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MATHEMATICS TEST

60 Minutes – 60 Questions

DIRECTIONS: Solve each of the problems in the time allowed, then fill in the corresponding bubble on your answer sheet. Do not spend too much time on any one problem; skip the more difficult problems and go back to them later. You may use a calculator on this test. For this test you should assume that figures are NOT necessarily drawn to scale, that all geometric figures lie in a plane, and that the word *line* is used to indicate a straight line.

DO YOUR FIGURING HERE.

1. At the "Parkway" Bridge, a vehicle must be, at most, 1,500 pounds to cross the bridge. If w represents the car's weight, in pounds, this requirement can be indicated by which of the following inequalities?
   A. $w > 1{,}500$
   B. $w < 1{,}500$
   C. $w \geq 1{,}500$
   D. $w \leq 1{,}500$
   E. $w \neq 1{,}500$

2. What is the smallest positive integer that is a multiple of 2, of 6, and of 9?
   F. 12
   G. 17
   H. 18
   J. 56
   K. 112

3. If $\frac{z(x+y)^v}{u} = 1$, which of the numbers u, v, x, y, or z CANNOT be 0?
   A. u only
   B. v only
   C. x only
   D. y and z
   E. u and z

4. In a town called Hortonville, exactly 648 of the 2,160 residents have a white house. What percentage of the Hortonville residents does NOT have a white house?
   F. 30%
   G. 50%
   H. 70%
   J. 80%
   K. 90%

5. If $q = -1$ and $s = 3$, what is the value of the expression $\frac{(q-s)}{3q}$?
   A. -1
   B. $-\frac{2}{3}$
   C. $\frac{2}{3}$
   D. $\frac{4}{3}$
   E. 4

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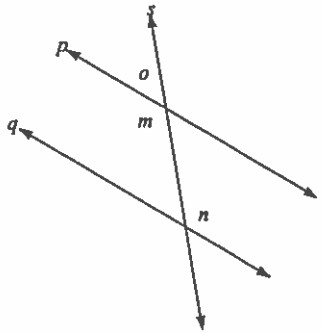
6. Which of the following expressions is equivalent to $\frac{(6p+60)}{6}$?

F. $p+10$
G. $p+60$
H. $6p+10$
J. $11p$
K. $60p$

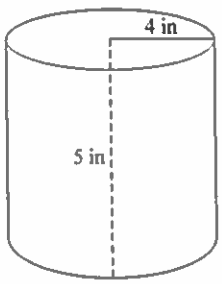
DO YOUR FIGURING HERE.

7. Given: p and q are parallel lines
s is a transversal crossing lines p and q
o, m, and n are angles
$m+n=230°$
What is the measure of angle o below?



A. 25°
B. 65°
C. 115°
D. 130°
E. 140°

8. The volume of a cylinder is $\pi r^2 h$, where r is the radius of the base of the cylinder and h is the height of the cylinder. What is the volume, in cubic inches, of a cylinder of height 5 inches that has a base of radius 4 inches?



F. 9π
G. 20π
H. 40π
J. 80π
K. 100π

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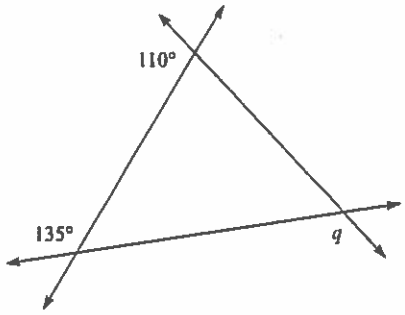
DO YOUR FIGURING HERE.

9. What is the value of $|4-x|$ if $x=7$?
   A. -11
   B. -3
   C. 3
   D. 11
   E. 47

10. In the figure below, where the triangle is created by 3 lines that intersect at the angles indicated, the measure of angle q=?



   F. 45°
   G. 65°
   H. 70°
   J. 110°
   K. 115°

11. $(\sqrt{2}-6)(\sqrt{2}-4)=?$
   A. $10\sqrt{2-22}$
   B. $12\sqrt{2+24}$
   C. $24-\sqrt{2}$
   D. $26-10\sqrt{2}$
   E. $10-11\sqrt{2}$

12. For all real numbers x and y, $(x-3y)^2=?$
   F. $2x-6y$
   G. $x^2-6xy+9y^2$
   H. x^2-9y^2
   J. $x^2-9x^2y^2-9y^2$
   K. $x^2+9xy+9y^2$

13. If x is an odd integer greater than 5, what is the next greater odd integer in terms of x?
   A. $x+2$
   B. $x+3$
   C. $x+5$
   D. $3x$
   E. x^2

14. Which of the following has the same graph as $x+8y=3$?
   F. $3x+11y=6$
   G. $2x+10y=5$
   H. $3x+y=8$
   J. $3x+24y=9$
   K. $x-8y=-3$

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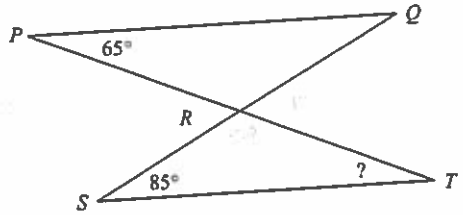
DO YOUR FIGURING HERE.

15. Anne is 3 times as old as Kyle. If their combined age is 24, how old is Anne?

A. 24
B. 18
C. 12
D. 9
E. 6

16. In the figure below, the 2 intersecting lines QS and PT form triangles PRQ and SRT. Lines PQ and ST are parallel. If angle P is 65° and angle S is 85°, what is the measure of angle T?



F. 45°
G. 55°
H. 65°
J. 75°
K. 85°

17. Carrie has $7 less than does her brother, Steve, who has d dollars. Carrie does not spend any money and earns $3. Which of the following is an expression for the amount of money, in dollars, that Carrie has?

A. $(d-7)+2$
B. $d+4$
C. $d-(7+3)$
D. $d-4$
E. $d-7$

18. If $0.2a+1.8=a-2.2$, then $a=?$

F. 4
G. 5
H. 8
J. 12
K. 20

19. Of the following, which is the smallest integer, x, satisfying the condition that $-\sqrt{8}+x$ is negative?

A. 2
B. 3
C. 4
D. 5
E. 6

20. Jennifer cut a ribbon 30 inches long into 2 pieces. The ratio of the lengths of the 2 pieces is 2:3. What is the length, to the nearest inch, of the longer piece?

F. 5
G. 6
H. 12
J. 15
K. 18

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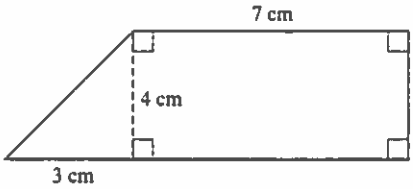
DO YOUR FIGURING HERE.

21. A circle has an area of 49π. What is the diameter of the circle?

A. 7
B. 14
C. 24.5
D. 49
E. 153

22. What is the area, in square centimeters, of the figure shown below?



F. 21
G. 24
H. 34
J. 40
K. 84

23. For all positive a, b, and c, $\frac{3a^2b^{-4}c^2}{2^{-2}ac^{-2}} = ?$

A. $\frac{3a^3b^4}{4}$
B. $\frac{12a^3}{b^4}$
C. $\frac{3ac^4}{4b^4}$
D. $\frac{12ac^4}{b^4}$
E. $\frac{12a^4c}{b^2}$

24. If $\frac{3\sqrt{7}}{7} = \frac{3\sqrt{7}}{x\sqrt{7}}$ is true, then $x = ?$

F. 49
G. 21
H. 7
J. $\sqrt{7}$
K. 1

25. Which of the following gives the complete solution for the quadratic equation $3x^2 = 4x$?

A. $x = 3$ or $x = \frac{3}{4}$
B. $x = -3$ or $x = -4$
C. $x = 0$ or $x = \frac{3}{4}$
D. $x = 0$ or $x = \frac{4}{3}$
E. $x = \frac{3}{4}$ or $x = -\frac{3}{4}$

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DO YOUR FIGURING HERE.

26. In the standard (x,y) coordinate plane, what is the slope of a line containing the points $(3,-8)$ and $(4,7)$?
F. $-\frac{1}{15}$
G. -1
H. $\frac{3}{7}$
J. 7
K. 15

27. In the standard (x, y) coordinate plane, which of the following is an equation of the circle with a center located at $(2, -7)$ and a radius of 5?
A. $(x+2)^2+(y-7)^2=25$
B. $(x-2)^2+(y+7)^2=25$
C. $(x-2)+(y+7)=5$
D. $(x-7)^2+(y+2)^2=25$
E. $x^2+y^2=25$

28. If $8x^2-8x-6=(ax-3)(4x+a)$, what is the value of a?
F. -2
G. 1
H. 2
J. 3
K. 4

29. Which of the following is the slope-intercept form of a line that is perpendicular to $y=-\frac{1}{4}x+1$ in the standard (x,y) coordinate plane and that also contains the point $(0,-5)$?
A. $y=4x-5$
B. $y=-\frac{1}{4}x$
C. $y=4x+5$
D. $y=-\frac{1}{4}x-5$
E. $y=-5x+4$

30. When baking cookies, the quantity of flour needed is a constant proportion of the number of cookies being made. If 24 cookies require 2 cups of flour, how many cups of flour will 60 cookies require?
F. 2
G. $2\frac{1}{4}$
H. 3
J. $4\frac{1}{2}$
K. 5

31. What value of p will satisfy the equation $0.1(p+1{,}800)=p$?
A. 2,000
B. 1,620
C. 800
D. 200
E. 180

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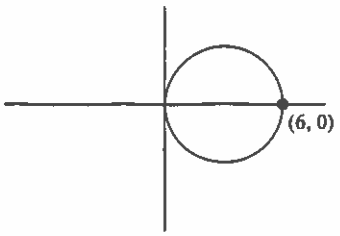
32. Which of the following is an equation of the circle shown below?



F. $(x-3)^2+y^2=9$
G. $(x-6)^2+(y-3)^2=9$
H. $x^2-(y-6)^2=3$
J. $x^2+(y+3)^2=9$
K. $(x-3)^2+(y-3)^2=9$

DO YOUR FIGURING HERE.

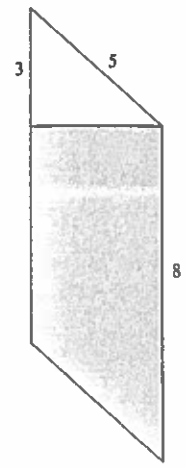
33. Which of the following is the solution statement for the inequality $x+2(5-x)\leq 2x+3$?

A. $x\leq -7$
B. $x\geq \frac{7}{3}$
C. $x\geq 3$
D. $x\leq \frac{7}{3}$
E. $x\geq 0$

34. $(4a^4)^4$ is equivalent to:

F. a
G. $4a^4$
H. $16a^8$
J. $256a^8$
K. $256a^{16}$

35. Given the parallelogram below, what is the area of the shaded region?



A. 24
B. 26
C. 32
D. 38
E. 40

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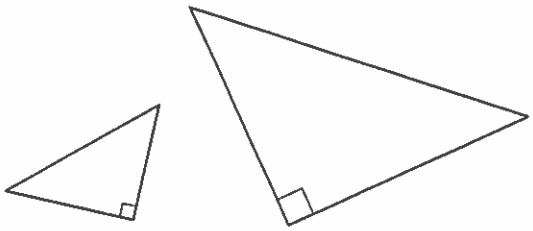
DO YOUR FIGURING HERE.

36. What is the only possible solution for x in the equation $\frac{3}{4}x - \frac{3}{8} = \frac{1}{4} + \frac{5}{8}x$?

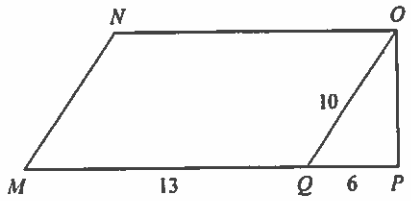
F. $\frac{1}{8}$
G. $\frac{5}{8}$
H. 3
J. $\frac{8}{5}$
K. 5

37. Two similar isosceles right triangles are shown below. The hypotenuse of the smaller triangle is $2\sqrt{2}$ cm. If the perimeter of the larger triangle is twice that of the smaller triangle, what is the length, in centimeters, of each of the 2 congruent legs of the larger triangle?



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

38. In the figure below, $MNOQ$ is a parallelogram and OPQ is a right triangle. The side lengths shown are in centimeters. What is the area, in square centimeters, of figure $MNOP$?



F. 104
G. 128
H. 136
J. 190
K. 208

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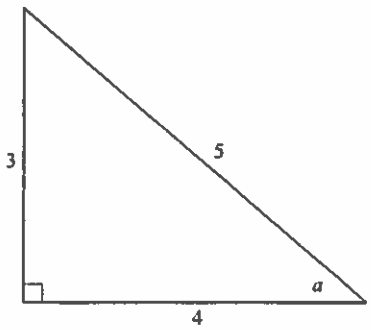
39. In the triangle below, sin a=?

DO YOUR FIGURING HERE.



A. $\frac{3}{5}$
B. $\frac{3}{4}$
C. $\frac{4}{5}$
D. $\frac{5}{4}$
E. $\frac{4}{3}$

40. If $x=-3$ and $x=5$ are solutions to the equation $(x+m)(x+n)=0$, then $m+n$=?

F. −15
G. −8
H. −2
J. 2
K. 8

41. What is the x coordinate if $(x,5)$ is on a line that passes through $(-2,-1)$ and $(2,2)$ in the standard (x, y) coordinate plane?

A. −3
B. 4
C. 5
D. 6
E. 7

42. If cos $B=\frac{15}{17}$ and the sin $B=\frac{8}{17}$, then tan B=?

F. $\frac{8}{15}$
G. $\frac{25}{17}$
H. $\frac{15}{8}$
J. $\frac{17}{15}$
K. $\frac{25}{15}$

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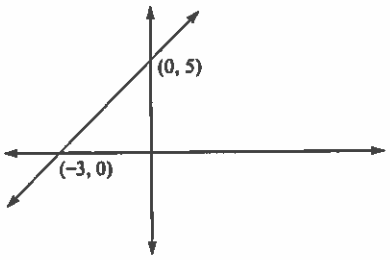
DO YOUR FIGURING HERE.

43. Which of the following expressions is illustrated in the (x, y) coordinate plane below?



A. $y = \frac{5}{3}x + 5$
B. $y = -\frac{5}{3}x + 5$
C. $y = \frac{3}{5}x - 5$
D. $y = -\frac{5}{3}x - 5$
E. $5y - 3x = 0$

44. The noncommon rays of 2 adjacent angles form a straight angle. The measure of one angle is twice the measure of the other angle. What is the measure of the smaller angle?

F. 45°
G. 55°
H. 60°
J. 65°
K. 90°

45. How many 3-letter orderings, where no letter is repeated, can be made using the letters of the word PONIES?

A. 6
B. 18
C. 30
D. 120
E. 216

46. Each side of a certain cube has a length of 5 centimeters. What is the volume of the cube, in cubic centimeters?

F. 3^5
G. 4^3
H. 5^3
J. 5^4
K. 6^3

47. For what values of x is $3x^2 + 4x - 15$ positive?

A. $x < -\frac{5}{3}$ or $x > 3$
B. $x < -5$ or $x > 3$
C. $x < -3$ or $x > 3$
D. $x < 5$ or $x > -3$
E. $x < -3$ or $x > \frac{5}{3}$

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48. Which of the following is a perfect square trinomial?
F. $4x^2+12x+9$
G. $9x^2-6x+10$
H. $2x^2+4x+16$
J. $9x^2-10$
K. $4x^2+16x+4$

49. Assuming both p and q are negative integers, if $p=2q$, which of the following must be a rational number?

I. $p+q$

II. $\frac{p}{q}$

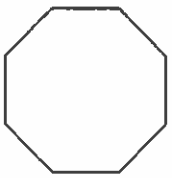
III. $\frac{q}{p}$

A. I only
B. II only
C. III only
D. II and III only
E. I, II, and III

50. Marcia rode her bike to Alan's house. The trip to Alan's house took x minutes. Returning home, Marcia was able to travel at an average speed 2 times faster than the speed at which she biked to Alan's house. Which of the following is an expression for the total number of minutes Marcia biked on the entire trip?
F. $2x$
G. $\frac{x}{2}$
H. $x+2$
J. $\frac{3}{2}x$
K. $3x$

51. If $s=19-(5+r)^3$, for what real value of r will s have its maximum value?
A. 19
B. 5
C. 1
D. -5
E. -19

52. The figure below is a regular octagon. What is the measure of 1 of the interior angles of the octagon?



F. 45°
G. 60°
H. 90°
J. 120°
K. 135°

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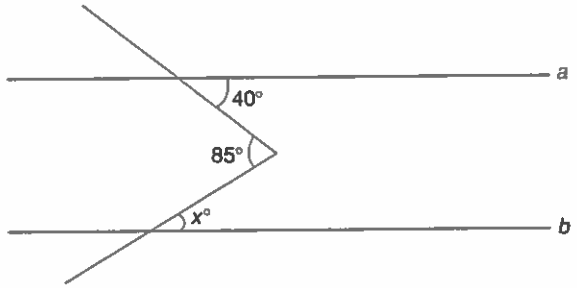
53. It is estimated that, from the beginning of 1995 to the end of 1999, the average number of CDs bought by teenagers increased from 5 per year to 9 per year. During the same time period, the average number of videogames purchased by teenagers increased from 2 per year to 10 per year. Assuming that in each case the consumption rates are the same, in what year did teenagers buy the same average number of CDs and videogames?

A. 1995
B. 1996
C. 1997
D. 1998
E. 1999

54. In the figure below, lines a and b are parallel and angle measures are as marked. If it can be determined, what is the value of x?



F. 40
G. 45
H. 50
J. 85
K. Cannot be determined from the given information

55. Which of the following is (are) equivalent to the mathematical operation $a(b+c)$ for all real numbers a, b, and c?

I. $ca+ba$
II. $ab+ac$
III. $(b+c)a$

A. I only
B. II only
C. III only
D. I and II only
E. I, II, and III

56. For values of x where $\sin x$, $\cos x$, and $\tan x$ are all defined, $\dfrac{(\tan x)}{(\sin x)(\cos x)} = ?$

F. $\dfrac{1}{\cos^2 x}$
G. $\cot x$
H. 1
J. $\sin^2 x$
K. $\sec x$

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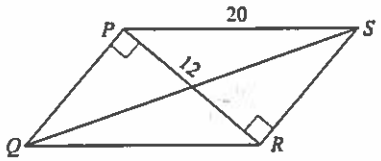
57. What is the solution set for the equation $|x^3| = -x^3$?
A. All real numbers
B. All $x \geq 0$
C. All $x \leq 0$
D. All odd numbers
E. Only $x = 1$

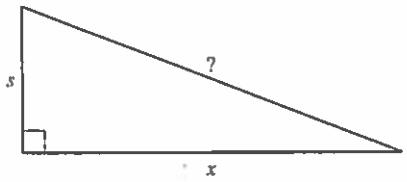
58. For which of the following values of c will there be 2 distinct solutions to the equation $3x^2 + 2x + c = 0$?
F. -1
G. 1
H. 2
J. 3
K. 4

59. In the figure below, angle QPR and angle PRS are right angles. If the length of line $\overline{PS}$ is 20 units and the length of line $\overline{PR}$ is 12 units, what is the length of line $\overline{RS}$?



A. $\sqrt{12}$
B. 16
C. $\sqrt{20}$
D. $4\sqrt{2}$
E. 20

60. The figure below shows a loading ramp at a hardware store that is s feet high and has a slope of t, where $t > 0$. Which of the following expressions gives the length of the ramp, in feet?



F. $\frac{t}{s}$
G. $t^2 + s^2$
H. $\left(\frac{t}{s}\right)^2$
J. $\frac{s}{t}$
K. $\sqrt{\left(\frac{s}{t}\right)^2 + s^2}$

END OF THE MATHEMATICS TEST
STOP! IF YOU HAVE TIME LEFT OVER, CHECK YOUR WORK ON THIS SECTION ONLY.