	5	15
Jamilica	10	5

How many 5-inch squares of wood does Jamilica need to create her structures?

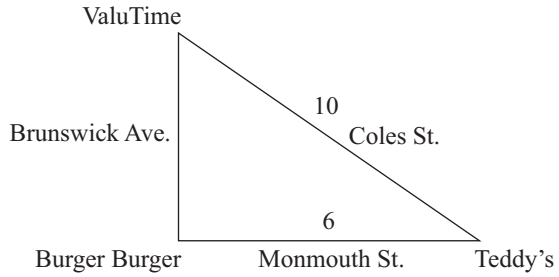
A. 150
B. 125
C. 52
D. 39
E. 29

18. Which of the following represents the least common multiple of 100, 60, and 20 ?

F. 80
G. 120
H. 300
J. 1,200
K. 120,000

GO ON TO THE NEXT PAGE.

19. The right triangle below represents three stores—Teddy's, ValuTime, and Burger Burger—as its vertices. The distances given on the triangle represent the numbers of miles required to travel between the stores on a road. Two customers leave Teddy's to shop at ValuTime. If the first customer travels from Teddy's to ValuTime on Coles St., while the second customer travels from Teddy's to Burger Burger on Monmouth St. before taking Brunswick Ave. to ValuTime, how many miles shorter is the first customer's trip than the second's?



A. 2
B. 4
C. 6
D. 10
E. 14

20. Which of the following expressions is equivalent to $\left(y^6\right)^{12}$?

F. $72y$
G. $12y^6$
H. $6y^{12}$
J. y^{72}
K. y^{216}

21. Given the function $f\left(x\right) = 2x^3 + x^2$, which of the following represents the value of $f(-2)$?

A. –24
B. –20
C. –16
D. –13
E. –12

22. The Merry Mechanics Shop has just ended its discount program, raising the price of all repairs by 20%. Which of the following gives the price, in dollars, of any repair with price r ?

F. $0.2r$
G. $r + 0.2r$
H. $r - 0.2r$
J. $r + 0.2$
K. $r + 20r$

DO YOUR FIGURING HERE.

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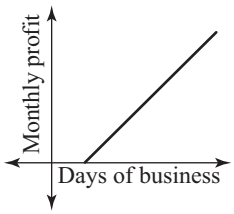
DO YOUR FIGURING HERE.

23. A local television advertisement offers 3 pairs of shoes for $30.97. Given the price of the shoes, how much would it cost to purchase 5 pairs of shoes?

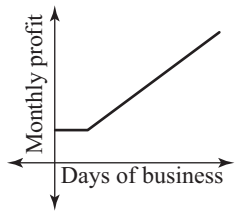
A. $10.32
B. $10.33
C. $20.65
D. $51.61
E. $51.62

24. Terra is opening a store. Her monthly profit is calculated by subtracting her monthly expenses from the total amount she earns each day. If her monthly expenses are $500, and she earns $100 per day on a particular month, which of the following graphs represents her profit as a function of the number of days of business?

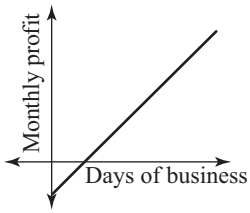
F.



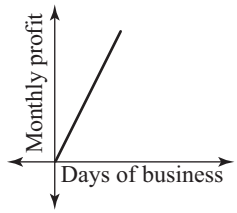
J.



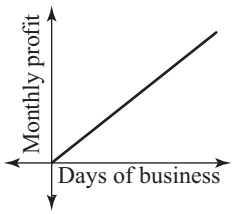
G.



K.



H.



25. The positive integer $x!$ is defined as the product of all the positive integers less than or equal to x. For example, $4! = 1(2)(3)(4) = 24$. What is the value of the expression $\frac{6!4!}{5!}$?

A. 1
B. 2
C. 4
D. 72
E. 144

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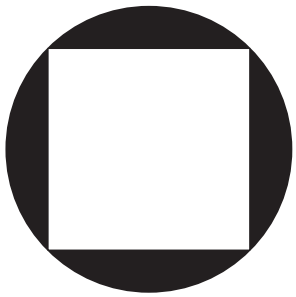
26. Alfred spent \$25 to purchase 65 stamps. If each stamp costs either \$0.20 or \$0.45, how many of the more expensive stamps did he purchase?

F. 17
G. 48
H. 56
J. 65
K. 125

DO YOUR FIGURING HERE.

27. A square with a side length of 2 feet is circumscribed, as shown below.



What is the area of the shaded region, in square feet?

A. π
B. $\pi - 4$
C. $2\pi - 1$
D. $2\pi - 2$
E. $2\pi - 4$

28. Two similar triangles have corresponding sides that are in the ratio 3:4. The length of one of the sides of the larger triangle is 12 feet long. What is the length, in feet, of the corresponding side of the smaller triangle?

F. 6
G. 7
H. 9
J. 11
K. 16

29. For the polygon below points *V, Z,* and *Y* are collinear. Which of the following represents the length, in inches, of $\overline{VZ}$?

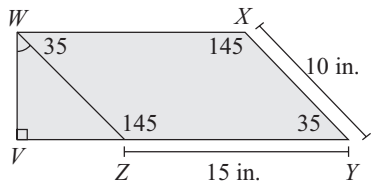
A. 10

B. $10 \cos 35°$

C. $\cos 35°$

D. $\dfrac{15}{\cos 35°}$

E. $\dfrac{10}{\cos 35°}$



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DO YOUR FIGURING HERE.

30. The perimeter of a rectangle is 144 feet, and one side measures 32 feet. If it can be determined, what are the lengths, in feet, of the other three sides?

F. 32, 40, 40
G. 32, 32, 46
H. 32, 48, 48
J. 32, 66, 66
K. Cannot be determined from the given information

31. If $9 + 4x < 2x - 7$, which of the following represents the solution?

A. $x > -12$
B. $x > -8$
C. $x < -8$
D. $x < -2$
E. $x < 8$

32. The drama team wants to post a triangular advertisement for its next play. The base of the advertisement will be 2.25 feet, and the height will be 3.5 feet. Which of the following is closest to the area, in square feet, of the advertisement?

F. 3.0
G. 3.9
H. 6.0
J. 7.9
K. 9.0

33. $-8|-2-7| = ?$

A. –112
B. –92
C. –72
D. 40
E. 72

34. In a local deli, some sandwiches have only one kind of meat, and other sandwiches have more than one kind of meat. Using the information given in the table below about the kinds of meat in the sandwiches, how many sandwiches have roast beef only?

Number of sandwiches	Meat
8	at least roast beef
10	at least chicken
12	at least turkey
5	both chicken and turkey, but no roast beef
1	both roast beef and turkey, but no chicken
3	chicken only
2	roast beef, chicken, and turkey

F. 9
G. 7
H. 5
J. 4
K. 2

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DO YOUR FIGURING HERE.

Use the following information to answer questions 35–37.

The 4-H club at Arlington High School cares for various animals in the school's stockyards. The members of the club sell the animals in order to raise funds for the club, and Marcus and Jae are taking inventory of the animals. The table below gives the numbers of groups of animals. For example, there are 5 groups of pigs with 1 pig per group, 20 groups of chickens with 5 chickens per group, and 20 groups of rabbits with 10 rabbits per group. All of the animal groups have been counted except for the 5-animal groups of rabbits.

Animals	Number of 1-animal groups	Number of 5-animal groups	Number of 10-animal groups
Chickens	0	20	30
Rabbits	5	?	20
Pigs	5	10	0
Goats	22	10	0

35. Marcus finishes the inventory and afterward tells Jae that the number of rabbits is equal to the number of chickens. How many 5-animal groups of rabbits are in the stockyards?

A. 15
B. 25
C. 35
D. 39
E. 195

36. Mrs. Bradshaw purchased $\frac{1}{5}$ of the chickens for $1,200.00. What was the price of 1 chicken?

F. $10.00
G. $15.00
H. $20.00
J. $60.00
K. $120.00

37. Bethany takes all of the goats in the 1-animal groups and combines them to create as many 5-animal groups as possible. How many complete 5-animal groups of goats can Bethany create?

A. 22
B. 14
C. 10
D. 5
E. 4

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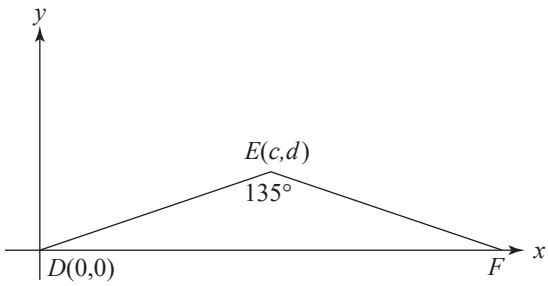
DO YOUR FIGURING HERE.

Use the following information to answer questions 38–40

Isosceles triangle *DEF* is shown in the standard (*x*,*y*) coordinate plane below. The coordinates for two of its vertices are *D*(0,0) and *E*(*c*,*d*).



38. What are the coordinates of *F* ?

F. $(0, \ 2d)$
G. $(2c, \ 0)$
H. $(c + d, \ 0)$
J. $(2c, \ 2d)$
K. $(c + d, 2d)$

39. What is the measure of the angle formed by *DE* and the *y*-axis?

A. 22.5°
B. 30.0°
C. 45.0°
D. 60.0°
E. 67.5°

40. Isosceles triangle *DEF* is rotated clockwise (↵) by 180° about the origin. If the new location of point *E* is called *E*′, what are the coordinates of *E*′ ?

F. $(-c, \ d)$
G. $(\ c, -d)$
H. $(-d, -c)$
J. $(-c, -d)$
K. $(\ d, \ c)$

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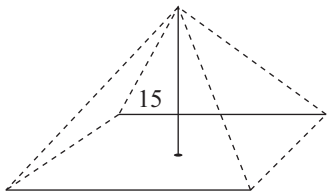
41. A gallon is 231 cubic inches. Which of the following is closest to the area of the base, in square inches, of a pyramid shaped container, shown below, with height 15 inches and volume 2 gallons?

(Note: The volume of a pyramid with base area B and height h is $\frac{1}{3}Bh$.)

A. 92
B. 132
C. 276
D. 432
E. 1,296



DO YOUR FIGURING HERE.

42. For law school, Aaron must read a book of legal cases in 6 months. He reads $\frac{1}{8}$ of the book in each of the first 2 months. For the remaining 4 months, what portion of the book, on average, must Aaron read per month?

F. $\frac{3}{16}$
G. $\frac{3}{32}$
H. $\frac{1}{16}$
J. $\frac{1}{32}$
K. $\frac{1}{64}$

43. Which of the following equations indicates the correct application of the quadratic formula to the equation $2x^2 + 3x - 10 = 10$?

A. $\frac{3 \pm \sqrt{9-4(2)(-10)}}{2(2)}$
B. $\frac{3 \pm \sqrt{9+4(2)(-10)}}{2(2)}$
C. $\frac{-3 \pm \sqrt{9+4(2)(-10)}}{2(2)}$
D. $\frac{-3 \pm \sqrt{9-4(2)(-10)}}{2(2)}$
E. $\frac{-3 \pm \sqrt{9-4(2)(10)}}{2(2)}$

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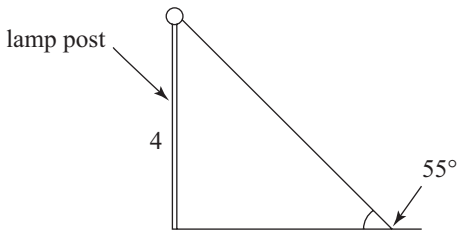
44. In the standard (x,y) coordinate plane, the point $(-2,5)$ is the midpoint of the line segment with endpoints $(-7,3)$ and (c,d). What is (c,d) ?

F. $(-19,8)$
G. $(-12,1)$
H. $(-12,7)$
J. $(\ \ 3,1)$
K. $(\ \ 3,7)$

DO YOUR FIGURING HERE.

45. A straight 4-meter-tall lamppost casts a shadow at an angle of 55°, as shown in the figure below. Which of the following expressions gives the length, in meters, of the shadow along the level ground?



A. $\dfrac{4}{\tan 55°}$

B. $\dfrac{4}{\cos 55°}$

C. $\dfrac{4}{\sin 55°}$

D. $4 \tan 55°$

E. $4 \sin 55°$

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46. One of the following equations is graphed in the standard (x,y) coordinate plane below. Which one?

DO YOUR FIGURING HERE.

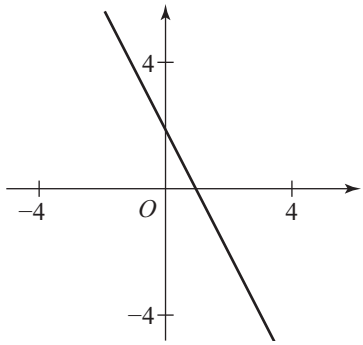
F. $y = 2x + 2$

G. $y = \frac{1}{2}x + 4$

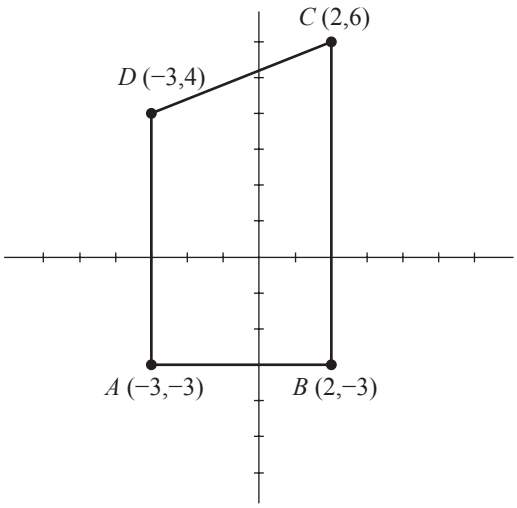
H. $y = -\frac{1}{2}x + 2$

J. $y = -2x + 2$

K. $y = -2x - 4$



47. The vertices of $ABCD$ have the (x,y) coordinates indicated in the figure below. What is the area, in square coordinate units, of $ABCD$?



A. 25
B. 29
C. 40
D. 45
E. 81

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DO YOUR FIGURING HERE.

48. Ms. Parker's economics class is reviewing slopes of lines. The class is tasked to graph the total expenditures, E, required for p products that cost 45¢ each. Ms. Parker instructs the class to characterize the slope between any 2 points (p,E) on the graph. Francine gives a correct answer that the slope between any 2 points on this graph must be:

F. two.
G. multiple positive values.
H. multiple negative values.
J. one positive value.
K. one negative value.

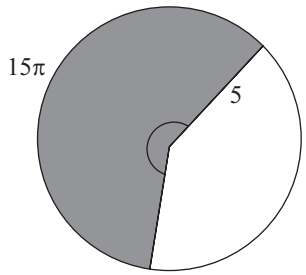
49. If the first four terms of a geometric sequence are 10, 15, 22.5, and 33.75, what is the fifth term in the sequence?

A. 35
B. 50.625
C. 56.25
D. 70.625
E. 75

50. The total surface area of a cube is 54 square inches. What is the volume, in cubic inches, of the cube?

F. 9
G. 18
H. 27
J. 81
K. 729

51. In the figure below, a region of a circle with a radius of 5 is shown shaded. The area of the shaded region is 15π. What is the measure of the central angle of the shaded region?



A. 72°
B. 144°
C. 215°
D. 216°
E. 315°

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DO YOUR FIGURING HERE.

52. Which of the following equations represents the graph of a circle with center (2,–6) and radius 4 coordinate units in the standard (x,y) coordinate plane?

F. $(x-2)^2+(y+6)^2=4$
G. $(x+2)^2+(y-6)^2=4$
H. $(x-2)^2+(y-6)^2=16$
J. $(x-2)^2+(y+6)^2=16$
K. $(x+2)^2+(y-6)^2=16$

53. In ΔXYZ, the value of $\angle X$ is 53°, the value of $\angle Y$ is 88°, and the length of $\overline{YZ}$ is 11 inches. Which of the following is an expression for the length, in inches, of $\overline{XZ}$?

(Note: The Law of Sines states that for any triangle, the ratios of the lengths of the sides to the sines of the angles opposite those sides are equal.)

A. $\dfrac{(\sin 88°)(\sin 53°)}{11}$
B. $\dfrac{\sin 88°}{11 \sin 53°}$
C. $\dfrac{\sin 53°}{11 \sin 88°}$
D. $\dfrac{11 \sin 53°}{\sin 88°}$
E. $\dfrac{11 \sin 88°}{\sin 53°}$

54. The radius of a circle is p feet shorter than the radius of a second circle. How many feet shorter is the circumference of the first circle than the circumference of the second circle?

F. $\sqrt{p}$
G. p^2
H. πp
J. p
K. $2\pi p$

55. If $y \leq -3$, then $|y+3| =$?

A. $y-3$
B. $y+3$
C. $-y-3$
D. $-y+3$
E. 0

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DO YOUR FIGURING HERE.

56. There are 18 countries in the trade union. Of these 18 countries, 7 have fewer than 20 cities, 7 have more than 21 cities, and 2 have more than 22 cities. What is the total number of countries in the trade union that have 20, 21, or 22 cities?

F. 15
G. 11
H. 9
J. 7
K. 4

57. If $\sin x = -\frac{3}{4}$, what is the value of $\cos 2x$?

(Note: $(\sin x)^2 = \frac{1-\cos 2x}{2}$)

A. $-\frac{3}{4}$
B. $-\frac{1}{4}$
C. $-\frac{1}{8}$
D. $\frac{1}{8}$
E. $\frac{13}{4}$

58. Let $f(x) = x^3$ and $g(x) = \frac{x}{2} - k$. In the standard (x,y) coordinate plane, $y = f(g(x))$ passes through $(-2,8)$. What is the value of k?

F. 2
G. 1
H. –3
J. –8
K. –9

59. A plane contains 7 vertical lines and 7 horizontal lines. These lines partition the plane into disjoint regions. How many of these disjoint regions have a finite, nonzero area?

A. 12
B. 14
C. 25
D. 36
E. 49

60. Which of the following must be less than 0, if x, y, and z are real numbers and $x^3y^4z^6 < 0$?

F. xy
G. xy^2
H. yz
J. xyz
K. $x^2y^2z^3$

END OF TEST.
STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.