Algebra 2 - Standards Assessment

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. If x is a real number, for what values of x is the equation $\log_5 6^x = x \log_5 6$ true?
   A no values of x
   B some values of x
   C all values of x
   D impossible to determine

2. Which ordered pair is the vertex of $f(x) = -x^2 + 4x - 4$?
   F $\left(\frac{1}{2}, -\frac{9}{4}\right)$
   G $\left(\frac{1}{2}, -\frac{7}{4}\right)$
   H (2, 8)
   I (2, 0)

3. Which system of equations has $\left(-3, \frac{1}{2}\right)$ as a solution?
   A $2x + 2y = -5$
   $-x + 6y = 6$
   B $2x + 2y = 7$
   $x - 2y = -4$
   C $2x - 3y = 10$
   $4x + 3y = -7$
   D $x - 6y = -6$
   $x - 4y = -1$

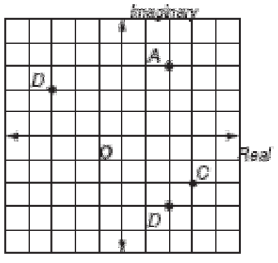
4. If $\log_4 x = -3$, what is the value of x?
   F $x = -12$
   G $x = -\frac{1}{12}$
   H $x = \frac{1}{64}$
   I $x = 64$

5. Which product of factors is equivalent to $64y^2 + 112y + 49$?
   A $(8y + 7)(8y - 7)$
   B $(8y + 7)(8y + 7)$
   C $(8y + 56)(8y + 56)$
   D $(8y - 7)(8y - 7)$

6. What is the simplest form of $\frac{1}{1 - \frac{1}{x+4}}$?
   F $\frac{3}{4}$
   G $\frac{x+4}{x+5}$
   H $\frac{x+4}{x+3}$
   I $\frac{x+3}{x+4}$

7. $(3x - 5y)^3 =$
   A $27x^3 - 135x^2y + 225xy^2 - 125y^3 - 15$
   B $27x^3 - 135x^2y + 225xy^2 - 125y^3$
   C $3x^3 - 15x^2y + 25xy^2 - 5y^3$
   D $27x^3 - 135x^2y + 225xy^2 - 125y^3 - 15xy - 5$

8. If $i = \sqrt{-1}$, which point shows the location of $2 + 3i$?



   F A
   G B
   H C
   I D

9. Which matrix equation represents the following system of equations?

$$5x - y + 3z = -8$$
$$2x + 2y + 3z = -5$$
$$6x + 5y - z = -5$$

A $\begin{bmatrix} x \\ y \\ z \end{bmatrix} \cdot \begin{bmatrix} 5 & 2 & 6 \\ -1 & 2 & 5 \\ 3 & 3 & -1 \end{bmatrix} = \begin{bmatrix} -8 \\ -5 \\ -5 \end{bmatrix}$

B $\begin{bmatrix} 5 & -1 & 3 \\ 2 & 2 & 3 \\ 6 & 5 & -1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -8 \\ -5 \\ -5 \end{bmatrix}$

C $\begin{bmatrix} x \\ y \\ z \end{bmatrix} \cdot \begin{bmatrix} 5 & -1 & 3 \\ 2 & 2 & 3 \\ 6 & 5 & -1 \end{bmatrix} = \begin{bmatrix} -8 \\ -5 \\ -5 \end{bmatrix}$

D $\begin{bmatrix} 5 & 2 & 6 \\ -1 & 2 & 5 \\ 3 & 3 & -1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -8 \\ -5 \\ -5 \end{bmatrix}$

10. Which equation is true for all real numbers?

F $(x^{10})^{\frac{1}{2}} = x^5$

G $\sqrt[4]{x^4} = x$

H $\log_3 x - \log_3 y = \log_3 \frac{x}{y}$

I $\sqrt[7]{x^7} = x$

11. What ordered pair identifies the minimum point on the graph of the quadratic function $y = x^2 + 2x - 15$?

A $(-1, -16)$
B $(1, -12)$
C $(0, -15)$
D $(-2, -23)$

12. For which values of x is the equation $\frac{\sqrt{(16 - x^2)^2}}{4 - x} = 4 + x$ true?

F for all real numbers x
G for some real numbers x
H for no real numbers x
I impossible to determine

13. If $i = \sqrt{-1}$, what is the value of i^{15}?

A -1
B 1
C i
D $-i$

14. What amount must be added to each side of $2x^2 - 6x = 5$ to solve by completing the square?

F 18
G 9
H $\frac{9}{2}$
I $-\frac{9}{2}$

15. To the nearest tenth, what is the standard deviation of the following temperatures?

6° 8° 11° 16° 4°

A 17.6°
B 9.3°
C 9°
D 4.2°

16. A chef has 5 red potatoes and 6 white potatoes in a box. He randomly removes one potato from the box, then decides he does not want to serve potatoes, and puts it back. What is the probability that the potato he chose and the next potato he chooses randomly will both be red potatoes?

F $\frac{25}{121}$

G $\frac{36}{121}$

H $\frac{5}{6}$

I $\frac{10}{11}$

17. What is the sum when $(4x^2 - 6x - 5)$ is added to $(-3x^2 + 5x - 6)$?

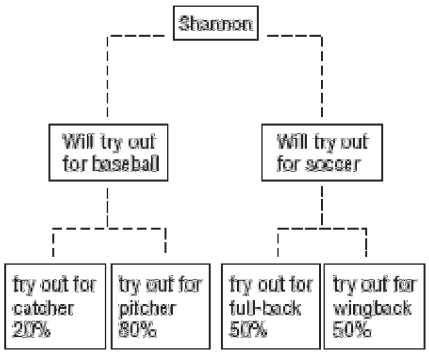
A $x^2 - 11x - 1$

B $7x^2 - 11x + 1$

C $x^2 - x - 11$

D $x^2 - x - 1$

18. The probabilities of what Shannon will do today are shown in the chart below.



Shannon will definitely either try out for baseball or for soccer, but not both. The probability that Shannon will try out for baseball and try out for catcher is 6%. What is the probability that Shannon will try out for soccer?

F 47%

G 60%

H 70%

I 94%

19. What is the complete factorization of $16a^2 - 9b^2$?

A $(4a - 3b)(4a - 3b)$

B $(4a - 3b)(4a + 3b)$

C $(16a - 9b)(a + b)$

D $(8a - 3b)(8a + 3b)$

20. What are the values of x and y that make $(2x - yi)(3 - 2i) = 10 - 11i$ true?

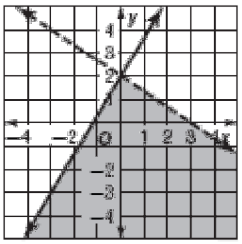
F $x = 1, y = \frac{1}{2}$

G $x = 1, y = 2$

H $x = -2, y = -1$

I $x = 2, y = 1$

21. What system of inequalities *best* represents the graph shown below?



A $y < \frac{2}{3}x + 2$ and $y \leq -\frac{1}{3}x + 2$

B $y < \frac{2}{3}x + 2$ and $y \geq -\frac{1}{3}x + 2$

C $y < -\frac{2}{3}x + 2$ and $y \leq \frac{5}{3}x + 2$

D $y > -\frac{2}{3}x + 2$ and $y \geq \frac{5}{3}x + 2$

22. What is the complete solution to the equation $|5 - 4x| = 3$?

F $x = 2; x = \frac{1}{2}$

G $x = 2; x = -\frac{1}{2}$

H $x = -2; x = \frac{1}{2}$

I $x = \frac{1}{2}$

23. What is the solution to the equation $8^x = 24$?

A $x = \dfrac{\log_{10} 8}{\log_{10} 24}$

B $x = \dfrac{\log_{10} 24}{\log_{10} 8}$

C $x = 3$

D $x = \dfrac{1}{3}$

24. $y^{\frac{2}{5}} =$

F $\sqrt[2]{y^5}$

G $\sqrt[5]{y^2}$

H $\sqrt[2]{5^y}$

I $\sqrt[5]{2^y}$

25. Which of the following *most* accurately describes the translation of the graph $y = (x + 3)^2 + 5$ to the graph of $y = (x + 1)^2 + 2$?

A down 3 and 2 to the right

B 3 to the right

C up 3 and 2 to the left

D down 2 and 3 to the right

26. How many real zeros does the function $f(x) = x^2 - 8x - 2$ have?

F 0

G 1

H 2

I 3

27. A rectangle has an area that can be expressed as $x^2 - 12x + 35$. If the width is 5 feet, what is the length?

A 6 feet

B 6.5 feet

C 6.8 feet

D 7 feet

28. A box contains 6 baseballs, 5 softballs, and 9 tennis balls. If a ball is drawn at random from the box, what is the probability that it will be a baseball?

F $\dfrac{1}{19}$

G $\dfrac{1}{6}$

H $\dfrac{1}{4}$

I $\dfrac{3}{10}$

29. Which equation, when graphed, produces a line closest to the x-axis?

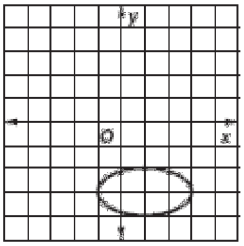
A $y = 25^{\frac{3}{2}}$

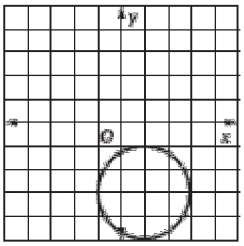
B $y = 8^{\frac{2}{3}}$

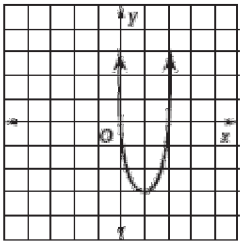
C $y = 16^{\frac{3}{4}}$

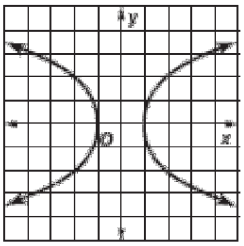
D $y = 4^{\frac{2}{5}}$

30. Which is the graph of $2x^2 - 4x + 2y^2 + 12y = -12$?

F 

G 

H 

I 

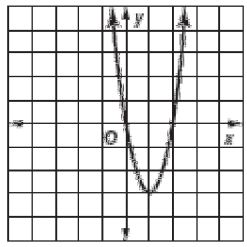
31. What is the remainder when $a^2 + 7ab + 10 - 30b^2$ is divided by $a - 3b$?
A 10
B 3
C 0
D −10

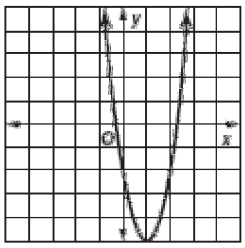
32. Harold wants to create several different 7-character passwords. He wants to use arrangements of the first 4 letters of his name (haro) *followed by* arrangements of the 3 digits in 624, his house number. How many different passwords can he create in this way?
F 240
G 144
H 84
I 12

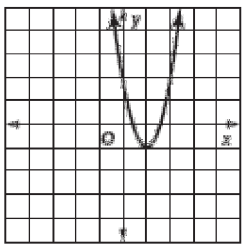
33. What is the sum of the infinite geometric series $2 + \frac{1}{2} + \frac{1}{8} + \ldots$?
A $\frac{8}{3}$
B $\frac{21}{8}$
C $\frac{19}{8}$
D $\frac{9}{4}$

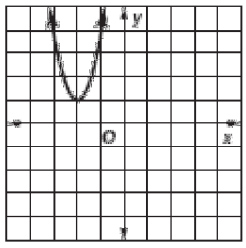
34. What is the third term in the binomial expansion of $(3 + 2y)^4$?
F $96y^3$
G $36y^3$
H $216y^2$
I 81

35. If the graph of the equation $y = 3(x - 1)^2 - 3$ is shifted 2 units up, which would be the graph of the new parabola?

A 

B 

C 

D 

36. $\log_8 24 =$

F $\dfrac{\log_{10} 24}{\log_{10} 8}$

G $\dfrac{\log_{10} 8}{\log_{10} 24}$

H $(\log_{10} 24)(\log_{10} 8)$

I $(\log_{10} 8) + (\log_{10} 24)$

37. What is the simplest form of $\dfrac{-45x^{n+1} + 6x^2}{3x}$?

A $-45x^{n+1} + 2x$

B $-15x^{n+2} + 2x$

C $-15x^n + 6x^2$

D $-15x^n + 2x$

38. Jorge, Kali, and Toya are among 10 students who have a chance to win a free book from the Lava Beds National Monument bookstore. Three students from the group will be selected at random to each win a book. What is the possibility that the 3 students selected will be Jorge, Kali, and Toya?

F $\dfrac{1}{120}$

G $\dfrac{1}{30}$

H $\dfrac{1}{10}$

I $\dfrac{3}{10}$

39. Which product of factors is equivalent to $8x^3 - 125y^3$?

A $(2x + 5y)(4x^2 + 10xy + 25y^2)$

B $(x + y)(8x^2 + xy + 125y^2)$

C $(2x - 5y)(4x^2 + 10xy + 25y^2)$

D $(x - y)(8x^2 + xy + 125y^2)$

40. A certain radioactive element decays over time according to the equation $y = A\left(\dfrac{1}{3}\right)^{\frac{t}{200}}$, where $A =$ the number of grams present initially and $t =$ time in years. If 5400 grams were present initially, how many grams will remain after 600 years?

F 0 grams

G 200 grams

H 600 grams

I 4800 grams

41. If $4^{5x-1} = 64^x$, what is the value of x?

A $x = \dfrac{1}{4}$

B $x = \dfrac{1}{2}$

C $x = \dfrac{3}{5}$

D $x = 2$

42. Which is the first incorrect step in simplifying $\log_4 8^2 + \log_4 2^3 - \log_4 2$?

$\log_4 8^2 + \log_4 2^3 - \log_4 2$
Step 1: $= 2\log_4 8 + 3\log_4 2 - \log_4 2$
Step 2: $= 2\log_4 48 + 2\log_4 2$
Step 3: $= 2\log_4 2^3 + 2\log_4 2$
Step 4: $= 6\log_4 2 + 2\log_4 2$
Step 5: $= 8\log_4 2$

F Step 1
G Step 3
H Step 4
I Each step is correct.

43. What is the eccentricity of the graph of the equation $9x^2 + 25y^2 = 900$?
A 0
B 0.8
C 0.9
D 1

44. What are the solutions to the equation $2x^2 - 5x = -5$?

F $x = \frac{5-5\sqrt{3}}{4}, x = \frac{5+5\sqrt{3}}{4}$

G $x = \frac{5-\sqrt{15}}{4}, x = \frac{5+\sqrt{15}}{4}$

H $x = \frac{5+i\sqrt{15}}{4}, x = \frac{5-i\sqrt{15}}{4}$

I $x = \frac{5+i\sqrt{15}}{2}, x = \frac{5-i\sqrt{15}}{2}$

45. $\left(x-2-\frac{3}{x}\right)\left(2-\frac{x+2}{x+1}\right)\left(\frac{3x-2}{x^2-8x+15}\right) =$

A $2x-7$
B $-\frac{1}{5}$
C $\frac{(3x-2)(x+4)}{x(x-5)}$
D $\frac{3x-2}{x-5}$

46. Which function is the inverse of $f(x) = \frac{3}{8}x - 3$?

F $f^{-1}(x) = \frac{8}{3}x + 8$

G $f^{-1}(x) = 3x - 24$

H $f^{-1}(x) = 3x + 24$

I $f^{-1}(x) = -\frac{8}{3}x - 8$

47. Which is the first incorrect step in simplifying $\left(8x^3 y^{\frac{1}{2}}\right)^{\frac{2}{3}}$?

Step 1: $\left(8x^3 y^{\frac{1}{2}}\right)^{\frac{2}{3}} = \left(2^3 x^3 y^{\frac{1}{2}}\right)^{\frac{2}{3}}$
Step 2: $= 2^2 x^2 \sqrt{y^3}$
Step 3: $= 4x^2 y\sqrt{y}$

A Step 1
B Step 2
C Step 3
D Each step is correct.

48. A box contains 4 long red ribbons, 3 long yellow ribbons, 2 short red ribbons, and 7 short yellow ribbons. If a ribbon is drawn at random, what is the probability that it is red, given that it is one of the long ribbons?

F $\frac{3}{4}$
G $\frac{4}{7}$
H $\frac{3}{8}$
I $\frac{1}{4}$

49. Madhu found the mean and standard deviation of the set of numbers given above. If she multiplies the variance by 4, which of the following will result?

4, 7, 8, 1, 0

A The standard deviation will be multiplied by 2.
B The standard deviation will be multiplied by 4.
C The mean will increase by 4.
D The mean will be multiplied by 4.

50. $(8y^2 - 7y + 6) - 3(2y^2 - y + 6) =$
F $2y^2 - 6y + 12$
G $2y^2 - 10y + 12$
H $2y^2 - 6y$
I $2y^2 - 4y - 12$

51. $\frac{x^2 - x - 2}{7x} \div \frac{x^4 - 5x^2 + 4}{63x^4} =$
A -1
B $\frac{9x^3}{(x+2)(x-1)}$
C $\frac{9x^3}{2x+1}$
D $\frac{9x^3}{x^2 - 5x + 2}$

52. If $\log 2 \approx 0.301$ and $\log 3 \approx 0.477$, what is the approximate value of $\log 18$?
F 0.460
G 0.778
H 1.255
I 1.380

53. What is an equivalent form of $(6 - 3i) - (4i + 9)$?
A $-3 - 7i$
B $2 + 6i$
C $15 - 7i$
D -4

54. What is the solution to the system of equations shown below?

$$\begin{aligned} x - 5y - 6z &= 11 \\ 2x + y + z &= 2 \\ -x - 3y - 4z &= 3 \end{aligned}$$

F infinitely many solutions
G no solutions
H $(2, -3, 1)$
I $(-2, 1, 1)$

55. What is the nth term in the arithmetic series below?

$4 + 10 + 16 + 22 + \ldots$

A $n + 6$
B $6n + 22$
C $6n + 2$
D $6n - 2$

56. Which system of inequalities' solution is an empty set?
F $2x + y > 0$
$3x + y \leq 0$

G $2y - x > 2$
$2y - x < 6$
H $3x + y > -1$
$x - 3y > 13$

I $4y - 2x \geq 12$
$2y - x \leq 6$

57. What is an equivalent form of $\frac{3}{3 - i}$?
A $9 - 3i$
B $\frac{9 + 3i}{8}$
C $\frac{9 + 3i}{10}$
D $-\frac{1}{i}$

58. What value of k makes 3 the only real zero of the graph of $f(x) = x^2 + kx + 9$?

F $k = -6$
G $k = 6$
H $k = -12$
I $k = 12$

59. $\dfrac{x}{x^{-1}} - \dfrac{x^2 - 4}{x + 2} =$

A $x^2 - x + 2$
B $\dfrac{x^2 - 2}{x}$
C $\dfrac{x + 2}{x}$
D $\dfrac{-x^2 - x - 2}{x + 2}$

60. $2m - 1\overline{)\,4m^3 - 7m - 5}$

F $2m^2 - \dfrac{5m - 5}{2m - 1}$
G $2m^2 + \dfrac{5m - 5}{2m - 1}$
H $2m^2 - m + 3 + \dfrac{8}{2m - 1}$
I $2m^2 + m - 3 - \dfrac{8}{2m - 1}$

61. Which is the *best* approximation for x if $\log_{10} 3 \approx 0.5$, $\log_{10} 2 \approx 0.3$, and $\log_8 27 = x$?

A $0.5 < x < 0.3$
B $1 < x < 2$
C $2 < x < 3$
D $3 < x < 4$

62. Param wrote the equation $\dfrac{x^2 - 25}{x - 5} = x + 5$ on the board. Which of the following statements is correct about the equation he wrote?

F The equation is always true.
G The equation is never true.
H The equation is always true except for $x = 5$.
I The equation is true when $x = 5$ and $x = -5$.

63. $\dfrac{x + 6}{3x - 2} + \dfrac{-20x - 16}{9x^2 - 4} =$

A $\dfrac{3x^2 - 4}{9x^2 - 4}$
B $\dfrac{-19x - 16}{9x^2 - 4}$
C $3x^2 - 4$
D 3

64. A necklace is made up of a clasp, 8 different beads, and a clasp hook. If the clasp must be first and the clasp hook last, how many different ways can the necklace be arranged?

F 3,628,800
G 40,320
H 20,160
I 720

65. What are the solutions to the equation $3x^2 - 5x + 2 = 0$?

A $x = \dfrac{2 + i}{3}; x = \dfrac{2 - i}{3}$
B $x = \dfrac{5 + i}{6}; x = \dfrac{5 - i}{6}$
C $x = \dfrac{2}{3}; x = 1$
D $x = -\dfrac{2}{3}; x = -1$

Algebra 2 - Standards Assessment
Answer Section

MULTIPLE CHOICE

1. ANS: C STA: (Key)15.0
2. ANS: I STA: (Key)10.0
3. ANS: A STA: (Key)2.0
4. ANS: G STA: (Key)11.1
5. ANS: B STA: (Key)4.0
6. ANS: H STA: (Key)7.0
7. ANS: B STA: (Key)20.0
8. ANS: F STA: (Key)5.0
9. ANS: B STA: (Key)2.0
10. ANS: I STA: (Key)15.0
11. ANS: A STA: (Key)10.0
12. ANS: G STA: (Key)15.0
13. ANS: D STA: (Key)5.0
14. ANS: H STA: (Key)8.0
15. ANS: D STA: PS 7.0
16. ANS: F STA: PS 1.0
17. ANS: C STA: (Key)3.0
18. ANS: H STA: PS 2.0
19. ANS: B STA: (Key)4.0
20. ANS: I STA: (Key)6.0
21. ANS: C STA: (Key)2.0
22. ANS: F STA: (Key)1.0
23. ANS: B STA: (Key)11.1
24. ANS: G STA: (Key)12.0
25. ANS: A STA: (Key)9.0
26. ANS: H STA: (Key)10.0
27. ANS: D STA: (Key)8.0
28. ANS: I STA: (Key)19.0
29. ANS: D STA: (Key)12.0
30. ANS: G STA: 17.0
31. ANS: A STA: (Key)3.0
32. ANS: G STA: (Key)18.0
33. ANS: A STA: 22.0
34. ANS: H STA: (Key)20.0
35. ANS: C STA: (Key)9.0
36. ANS: F STA: 13.0
37. ANS: D STA: (Key)7.0
38. ANS: F STA: (Key)19.0

39. ANS: C STA: (Key)4.0
40. ANS: G STA: (Key)12.0
41. ANS: B STA: (Key)11.1
42. ANS: I STA: (Key)11.2
43. ANS: B STA: 16.0
44. ANS: H STA: (Key)8.0
45. ANS: D STA: (Key)7.0
46. ANS: F STA: 24.0
47. ANS: B STA: (Key)11.2
48. ANS: G STA: PS 2.0
49. ANS: A STA: PS 7.0
50. ANS: I STA: (Key)3.0
51. ANS: B STA: (Key)7.0
52. ANS: H STA: 14.0
53. ANS: A STA: (Key)6.0
54. ANS: H STA: (Key)2.0
55. ANS: D STA: 22.0
56. ANS: G STA: (Key)2.0
57. ANS: C STA: (Key)6.0
58. ANS: F STA: (Key)10.0
59. ANS: A STA: (Key)7.0
60. ANS: I STA: (Key)3.0
61. ANS: B STA: 14.0
62. ANS: H STA: (Key)15.0
63. ANS: A STA: (Key)7.0
64. ANS: G STA: (Key)18.0
65. ANS: C STA: (Key)8.0