Math Power

Name: (First)_____(Last)_____

School: _____ Grade:_____

PSAT

Assessment (Circles)

1. A broadcast tower is located at point (-1, 3) on an *xy*-coordinate grid, where each unit is one mile. If its broadcast reaches only a 20-mile radius, what is the set of points where the broadcast is received by its listeners?
   (A) $(x + 1)^2 + (y - 3)^2 \le 400$
   (B) $(x + 1)^2 + (y - 3)^2 \ge 400$
   (C) $(x - 1)^2 + (y - 3)^2 \ge 400$
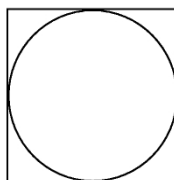   (D) $(x - 1)^2 + (y + 3)^2 \le 400$

2. In order to create a pattern for a blanket, Ming needs to use two congruent circles as shown.
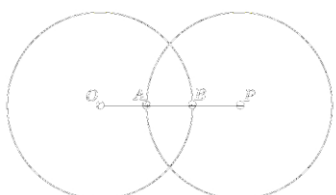
   If OP = 31 inches and AB = 5 inches, what is the radius of one of the circles?
   (A) 13 in.
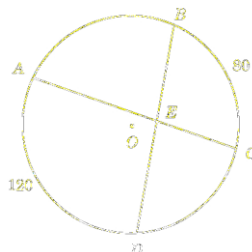   (B) 15.5 in.
   (C) 16.5 in.
   (D) 18 in.

3. A gardener wants to enclose a circular garden with a square fence, as shown below.

   If the circumference of the circular garden is about 48 feet, which of the following is the best estimate for the length of fencing needed?
   (A) 31 ft
   (B) 61 ft
   (C) 122 ft
   (D) 244 ft

4. In circle O, arc(AD) = 120° and arc(BC) = 80°.
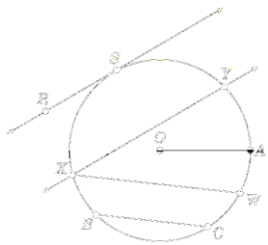

   What is the measure of ∠BEC?
   (A) 30°
   (B) 80°
   (C) 100°
   (D) 160°

5. Which of the following statements is true?
   (A) A chord is contained in a tangent.
   (B) A chord is contained in a radius.
   (C) A chord is contained in a secant.
   (D) A chord is contained in an arc.

6. In circle O, which term correctly identifies XY?


(A) chord
(B) radius
(C) secant
(D) tangent

7. *AP* is tangent to circle *O* at *A*, circle *O* has a radius of 6 ft, circle *P* has a radius of 2 ft, and *AB* = 6 ft.
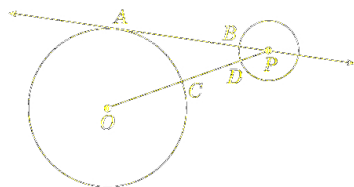
What is length of CD?
(A) 1 ft
(B) 2 ft
(C) 3 ft
(D) 4 ft

8. A spherical foam ball, 10 inches in diameter, is used to make a tabletop decoration for a party. To make the decoration sit flat on the table, a horizontal slice is removed from the bottom of the ball, as shown below.
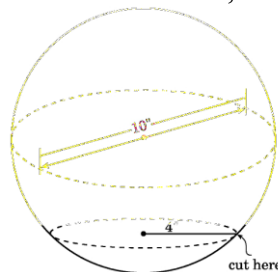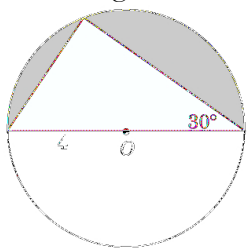

If the radius of the flat surface formed by the cut is 4 inches, what is the height of the decoration?
(A) 10 in.
(B) 8 in.
(C) 6 in.
(D) 4 in.

9. The equation of a sphere is
$(x - 2)^2 + (y - 3)^2 + (z - 4)^2 = 49$.
What are the center and the radius, r, of the sphere?
(A) (-2, -3, -4); $r = 49$
(B) (2, 3, 4); $r = 7$
(C) (2, 3, 4) ; $r = 49$
(D) (-2, -3, -4); $r = 7$

10. What is the approximate area of the shaded region?

(A) 8.57 square units
(B) 8.70 square units
(C) 9.13 square units
(D) 11.28 square units

11. Marianna designed the logo shown for a computer software company. If the diameter of the circle is 8 cm, what is the approximate area of the shaded part of the logo?
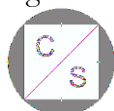

(A) 64 cm^2
(B) 50.24 cm^2
(C) 32 cm^2
(D) 18.27 cm^2

12. An inflated round balloon with radius r = 50 centimeters holds approximately 523, 600 cubic centimeters of air. When the balloon is contracted such that the radius is $\frac{2}{3}$ the original size, what is the approximate volume of the partially deflated balloon?
(A) 1.94×10^4 cm^3
(B) 1.55×10^5 cm^3
(C) 1.75×10^5 cm^3
(D) 3.49×10^5 cm^3

13. If Jim threw a marble inside the circle, what is the probability that it would land inside the triangle?
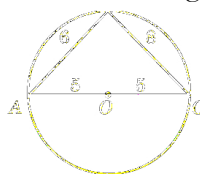
(A) 0.08
(B) 0.15
(C) 0.31
(D) 0.61

14. What is the area of the trapezoid?

(A) 83.1 cm^2
(B) 110.9 cm^2
(C) 128.0 cm^2
(D) 192.0 cm^2

15. To win a carnival game, Keisha must throw a dart at a board four feet by three feet and hit one of the 25 circles on the board. The diameter of each circle is four inches.
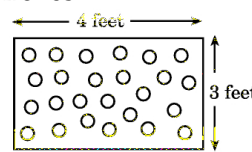
Approximately what percent of the time will a randomly thrown dart that hits the board also hit a circle?
(A) 18%
(B) 26%
(C) 63%
(D) 73%

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16. A point is randomly selected on XY. What is the probability (p) that it will p be closer to the midpoint of XY than XY to either X or Y?

(A) $p = \frac{1}{4}$

(B) $p = \frac{1}{3}$

(C) $p = \frac{1}{2}$

(D) $p = \frac{3}{4}$

Algebra I Review

17. How many cents are there in $2x - 1$ dimes?

22. A storekeeper sold *n* articles at *D* dollars each and thereby made a profit of *r* dollars. The cost to the storekeeper for each article was _____.

18. How many days are there in *w* weeks and *w* days?

Question set [**23 - 24**]

A classroom has *R* rows desks with *D* desks in each row.

23. On a particular day when all pupils are present 3 seats are left vacant. The number of pupils in this class is _____.

19. How many pupils can be seated in a room with *s* single seats and *d* double seats?

24. If the students are asked to sit as tightly as possible by taking seats from the front to the back, from left to the right. How many students are there if the last seat is at *r*-th row and *d*-th seat (counting from front and from left)?

20. A storekeeper had *n* loaves of bread. By noon he had *s* loaves left. How many loaves did he sell?

21. Sylvia is two years younger than Mary. If Mary is *m* years old, how old was Sylvia two years ago?

25. $\frac{y}{s-t} = \frac{s+t}{t-s}$, $y =$ _____

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26. $\frac{a}{b} = c$, $b = c$. Find b in terms of a.

_____

31. $\sqrt{x^2 y^2 - y^2} =$ _____

    (A) $x - 1$
    (B) $y\sqrt{x^2 - 1}$
    (C) $y(x^2 - 1)$
    (D) $(x^2-1)\sqrt{y}$
    (E) $xy - y$

27. $7x - 5y = 13$ and $2x - 7y = 26$. $5x + 2y =$

_____

32. $\frac{a+b}{a-b} \div \frac{b+a}{b-a} =$ _____

33. The expression a^x means that a is to be used a factor x times. Therefore, if a^x is squared, the result is _____.

28. $2x - 4y = -10$ and $5x - 3y = 3$. $3x - 6y =$

_____

29. If $a \neq 0$, and $a = \frac{ax}{1-x}$, then $x =$

_____

34. $\frac{\frac{1}{1}}{\frac{1}{N}} \div \frac{1}{N} =$

30. If $x\sqrt{.16} = 2$, then $x =$ _____

35. $\frac{1}{x} = \sqrt{.16}$, $x =$

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36. If $x^2 = 5$, then $6x^6 =$

37. If $17xy + 7 = 19xy$, $4xy =$

38. $3x + 10 = 9x - 20$, $(x+5)^2 =$

39. $3r - 2s = 0$, $\frac{9r^2}{s^2} =$ _____

40. If $a = \frac{1}{2}$, $b = \frac{2}{3}$, and $c = \frac{3}{4}$, what is the value of $(2a+3b)/c$? _____

41. After simplification, $\frac{4(O-P)-8P}{6P-2O} =$ _____.

42. One-half a number is 17 more than one-third of that number. What is the number?

43. In which can the 2's be cancelled out without changing the value of the expression?
(A) $2x - 2m$
(B) $\frac{\frac{x}{2}}{\frac{2}{m}}$
(C) $\frac{2x-m}{2}$
(D) $\frac{x^2}{m^2}$
(E) $\frac{\frac{2}{x}}{\frac{2}{m}}$

44. $-\frac{1}{7}$ and 0 are roots of which of the following equations?
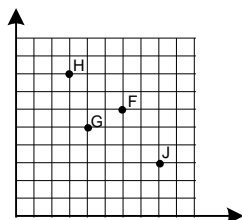(A) $7x^2 - 3x = 0$
(B) $7x^2 + 3 = 0$
(C) $7x^2 - 3 = 0$
(D) $7x^2 + x = 0$
(E) $7x + 3 = 0$

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Integrated Review

45. Which point shown below corresponds to (8, 3)?

(A) Point F
(B) Point G
(C) Point H
(D) Point J

46. For what priced item does 40% off equal a $4.00 discount?
(A) $16.00
(B) $4.00
(C) $8.00
(D) $10.00

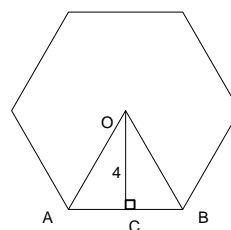47. If $2(a + m) = 5m - 3 + a$, what is the value of a, in terms of m?
(A) $\frac{3m}{2}$
(B) 3
(C) $5m$
(D) $4m + 33$
(E) $3m - 3$

48. If Mary bought e pencils, Jane bought 5 times as many pencils as Mary, and Peggy bought 2 pencils fewer than Mary, then in terms of e, how many pencils did the three girls buy all together?
(A) $7e - 2$
(B) $5e - 2$
(C) 7
(D) $8e$
(E) $8e - 2$

49. Calculate the area of the hexagon.

(A) $96\sqrt{3}$
(B) $32\sqrt{3}$
(C) 32
(D) $16\sqrt{3}$

50. Tony is now three years older than Karen. If seven years from now the sum of their ages is 79, how old is Karen now?

51. Two positive whole numbers are in a ratio of 3 to 4. If the smaller one is 9, what is the average of the two numbers?
    (A) 4
    (B) 10
    (C) 10.5
    (D) 12

52. Find the height of a triangle whose area is 280 sq. inches with base 20 in.
    (A) 14 inches
    (B) 28 inches
    (C) 56 inches
    (D) 84 inches

53. If $6x - 4 = 38$, then $x - 5 =$
    (A) 2
    (B) 3
    (C) 5
    (D) 7
    (E) 9

54. Solve for x:
    $$7x - 3 = 4x + 6$$
    (A) 2
    (B) 4
    (C) -1
    (D) 3
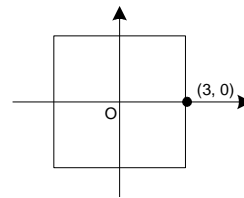
55. $(-3)^2 - 4(-3) =$
    (A) 3
    (B) -15
    (C) 108
    (D) 21

56. Express as a ratio in simplest form: 5 feet to 3 inches
    (A) 5:3
    (B) 3:5
    (C) 1:20
    (D) 60:3
    (E) 20:1

57. In the figure O is the center of the square with sides parallel to the coordinates axes.

    What is the perimeter of the square?
    (A) 9
    (B) 12
    (C) 24
    (D) 36
    (E) 48

58. Any number that is divisible by both 12 and 18 is also divisible by
    (A) 216
    (B) 72
    (C) 108
    (D) 36

59. If n is an integer which of the following must be odd?
    (A) $n + 1$
    (B) $2n + 1$
    (C) $3n + 2$
    (D) n^2
    (E) $n^2 + 2$

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60. Trevor's monthly rent increased from $900 to $1,080. Find the percent of increase.
(A) 15%
(B) 20%
(C) 25%
(D) 30%

61. $(-4)^2 - 3(-4) =$
(A) -4
(B) 52
(C) -52
(D) 28

62. A dress originally priced at $90 is marked down 35%, then discounted a further 10%. What is the new, reduced price?

63. If two fractions, each of which has a value between 0 and 1, are multiplied together, the product will be:
(A) Always greater than both of the original fractions
(B) Always less than both of the original fractions
(C) Sometimes greater and sometimes less than both of the original fractions
(D) Never less than both of the original fractions

64. The original price of a television decreases by 20 percent. By what percent must the price increase to reach its original value?
(A) 15%
(B) 20%
(C) 25%
(D) 30%
(E) 40%

65. If $x = 7$ and $y = 5$, what is the value of $(x - y)(x + y) + xy$?
(A) 26
(B) 36
(C) 49
(D) 59
(E) 99

66. If x is subtracted from $\frac{1}{x}$, the result is
(A) $\frac{2}{x}$
(B) $\frac{x-1}{x}$
(C) $\frac{x-x^2}{x}$
(D) $\frac{1-x^2}{x}$

67. Tom's bowling scores were 175, 155, and 210. What is his average score?
(A) 540
(B) 185
(C) 180
(D) 175

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68. Assume that the notation $\Psi(a, b, c)$ means "Subtract the sum of a, b and c from the product of a, b and c. What is the value of $\Psi(4, 5, 6) + \Psi(3, 2, 1)$?
    (A) -111
    (B) -105
    (C) 0
    (D) 105
    (E) 111

69. Two angles of a triangle are 45° and 75°. What is the measure of the third angle?
    (A) 60°
   (B) 35°
    (C) 180°
    (D) 45°

70. An automobile traveling 50 miles per hour will take how many hours to travel 1,000 miles?
    (A) 2
    (B) 5
    (C) 10
    (D) 20

71. A car uses $\frac{1}{3}$ of its gas with 8 gallons remaining. How many gallons of gas are used?
    (A) 2
    (B) 4
    (C) 6
    (D) 8

72. On a blueprint, 6 inches represent 27 feet. How long must a line be to represent 72 feet?
    (A) 16 inches
    (B) 12 inches
    (C) 6 inches
    (D) 4 inches

73. A snapshot measures $2\frac{1}{2}$ inches by $1\frac{2}{3}$ inches. It is to be enlarged so that the longer dimension will be 5 inches. After enlargement, the area becomes
    (A) $2\frac{1}{3}$ times
    (B) 4 times
    (C) $4\frac{1}{2}$ times
    (D) $6\frac{1}{2}$ times

74. ΔABE and ΔACD are similar. Find the length of DE.
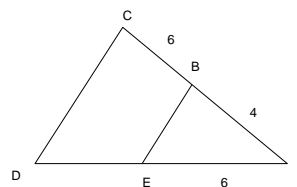
    (A) 9
    (B) 15
    (C) 4
    (D) 11
    (E) 8

Answer Key

Assessment (Circles)

1. A
2. D
3. B
4. C
5. C
6. C
7. B
8. B
9. B
10. D
11. D
12. B
13. C
14. B
15. A
16. C

Algebra I Review

17. $20x - 10$
18. $8w$
19. $2d+s$
20. $n - s$
21. $m - 4$
22. $(Dn-r)/n$ or $D - r/n$
23. $RD - 3$
24. $D(r-1) + d$

25. $-s - t$

26. $\pm\sqrt{a}$
    $\frac{a}{b} = c = b \Rightarrow a = b^2 \Rightarrow b = \pm\sqrt{a}$

27. -13
    Subtract the second equation from the first one, you will get the desired result.

28. -15
    You have to solve the system of linear equations, so you get $x = 3$ and $y = 4 \Rightarrow$
    $3x - 6y = -15$

29. $\frac{1}{2}$
    $a = \frac{ax}{1-x}$
    $1 = \frac{x}{1-x}$ (cancellation)
    $1 - x = x \Rightarrow x = \frac{1}{2}$

30. 5

31. $y\sqrt{x^2 - 1}$

32. -1

33. a^{2x}

34. N^2

35. 2.5

36. 750

37. 14

38. 100

39. 4

40. 4

41. -2

42. 102
    $\frac{1}{2}x = \frac{1}{3}x + 17$
    $\frac{1}{6}x = 17$
    $x = 102$

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43. E

44. D
$7x^2+x = x(7x+1) = 0$
$x=0$ or $x=-\frac{1}{7}$

Integrated Review

45. D

46. D

47. E

48. A
Mary $= e$
Jane $= 5e$
Peggy $= e$ - 2
M + J + P $= 7e$ - 2

49. B

50. 31

51. C
The bigger one is 12.
The average is $\frac{1}{2}(9 + 12) = 10.5$

52. B
$280÷20×2 = 28$

53. A

54. D

55. D

56. E
$5×12:3 = 20:1$

57. C

58. D
The GCD of 12 and 18 is 36.

59. B

60. B
$(1080 - 900)÷900 = 20\%$

61. D
$(-4)^2 - 3(-4)$
$= 16 + 12$
$= 28$

62. $52.65

63. B

64. C

65. D
$2×12 + 35 = 59$

66. D

67. C

68. D

69. A

70. D
$1000÷50 = 20$

71. $1 - \frac{1}{3} = \frac{2}{3}$
$\frac{1}{3}÷\frac{2}{3} = \frac{1}{2}$ (ratio between used gas and un-used gas)
$\frac{1}{2}×8 = 4$ gallons

72. A
$\frac{6}{27} = \frac{x}{72}$
$x = 16$

73. B
$(\frac{5}{2\frac{1}{2}})^2 = 4$

74. A

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