

MATHEMATICS TEST THREE

60 Minutes—60 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and circle the letter corresponding to the correct answer. 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:

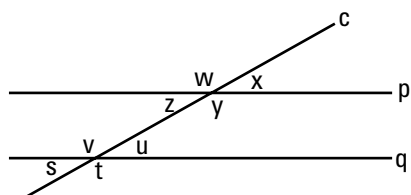
1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word line indicates a straight line.
4. The word average indicates arithmetic mean.

1. $10^2 + 10^9 = ?$

- A. 1,000,100
- B. 1,000,000,100
- C. 10^{10}
- D. 10^{11}
- E. 10^{18}

2. In the figure below, p and q are parallel lines and c is a transversal crossing lines p and q . Angle x measures 45° . What is the measure of angle t ?

- F. 45°
- G. 75°
- H. 100°
- J. 120°
- K. 135°



3. Mrs. Dietz took a trip. She drove 450 miles in 8 hours and 15 minutes. What was her average speed, to the nearest tenth of a mile, per hour?

- A. 47.8
- B. 50.2
- C. 51.9
- D. 54.5
- E. 55.2

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4. For all b , which of the following is a factor of $2x^2 + 10x - 12$?

- F. $x + 6$
- G. $x + 12$
- H. $x + 1$
- J. $x - 1$
- K. $2x - 1$

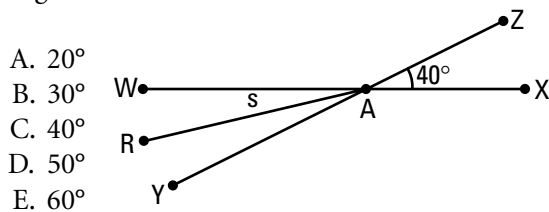
5. A container holds 4 red balls and 8 green balls. What is the probability that the first ball drawn at random from the container will be green?

- A. $1/8$
- B. $1/4$
- C. $1/3$
- D. $1/2$
- E. $2/3$

6. Sandy went shopping for some shoes and found a pair of sandals that cost twice as much as a pair of running shoes that she liked. If the total, before tax, for both pairs of shoes that she liked was \$52.50, how much was the pair of sandals, before tax?

- F. \$10.50
- G. \$17.50
- H. \$26.50
- J. \$35.00
- K. \$42.00

7. Lines WX and YZ intersect at point A . Line RA bisects angle YAW . What is the measure of angle s ?



- A. 20°
- B. 30°
- C. 40°
- D. 50°
- E. 60°

8. Which of the following is an irrational number?

- F. 0.3
- G. $\sqrt{2}$
- H. $|-4.2|$
- J. $2/3$
- K. $7/4$

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9. Katie is a teacher and has been grading tests for 3 hours. She graded 16 of 22 biology tests, 13 of 27 math tests, and 19 of 21 chemistry tests. What is the fraction of biology, math, and chemistry tests that Katie graded in the past 3 hours?

- A. $16/22$
- B. $13/27$
- C. $19/21$
- D. $24/35$
- E. $16/70$

10. If 20% of $y = 30$, then $y = ?$

- F. 150
- G. 90
- H. 60
- J. 6
- K. 0.6

11. John is re-carpeting his house. He is using the following formula to estimate the number of square feet, S , of carpeting needed for a room c feet by d feet containing a stairway that is p feet by q feet with r stairs:

$$S = cd + p[q(2r - 1) + 2r]$$

What is John's estimate for the number of square feet of carpeting that he needs for a room that is 10 feet by 13 feet and contains a stairway that is 5 feet by 5 feet with 4 stairs?

- A. 165
- B. 173
- C. 237
- D. 243
- E. 345

12. What is the slope-intercept form of the equation $2y + 5x = 10$?

- F. $y = 5x + 10$
- G. $y = -5x + 10$
- H. $y = -5x + 5$
- J. $y = (-2/5)x + 2$
- K. $y = (-5/2)x + 5$

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DO YOUR FIGURING HERE.

13. Angie wants to retiling her kitchen floor. Her kitchen is 15 feet long and 9 feet wide. The floor tiles are 1.5 feet by 1.5 feet squares. How many tiles does Angie need to cover her kitchen floor with one layer of the tiles?

A. 16
B. 24
C. 32
D. 48
E. 60

14. What is the distance, in units, between the points with standard (x, y) coordinates: $(3, 3)$ and $(7, 2)$?

F. 5
G. $\sqrt{17}$
H. 17
J. 34
K. 37

15. In a total of 5 days, Marie baked $2z$ pies on each of the first two days and $3z - 2$ on each of the following 3 days. Which of the following expressions best represents the total number of pies Marie baked over the 5-day period?

A. $5z - 2$
B. $5z - 6$
C. $7z - 2$
D. $13z - 2$
E. $13z - 6$

16. For all real numbers $x, y,$ and $z,$
 $3z - 7y + 2(3x - z) + 4y = ?$

F. $6x - 3y + z$
G. $6x - 3y + 5z$
H. $6x + 11y + 5z$
J. $6x - 11y + 5z$
K. $6x - 11y + z$

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17. A pet store manager instructs the staff to clean the bird cages every 3rd day starting today, the rabbit cages every 5th day starting today, and the snake cages every 6th day starting today. If the store is open everyday, how often does the staff clean all of these cages on the same day? (Note: cleaning every 3rd day means clean 1 day, skip 2 days, clean one day, and so on.)

- A. every 3th day
- B. every 6th day
- C. every 18th day
- D. every 24th day
- E. every 30th day

18. Which of the following represents $1/10$ of 4% ?

- F. 40
- G. 4
- H. 0.4
- J. 0.04
- K. 0.004

19. If $p = 6$ and $q = -3$, then $p^3 - 2p^2q + 3pq^3 - q^3 = ?$

- A. -459
- B. -216
- C. -27
- D. 27
- E. 216

20. What is the slope of the line determined by the equation $y - (1/4)x = (2/5)$

- F. 4
- G. $2/5$
- H. $1/4$
- J. $-(1/4)$
- K. -4

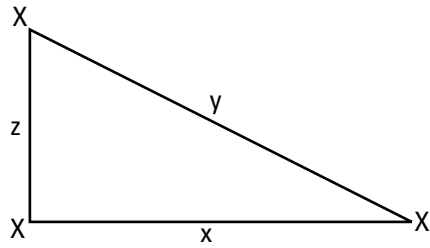
21. What is the value of x if $(x/3) + (x/4) = 1$?

- A. $7/12$
- B. $12/7$
- C. 7
- D. 10
- E. 12

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DO YOUR FIGURING HERE.

22. In right triangle XYZ, x, y, and z are the lengths of the sides of the triangle. What is the tangent of X?



- F. x/y
- G. x/z
- H. z/y
- J. z/x
- K. y/x

23. $(2\sqrt{5} - 3)(\sqrt{5} + 4) = ?$

- A. $10 - 3\sqrt{5}$
- B. $10 + 5\sqrt{5}$
- C. $10 + 8\sqrt{5}$
- D. $-2 + 5\sqrt{5}$
- E. $-12 + 5\sqrt{5}$

24. If the lengths of adjacent sides of a football field are represented by $2x - 3$ and $3x^2 + 5$ units, respectively, for some value of x, then which of the following expressions represents the area in square units of the field?

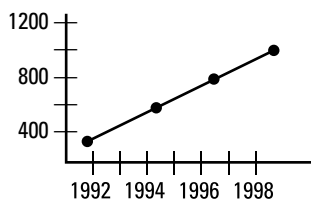
- F. $6x^2 + x - 15$
- G. $6x^2 - 9x - 15$
- H. $6x^2 + 10x - 15$
- J. $6x^3 - 9x^2 + 10x - 15$
- K. $6x^3 + x - 15$

25. Helen is planning to drive to the beach this weekend. The trip will be x miles long. Helen's car can travel r miles per gallon of gasoline. If gas costs 97 cents per gallon, which of the following formulas determines the cost of gas, in dollars, that Helen will need to spend for her trip?

- A. $r - (0.97)x$
- B. $(0.97)x/r$
- C. $(0.97)/rx$
- D. $(0.97)rx$
- E. $x - (0.97)r$

26. A certain retail store has recorded its annual profits over the past several years. Given the graph below, what will the store's annual profits be in 2000?

- F. \$1000
- G. \$1200
- H. \$1300
- J. \$1400
- K. \$1500



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27. $(-5)^{-2} + (-1)^{-2} = ?$

- A. -5
- B. $-(4/5)$
- C. $26/25$
- D. 24
- E. 26

28. What is the smallest positive integer, x , such that $|-4 - x| \geq 6$?

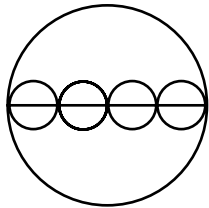
- F. 2
- G. 3
- H. 4
- J. 9
- K. 10

29. If $x\sqrt{2} = 6$, then $x^2 = ?$

- A. 12
- B. 16
- C. 18
- D. 25
- E. 36

30. The centers of 4 identically sized circles lie on the diameter of a larger circle, as can be seen in the figure below. All circles are tangent. If the circumference of each of the 4 smaller circles is 8π centimeters, what is the circumference of the largest circle, in centimeters?

- F. 32π
- G. 24π
- H. 20π
- J. 16π
- K. 8π



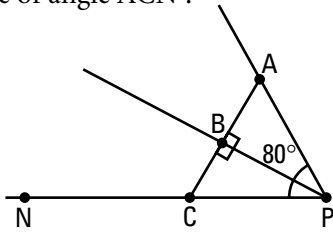
31. For all nonzero c and d , $(15c^2d^5)(-21c^2d^2) / 7c^2d^6 = ?$

- A. $-45d$
- B. $-45c^2d$
- C. $-45c^2d^4$
- D. $-5c^2d$
- E. $-5d$

DO YOUR FIGURING HERE.

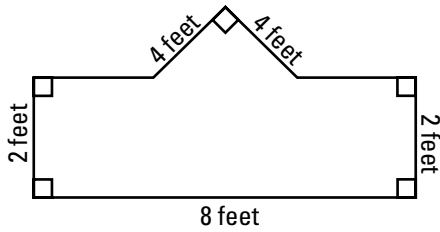
32. In the figure below, line segment PB bisects angle APC and is perpendicular to segment AC. What is the degree measure of angle ACN?

- F. 50°
- G. 100°
- H. 130°
- J. 135°
- K. 150°



33. What is the area, in square feet, of the figure shown below?

- A. 12
- B. 16
- C. 20
- D. 24
- E. 32

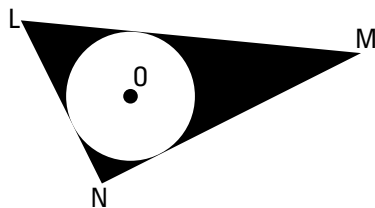


34. If $y = 12 - (x + 3)^2$, for what real value of x will y have its maximum value?

- F. -3
- G. -2
- H. -1
- J. 0
- K. 1

35. The figure below shows a circle inscribed in triangle LMN. The diameter of the circle is 6 units. The area of LMN is 50 square units. What is the area of the shaded region, in square units?

- A. $100 - 6\pi$
- B. $50 - 9\pi$
- C. $50 - 6\pi$
- D. $50 - 3\pi$
- E. $25 - 9\pi$



36. One endpoint of a diameter of a circle with center $(2, -4)$ has coordinates $(2, -2)$ in the standard (x, y) plane. What are the coordinates of the other endpoint of that diameter?

- F. $(0, -4)$
- G. $(4, -4)$
- H. $(2, 0)$
- J. $(2, -6)$
- K. $(2, -8)$

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37. The expression $(a + b)/(a - b)$ has the value 0 if and only if:

- A. $a \neq 0$ and $b \neq 0$
- B. $a = 0$ and $b = 0$
- C. $a - b = 0$ and $a + b \neq 0$
- D. $a - b \neq 0$ and $a + b = 0$
- E. $a - b = 0$ and $a + b = 0$

38. A map is set out in the standard (x, y) coordinate plane. How long, in units, is a truck's path on the map as the truck travels along a straight highway from City C, located at $(5, 2)$ to City D, located at $(8, 12)$?

- F. 341
- G. 213
- H. 109
- J. 13
- K. $\sqrt{109}$

39. Which of the following lines has the largest slope?

- A. $y = 4x - 1$
- B. $y = 5x + 10$
- C. $y = 6x + 1/3$
- D. $3y = 6x + 12$
- E. $6y = 12x - 4$

40. If the cosine of an angle is 0.6 and the sine of the angle is 0.8, what is the cotangent of the angle?

- F. $4/3$
- G. $4/5$
- H. $3/4$
- J. $1/3$
- K. $1/4$

41. Which of the following calculations will yield an even integer for any integer v ?

- A. v^2
- B. v^3
- C. $2v^2$
- D. $3v^2$
- E. $5v^2$

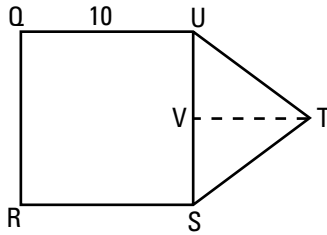
42. If $(p - q)^2 = 16$ and $pq = 5$, then $p^2 + q^2 = ?$

- F. 80
- G. 72
- H. 50
- J. 26
- K. 12

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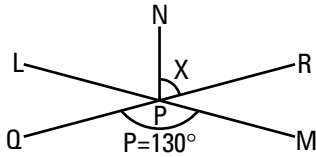
43. In the diagram below, angles QUT and RST both measure 135° , TV is an altitude of UTS and TV measures 5 feet. QRSU is a square. What is the area, in square feet, of pentagon QRSTU?

- A. 125
- B. 135
- C. 150
- D. 200
- E. 215



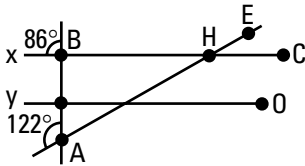
44. Lines LM and SR intersect at point P. Line NP bisects angle LPR. What is the measure of angle x?

- F. 55°
- G. 65°
- H. 75°
- J. 90°
- K. 130°



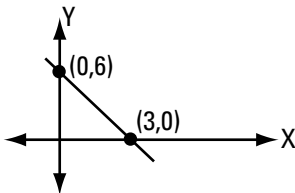
45. Line x and y are parallel. Two transversals intersect at point A. The measures of angles are shown below. What is the measure of angle CHE?

- A. 220°
- B. 140°
- C. 104°
- D. 68°
- E. 36°



46. Which of the following functions has the graph shown in the standard (x, y) coordinate plane below?

- F. $y = 2x - 3$
- G. $y = 2x + 3$
- H. $y = 2x - 6$
- J. $y = -2x + 6$
- K. $y = -2x - 6$



47. What is the slope of a line perpendicular to the following 2 parallel lines?

$$6x + 2y = 7$$

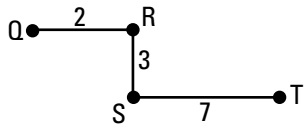
$$9x + 3y = 12$$

- A. -3
- B. $-1/3$
- C. $1/3$
- D. $1/2$
- E. 3

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48. In the figure below, all designated distances are in inches, and all angles are right angles. A straight line drawn from point Q to point T would be how many inches long?

- F. 9
- G. $3\sqrt{10}$
- H. 10
- J. 12
- K. 90



49. If $\sin b = -1/2$ and $3\pi/2 < b < 2\pi$, what is the value of cosine b ?

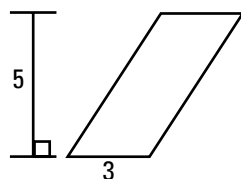
- A. $\sqrt{3}/2$
- B. $1/2$
- C. $-1/2$
- D. $-3/4$
- E. $-\sqrt{3}/2$

50. Points A, B, C lie in the same plane. If the length of AB is 8 feet and the length of BC is 2 feet, then which of the following could be the length, in feet, of AC?

- F. 2 only
- G. 10 only
- H. 2 and 10 only
- J. Any number greater than or equal to 6 and less than or equal to 10
- K. Any number less than 6 and greater than 10

51. In the parallelogram below, lengths are given in feet. What is the area of the parallelogram, in square feet?

- A. 9
- B. 15
- C. $\sqrt{10}$
- D. $\sqrt{20}$
- E. $2\sqrt{10}$



52. What is the greatest y-coordinate among all points on the circle:
 $(x + 2)^2 + (y - 3)^2 = 4$?

- F. 7
- G. 6
- H. 5
- J. 3
- K. 2

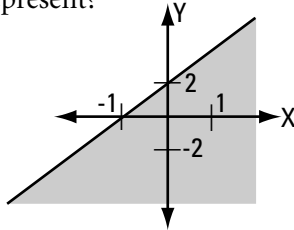
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53. Which of the following statements expresses all and only the values of x that satisfy $|3x + 2| < 4$?

- A. $-2 < x < 2$
- B. $-2 < x < 2/3$
- C. $-2/3 < x < 2/3$
- D. $-1/2 < x < 2$
- E. $-2 < x < 1/2$

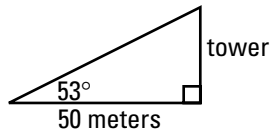
54. Which of the following inequalities does the shaded region below represent?

- F. $y \leq 2x + 2$
- G. $y \geq 2x + 2$
- H. $2x + y \geq 2$
- J. $2x + y \leq 2$
- K. $y + 2 \leq 2x$



55. When measured from a point on the ground that is 50 meters from the base of a tower, the angle of elevation to the top of the tower is 53° . What is the height, in meters, of the tower?

- A. $50 \tan 53^\circ$
- B. $50 \cot 53^\circ$
- C. $50 \sin 53^\circ$
- D. $50 \cos 53^\circ$
- E. $50 \sec 53^\circ$



56. What is the smallest number greater than 1 that, when divided by 2, 3, 5, or 6, leaves a remainder of 1 in each case?

- F. 7
- G. 13
- H. 31
- J. 61
- K. 79

57. If $15x^2 + 23x + b = (5x + 1)(3x + b)$, what is the value of b ?

- A. 4
- B. 3
- C. 2
- D. 1
- E. -3

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DO YOUR FIGURING HERE.

58. A solid wood cube has a total surface area of 3750 square inches. What is the largest number of smaller wood cubes, each with a total surface area of 150 square inches, that can be made from the larger cube?

- F. 5
- G. 25
- H. 40
- J. 80
- K. 125

59. Given that $|2x + 3| \geq 10$, what is the largest set of negative numbers included in the solution set of this inequality?

- A. All negative numbers less than or equal to $-13/2$
- B. All negative numbers less than or equal to -2
- C. All negative numbers less than or equal to -3
- D. All negative numbers less than or equal to -10
- E. No negative numbers satisfy this inequality

60. Both Q and R are positive integers, and the smallest possible integer that is divisible by both Q and R is 90. The greatest common factor of Q and R is 2. If $Q = 18$, then $R = ?$

- F. 2
- G. 3
- H. 10
- J. 15
- K. 30

**END OF MATHEMATICS TEST.
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