

MATHEMATICS TEST TWO

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.

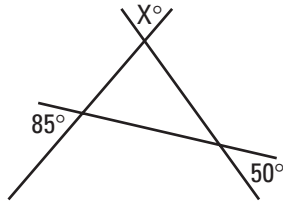
DO YOUR FIGURING HERE.

1. If 30% of $z = 18$, then $z = ?$

- A. 27
- B. 36
- C. 54
- D. 60
- E. 90

2. In the figure below, where the 3 lines intersect at the indicated angles, $x^\circ = ?$

- F. 85°
- G. 75°
- H. 50°
- J. 45°
- K. 25°



3. Mr. Pitt took a trip. He drove 1050 miles in 18 hours and 30 minutes. What was his average speed per hour, to the nearest tenth of a mile?

- A. 54.3
- B. 55.7
- C. 56.8
- D. 57.3
- E. 58.3

4. Which of the following is a prime factorization of 630?

- F. $2 \times 3^2 \times 5 \times 7$
- G. $2 \times 3 \times 5 \times 7$
- H. $2 \times 3^2 \times 35$
- J. $2 \times 5 \times 63$
- K. 2×315

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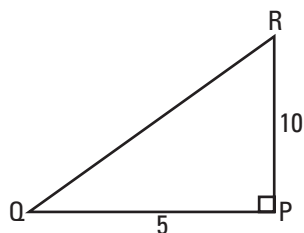
5. Lily has 4 blouses, 3 skirts, 2 jackets, and 2 pair of shoes that go together well in any combination. How many different outfits can Lily put together consisting of a blouse, a skirt, a jacket, and a pair of shoes?

- A. 11
- B. 20
- C. 24
- D. 36
- E. 48

6. What is the value of $3 - (2x^3 + 4n^2)$ if $x = -3$ and $n = -1$?

- F. -37
- G. -24
- H. -16
- J. 26
- K. 53

7. If the lengths of the sides of the triangle below are shown in inches, how many inches long is side QR?



- A. $5\sqrt{7}$
- B. $5\sqrt{5}$
- C. 5
- D. $4\sqrt{5}$
- E. $4\sqrt{2}$

8. $10^8 / 10^2 = ?$

- F. 10,000,000
- G. 1,000,000
- H. 100,000
- J. 10,000
- K. 100

9. If $6x^2 + x - 15 = 0$, what are the 2 possible values for x ?

- A. $-(5/3)$ and $3/2$
- B. $-(3/2)$ and $5/3$
- C. -1 and 1
- D. $-(1/2)$ and 3
- E. $-(1/3)$ and 2

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10. For all real numbers m and n , $(4m + 3n)^2 = ?$

- F. $16m^2 + 12m + 12n + 9n^2$
- G. $16m^2 + 12mn + 9n^2$
- H. $16m^2 + 24mn + 9n^2$
- J. $8m^2 + 7m + 7n + 6n^2$
- K. $8m^2 + 12mn + 9n^2$

11. For all real numbers a , b , and c ,
 $2a + 3b - 4(a + 7c) + 6c = ?$

- A. $-2a + 3b - 34c$
- B. $-2a + 3b - 22c$
- C. $2a + 3b + 34c$
- D. $6a + 3b + 13c$
- E. $8a + 3b + 22c$

12. What is the smallest positive integer, x , such that
 $|3 - x| \geq 6$?

- F. 2
- G. 3
- H. 7
- J. 8
- K. 9

13. Given a triangle with one side measuring 5 centimeters and another side measuring 7 centimeters, all of the following can be the length of the third side, in centimeters, EXCEPT:

- A. 10
- B. 7
- C. 4
- D. 3
- E. 1

14. What is the slope of the line $3y = 8x + 6$?

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

15. In a certain greenhouse, 120 of the flowers are roses, 45 of the flowers are tulips, and 135 of the flowers are daisies. What percent of the flowers in the greenhouse are tulips?

- A. 10%
- B. 15%
- C. $33 \frac{1}{3} \%$
- D. $37 \frac{1}{2} \%$
- E. 45%

DO YOUR FIGURING HERE.

16. Steven is an architect and designs buildings. This month, Steven has completed designs for 3 of 7 houses and 7 of 8 office complexes. What is the fraction of buildings for which Steven has completed designs this month?

F. $\frac{3}{15}$
G. $\frac{1}{3}$
H. $\frac{2}{3}$
J. $\frac{7}{8}$
K. $\frac{73}{56}$

17. Mary is learning to count to 50. In her past 5 attempts at counting as high as she could, she counted to: 39, 42, 47, 43, and 49. On average, how high can Mary count?

A. 50
B. 49
C. 47
D. 46
E. 44

18. Which of the following is an irrational number?

F. 0
G. $\frac{1}{7}$
H. 0.2
J. $\sqrt{5}$
K. $|-2.3|$

19. $(3\sqrt{3})^2 = ?$

A. 9
B. $6\sqrt{3}$
C. $9\sqrt{3}$
D. 27
E. 36

20. For all positive a, b, and c,
 $(2a^{(-2)}b^3c^4) / (3b^{(-2)}c^2) = ?$

F. $2c^4 / 3^2b^5$
G. $2c^2 / 3^a2b^5$
H. $2b^5c^2 / 3a^2$
J. $2b^5c^2 / 3a^5$
K. $2b^3c^4 / 3a^2$

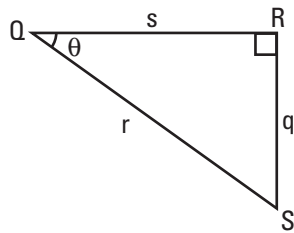
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21. Tom runs 2 miles every morning. Jack runs p times the number of miles that Tom runs each morning plus one additional mile. Which of the following formulas determines the total number of miles that Jack runs each morning?

A. $p + 1$
 B. $p + 2$
 C. $p + 3$
 D. $2p$
 E. $2p + 1$

22. In the figure below, right triangle QRS, $\cos \theta = ?$

F. s/r
 G. s/q
 H. q/r
 J. q/s
 K. r/q



23. In 5 games, Jim scored p points in each of the first 2 games, $(p - 2)$ points in each of the next 2 games, and $(2p + 1)$ points in the last game. Which of the following expressions best represents the total number of points Jim scored in all five games?

A. $3p - 1$
 B. $4p - 6$
 C. $4p - 3$
 D. $6p - 1$
 E. $6p - 3$

24. Chris washes cars at a used car lot. Today, he washed 7 of the 9 blue cars, 3 of the 6 red cars, and 11 of the 12 silver cars in the lot. What is the fraction of blue, red, and silver cars that Chris washed today?

F. $87/36$
 G. $85/36$
 H. $11/12$
 J. $7/9$
 K. $1/2$

25. The expression $[(c - d) / cd]$ has the value of zero if and only if:

A. $c - d \neq 0$ and $cd = 0$
 B. $c - d = 0$ and $cd \neq 0$
 C. $c - d \neq 0$ and $cd \neq 0$
 D. $c = 0$ and $d = 0$
 E. $c \neq 0$ and $d \neq 0$

DO YOUR FIGURING HERE.

26. Which of the following specifies precisely the real values of x that are solutions for the inequality $-5 < 4x - 3$?

- F. $x < 2$
- G. $x < (-1/2)$
- H. $x > (-1/2)$
- J. $x > -1$
- K. $x > -2$

27. Which of the following is an equation for the circle in the standard (x, y) coordinate plane with center at $(3, 4)$ and radius 2 ?

- A. $(x - 3)^2 + (y - 4)^2 = 4$
- B. $(x + 4)^2 + (y + 3)^2 = 4$
- C. $(x - 4)^2 + (y - 3)^2 = 4$
- D. $(x - 3)^2 + (y - 4)^2 = 2$
- E. $(x + 3)^2 + (y + 3)^2 = 2$

28. Which of the following lines has the same graph as the line $x - 4y = 8$?

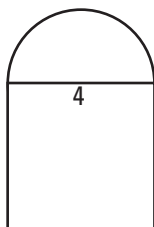
- F. $2x + 8y = 16$
- G. $4x - 8y = 24$
- H. $2x - 8y = 16$
- J. $x - 8y = 16$
- K. $-4x + 16y = -24$

29. For what values of x is $x^2 - x - 6$ equal to zero?

- A. $x = -2$ or $x = 3$
- B. $x = 2$ or $x = -3$
- C. $x = 6$ or $x = -1$
- D. $x = -6$ or $x = 1$
- E. $x = 0$ or $x = 3$

30. The figure below shows a semicircle joined to a square. Distances are given in inches. What is the area of this figure, in square inches?

- F. $4 + 2\pi$
- G. $4 + 4\pi$
- H. $16 + 2\pi$
- J. $16 + 4\pi$
- K. $16 + 8\pi$



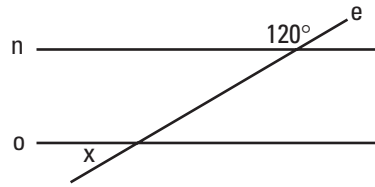
31. $(-4)^{-1} + (-1)^{-3} = ?$

- A. $-5/4$
- B. 0
- C. $7/4$
- D. 2
- E. 4

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32. Line e crosses parallel lines n and o . Angle measures are shown in the figure below. What is the degree measure of angle x ?

- F. 30°
- G. 45°
- H. 50°
- J. 60°
- K. 120°



33. A circle has a circumference of 12 units. What is the radius, in units, of the circle?

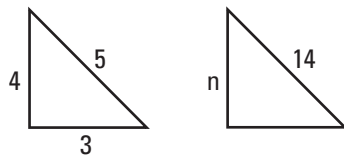
- A. $4/2\pi$
- B. $6/\pi$
- C. $12/\pi$
- D. 6π
- E. 12π

34. What is the distance, in units, between the points with standard (x, y) coordinates $(3, 2)$ and $(9, -4)$?

- F. 6
- G. $6\sqrt{2}$
- H. 8
- J. $7\sqrt{3}$
- K. $7\sqrt{2}$

35. Karen used a photocopy machine to enlarge a small triangle in order to produce a larger, similar triangle, as shown in the figure below. The triangles are similarly oriented. If the lengths of the sides, in inches, are as marked on the figure, what is the value of n ?

- A. $7 \frac{2}{5}$
- B. $9 \frac{1}{5}$
- C. $9 \frac{2}{5}$
- D. $11 \frac{1}{5}$
- E. 13



36. In selecting new students at a certain college, a constant proportion of students to professors is maintained. Last year, 1440 students were admitted, as there were 120 professors. This year there are 140 professors at the college. How many students will be admitted?

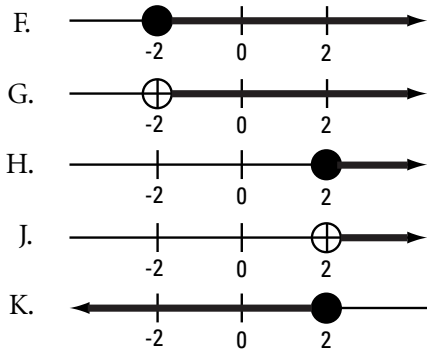
- F. 1680
- G. 1460
- H. 1400
- J. 1320
- K. 1280

DO YOUR FIGURING HERE.

37. A class of q students had an average score of p points on a history test. One student discovered that his score should have been h points higher. Compared to the uncorrected average, p , the new class average will be:

- A. h/q points higher
- B. p/h points higher
- C. q points higher
- D. h points higher
- E. the same

38. Which of the following is the graph of $4 > -2x$?

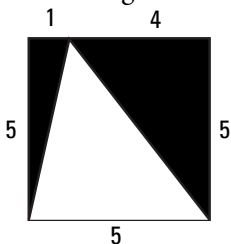


39. Ticket sales for full attendance in a 5,000-seat stadium were \$92,400. If tickets in the 2 sections of the stadium sold for \$20 and \$15, respectively, how many of the more expensive type of ticket were sold?

- A. 3620
- B. 3480
- C. 3200
- D. 2760
- E. 2500

40. The square shown below has lengths marked, in centimeters. What is the area, in square centimeters, of the shaded triangles?

- F. 9.5
- G. 10
- H. 12.5
- J. 15
- K. 16.5



41. Which of the following states the values of x for which $3x^2 = 2 - 5x$?

- A. $-(1/2)$ and 5
- B. $-(1/3)$ and 2
- C. $-(1/4)$ and 3
- D. -1 and $1/2$
- E. -2 and $1/3$

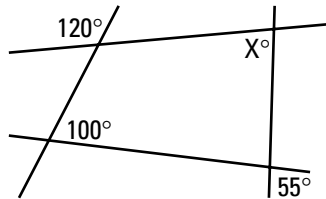
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42. Which of the following calculations will yield an even integer for any integer u ?

- F. u^2
- G. $5u^2$
- H. $6u^2$
- J. $5u^2 + 1$
- K. $6u^2 + 1$

43. In the figure below, where the 4 lines intersect at the indicated angles, $x^\circ = ?$

- A. 30°
- B. 35°
- C. 55°
- D. 70°
- E. 85°

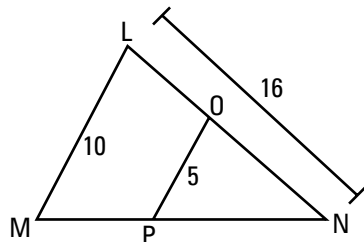


44. If the base of an isosceles triangle is 16 inches long, and each of the congruent sides is 10 inches long, what is the area, in square inches, of the triangle?

- F. 48
- G. 40
- H. 36
- J. 28
- K. 24

45. In triangle LMN shown below, side ML is parallel to side OP, and lengths in centimeters are marked. How many centimeters long is side ON?

- A. 15
- B. 11
- C. 10
- D. 8
- E. 6



46. What is the greatest y -coordinate among all points on the circle $(x - 3)^2 + (y + 2)^2 = 36$?

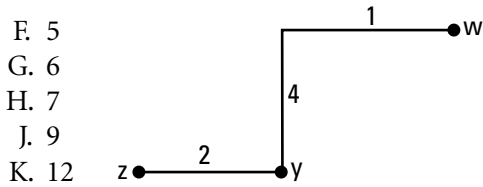
- F. 9
- G. 8
- H. 4
- J. -3
- K. -4

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

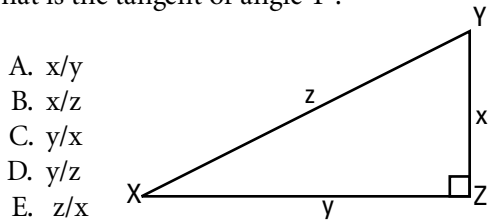
$$2y = 8x + 4$$

$$3y = 12x + 9$$

- A. -2
 B. $-(1/4)$
 C. $1/2$
 D. 4
 E. 6
48. In the figure below, all designated distances are in meters, and all angles are right angles. A straight line drawn from point W to point Z would be how many meters long?

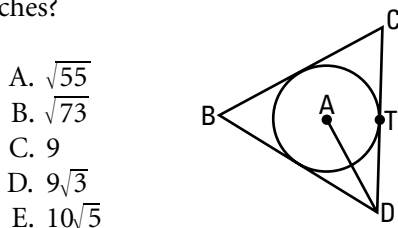


- F. 5
 G. 6
 H. 7
 J. 9
 K. 12
49. Triangle XYZ is a right triangle, and x, y, and z indicate the lengths of the sides of the triangle. What is the tangent of angle Y?



- A. x/y
 B. x/z
 C. y/x
 D. y/z
 E. z/x
50. For values of a, where $(\sin a)$, $(\cos a)$, and $(\tan a)$ are all defined,
 $(\sin a) / [(\cos a)(\tan a)] = ?$

- F. $\sin^2 a$
 G. $\cos^2 a$
 H. $1/(\tan a)$
 J. 1
 K. -1
51. In the figure below, a circle, with center A, is inscribed in BCD, and T is a point of tangency of the circle with side CD. If line segment AD is 8 inches in length, and the radius of the circle is 3 inches long, what is the length of segment TD, in inches?



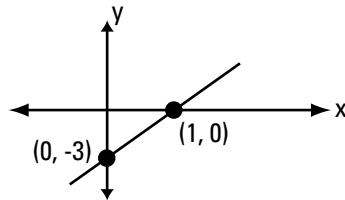
- A. $\sqrt{55}$
 B. $\sqrt{73}$
 C. 9
 D. $9\sqrt{3}$
 E. $10\sqrt{5}$

52. If $x^{(3x+2)} = 4^{(b-3)}$ and $x = 2$,
what is the value of b ?

F. 1
G. 3
H. 4
J. 7
K. 8

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

A. $-3y + 1 = 0$
B. $y = -3$ and $x = 1$
C. $y = -3x + 1$
D. $y = 3x + 3$
E. $y = 3x - 3$



54. A certain garden shop sells only roses and gardenias. The ratio of roses to gardenias is 3 to 5. The garden shop has 168 flowers. How many flowers are roses.

F. 34
G. 56
H. 63
J. 84
K. 105

55. Ted is paneling his ceiling. His ceiling is a 12 foot long by 7 foot wide rectangle. The panels are 1 foot by 2 foot rectangles. How many panels does Ted need to cover his ceiling with one layer of panels?

A. 84
B. 42
C. 28
D. 19
E. 12

56. If $(c - d)^2 = 36$ and $cd = 7$, then $c^2 + d^2 = ?$

F. 63
G. 50
H. 42
J. 36
K. 18

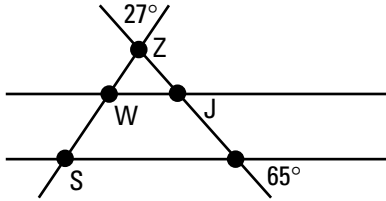
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57. If $12x^2 + 2x - a = (4x + a)(3x - 1)$, what is the value of a ?

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

58. Two transversals intersect at point z . The measures of angles are shown below. What is the measure of angle JWS ?

- F. 153°
- G. 115°
- H. 92°
- J. 78°
- K. 65°



59. $(8 - \sqrt{5})(5 - \sqrt{5}) = ?$

- A. $45 - 13\sqrt{5}$
- B. $45 - 8\sqrt{5}$
- C. $45 - 5\sqrt{5}$
- D. $35 - 13\sqrt{5}$
- E. $35 - 8\sqrt{5}$

60. How many zeros are there in the integer representation of the product of 5 million and 6 billion?

- F. 12
- G. 13
- H. 14
- J. 15
- K. 16

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