Algebra 2
Spring Break SOL Practice

• All 60 questions should be completed during Spring Break. I would suggest doing small sections at a time so that you don’t get “math burn-out.” If you will be traveling over break and you won’t have time to complete this on your trip, then I suggest making sure it is completed before you leave, or after you come back (if you think you will have time). However, traveling over break is not an excuse for not doing this assignment.

• You can write on this, but you need to show ALL of your work on separate paper… you will turn in your work with this practice booklet.

• Please refer back to your notes, graded assignments, and graded quizzes/tests if you need help. You can also use these websites below and search for the topic you need help with:
  o http://patrickjmt.com
  o https://www.mathsisfun.com
  o http://www.purplemath.com

• **Honors Algebra 2** – We have covered all of this material, and you should be familiar with all of the concepts that are in this booklet, and all problems should be attempted.

• **Regular Algebra 2** – We have covered all of this material except for the unit on Rationals \(\frac{x+1}{2x} - \frac{3x+2}{x+1}\), and you should be familiar with most of the concepts that are in this booklet. You can skip the rational problems (12, 33, 41, 44, 46).

Student Name _________________________________________ Teacher _____________________ PD ___
Student Signature ________________________________ Date ____________________

By signing above, I understand that this assignment, along with papers that show all my work, is to be completed and turned-in at the beginning of class on ________________, and that it will be graded for completion and accuracy and will be counted as a quiz grade. I also understand that there will be NO late packets accepted. If I am absent on the day that it is due, I am to turn it in at the beginning of the next class period… no exceptions.
1. A college gives all of its applicants a standardized math exam. The scores have a normal distribution with a mean score of 68 and a standard deviation of 10. Jack's score was 78 on the test. What percent of the test-takers scored lower or the same as Jack?
   A  78%
   B  80%
   C  82%
   D  84%

2. Which of the following equations is graphed below?
   ![Graph of y = |x| - 4]
   F  y = |x| - 4
   G  y = |x - 4|
   H  y = |x| + 4
   J  y = |x + 4|

3. Which of the following shows the graph of y = |x| and y = |x| - 2?
   ![Graph of y = |x| and y = |x| - 2]
   A
   B
   C
   D
4. Multiply and simplify.
\[-\sqrt[3]{2x^4y^2} \cdot 3\sqrt[3]{20x^5y}\]
F \(-24x^3y\sqrt[3]{5}\)
G \(-6x^3y\sqrt[5]{5}\)
H \(-6x^9y\sqrt[3]{5}\)
J \(-6x^3y\sqrt[3]{40}\)

5. What complex number is represented by the point?

\[
\begin{array}{|c|c|c|c|}
\hline
& 0 & 1 & 2 \\
\hline
0 & -3 & -2 & -1 \\
\hline
-3 & -2 & -1 & 0 \\
\hline
\end{array}
\]
A \(-1 - 2i\)
B \(2 + i\)
C \(1 + 2i\)
D \(-1 - 2i\)

6. The domain of a linear function is \(\{x : x \leq 0\}\) and the range is \(\{y : y = 5\}\). What are the domain and range of the inverse?
F domain: \(\{y : y \leq 0\}\); range: \(\{x : x = 5\}\)
G domain: \(\{x : x = 5\}\); range: \(\{y : y \leq 0\}\)
H domain: \(\{x : x \leq 0\}\); range: \(\{y : y = 5\}\)
J domain: \(\{x : x \leq 5\}\); range: \(\{y : y = 0\}\)

7. A population of animals in an experiment increases over time, as shown in the table. Using an exponential model and the data, what is the best estimate of the number of animals in May?

<table>
<thead>
<tr>
<th>Time</th>
<th>Number of Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>235</td>
</tr>
<tr>
<td>May</td>
<td>?</td>
</tr>
<tr>
<td>June</td>
<td>445</td>
</tr>
<tr>
<td>July</td>
<td>611</td>
</tr>
<tr>
<td>August</td>
<td>841</td>
</tr>
</tbody>
</table>

A 296
B 323
C 387
D 401
8. Give the solution to $|3x - 2| \geq 5$.
   F $x \leq -1$ or $x \geq \frac{7}{3}$
   G $x \geq \frac{7}{3}$
   H $-5 \leq x \leq 5$
   J $x \leq 3$ or $x \geq 7$

9. If $f(x) = 3x - 2$ and $g(x) = -2x + 3$, what is $f(g(6))$?
   A $-29$
   B $-9$
   C $16$
   D $19$

10. How many solutions does the equation below have?
    $x^4 + 6x^3 + 12x^2 + 8x = 0$
    F $5$
    G $4$
    H $3$
    J $2$

11. Evaluate.
    $|6 - 3i|$
    A $3\sqrt{3}$
    B $3\sqrt{5}$
    C $27$
    D $45$

12. Add and simplify the expression.
    $\frac{2x}{x^2 - 36} + \frac{2}{5x + 30}$
    F $\frac{12x - 12}{5(x + 6)}$
    G $\frac{3x - 3}{5(x + 6)(x - 6)}$
    H $\frac{12x + 12}{5(x - 6)}$
    J $\frac{12x - 12}{5(x + 6)(x - 6)}$

13. Which of the following can be written as a radical function?
    A $f(x) = x^3$
    B $f(x) = \frac{1}{x}$
    C $f(x) = 3x^2$
    D $f(x) = 4x^2 + 3x + 2$
14. Which is true about the degree and leading coefficient of the function graphed below?

F degree is even; leading coefficient is positive
G degree is odd; leading coefficient is negative
H degree is odd; leading coefficient is positive
J degree is even; leading coefficient is negative

15. Which of the following are the factors of $2x^2 - 5x - 3$?
A $(x + 3)(x - 2)$
B $(2x + 1)(x - 3)$
C $(x + 2)(6x - 5)$
D $(6x - 1)(x + 4)$

16. The graph of a function is shown. Which function might the graph represent?
F $f(x) = x^4 - 10x^2 + 9$
G $f(x) = (x - 2)^2 - (x + 9)^2 + (x + 2)^2$
H $f(x) = x^4 - 9$
J $f(x) = (x - 2)^2 + (x + 2)^2$
17. A set of data with a mean of 76 and a standard deviation of 4.2 is normally distributed. What is the value that is \(-2\) standard deviations from the mean?
   - A 84.4
   - B 80.2
   - C 71.8
   - D 67.6

18. Find the function that models the domain and range of the input-output table.

<table>
<thead>
<tr>
<th>Input, (x)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output, (y)</td>
<td>2.25</td>
<td>2.5</td>
<td>2.75</td>
<td>3</td>
<td>3.25</td>
</tr>
</tbody>
</table>

   - F \(y = \frac{x}{4} + 2\)
   - G \(y = \frac{x}{2} + 4\)
   - H \(y = \frac{x}{4} + 4\)
   - J \(y = \frac{x}{2} + 2\)

19. What are the solutions of \(x^3 - 3x^2 + 4 = 0\)?
   - A \(-1, -2\)
   - B \(-1, 0\)
   - C \(-1, 2\)
   - D \(-1, 4\)

20. Simplify the expression \((4 - 7i) - (3 + 2i)\).
   - F \(1 - 5i\)
   - G \(1 - 9i\)
   - H \(7 - 9i\)
   - J \(7 - 5i\)

21. Chris is practicing basketball. How many ways can he make exactly 3 baskets in 6 tries?
   - A 20
   - B 35
   - C 42
   - D 56

22. Simplify.
   - \(i^202\)
   - F \(i\)
   - G \(-1\)
   - H \(-i\)
   - J 1
23. Which of the following is not equal to $\sqrt[4]{x^8}$?
   A $x^2$
   B $\sqrt[4]{x^6}$
   C $x^6$
   D $\frac{8}{x^4}$

24. Which of the following equations is graphed below?

   ![Graph](image)

   F $y = |x| + 3$
   G $y = |x| - 3$
   H $y = |x + 3|$
   J $y = |x - 3|$

25. $(\frac{36}{49})^{\frac{-3}{2}} = ?$
   A $\frac{6}{7}$
   B $\frac{216}{343}$
   C $\frac{7}{6}$
   D $\frac{343}{216}$

26. Frank is planning to fly his plane on a round-trip to an airfield 300 miles west. There is a 20 mi/h wind blowing from the east. Write the round-trip time $t$ as a function of Frank’s air speed $r$.
   F $t(r) = 300(r + 20) + 300(r - 20)$
   G $t(r) = \frac{300}{r + 20} - 300(r - 20)$
   H $t(r) = \frac{300}{20r}$
   J $t(r) = \frac{300}{r + 20} + \frac{300}{r - 20}$
27. Suppose that \( y \) varies directly as \( x \) and inversely as the square of \( z \). When \( x = 4 \) and \( z = 8, y = 2.5 \). Find \( y \) when \( x = -2 \) and \( z = -3 \).

A \( \frac{9}{80} \)
B \( \frac{80}{9} \)
C \( \frac{80}{9} \)
D \( \frac{9}{80} \)

28. For a construction project, the workers need a steel rod that is 15 inches long, with a tolerance of \( \frac{1}{32} \) inch. What are the minimum and maximum allowable lengths of the actual beam?

F \( \text{min: } 14\frac{31}{32} \text{ in., max: } 15\frac{1}{32} \text{ in.} \)
G \( \text{min: } 14\frac{31}{32} \text{ in., max: } 15 \text{ in.} \)
H \( \text{min: } 14\frac{31}{32} \text{ in., max: } 15\frac{1}{2} \text{ in.} \)
J \( \text{min: } 15 \text{ in., max: } 15\frac{1}{32} \text{ in.} \)

29. If \( f(x) = 2x^3 + 5 \), what is \( f^{-1}(x) \)?

A \( f^{-1}(x) = \frac{3}{2} \sqrt{x - 5} \)
B \( f^{-1}(x) = 2 \sqrt[3]{x - 5} \)
C \( f^{-1}(x) = \sqrt[3]{x - 5} \)
D \( f^{-1}(x) = \frac{3}{2} \sqrt{x - 5} \)

30. A class has 7 groups presenting reports. How many different ways can the reports be ordered?

F 49
G 343
H 2401
J 5040
31. Which is true about the end behavior of the function graphed below?

A \( f(x) \to -\infty \) as \( x \to +\infty \)
B \( f(x) \to -\infty \) as \( x \to 2 \)
C \( f(x) \to +\infty \) as \( x \to 2 \)
D \( f(x) \to +\infty \) as \( x \to +\infty \)

32. Solve the system.

\[
\begin{align*}
y &= x^2 + 3x - 4 \\
y &= 4x - 4
\end{align*}
\]

A \( (0, -4) \) and \( (1, 0) \).
B \( (-4, 0) \)
C \( (0, -4) \) and \( (-1, 0) \).
D \( (0, -1) \)

33. Suppose \( y = a \) is the equation for the horizontal asymptote of the function \( y = \frac{8x^2 - x + 1}{4x^2 - 6} \). What is the value of \( a \)?

A \( 0 \)
B \( 2 \)
C \( 6 \)
D \( 8 \)

34. At a banquet, 54 people will be seated at tables of the same size. The number of tables \( t \) varies inversely with the number \( n \) of people at each table. Which equation models this relationship?

F \( tn = 54 \)
G \( n = 54t \)
H \( t = 54n \)
J \( n = \frac{t}{54} \)

35. Each month Rochelle deposits $5 more to her savings account than she did the previous month. If she deposits $5 during the first month, how many dollars does she deposit during the \( n \)th month?

A \( 5n \)
B \( n + 5 \)
C \( n^5 \)
D \( 5(n + 1) \)

36. Identify the equation that does NOT have an extraneous solution.

F \( \sqrt{8x - 5} + 2 = 4 \)
G \( \frac{1}{(x - 1)^2} = 7 - x \)
H \( x = \sqrt{x - 3} + 5 \)
J \( x + 5 = \sqrt{7 - 9x} \)

37. Factor \( 9x^4 - 16 \).

A \( (3x^4 + 4)(3x^4 - 4) \)
B \( (3x^2 + 4)(3x^2 - 4) \)
C \( (3x^4 + 8)(3x^2 - 2) \)
D \( (3x^4 + 4)(3x^4 + 4) \)
38. Which of the following is the graph of \( y = \frac{1}{x^2} + 1 \)?

39. What function is graphed below?

A \( y = -\frac{3}{2} x + 2 \)

B \( y = -\frac{1}{3} x + 2 \)

C \( y = \frac{3}{2} x + 2 \)

D \( y = \frac{1}{3} x + 2 \)

40. Solve the system.

\[
\begin{align*}
y & = 2x + 1 \\
y & = x^2 + 2x - 3
\end{align*}
\]

F \((2, -3)\)

G \((2, -5)\)

H \((-2, -3)\) and \((2, 5)\)

J \((-3, -2)\) and \((5, 2)\)

41. Solve the equation for \( t \) and check the solution to determine whether it is an extraneous solution.

\[
\frac{4}{t - 5} + \frac{3}{t + 5} = \frac{40}{t^2 - 25}
\]

A 3; solution

B 5; extraneous solution

C 3; extraneous solution

D 5; solution
42. Evaluate the series.
\[ \sum_{n=2}^{10} \frac{4n}{4n^2} \]

\[ \begin{align*}
F & \quad \frac{5}{8} \\
G & \quad \frac{5}{6} \\
H & \quad \frac{125}{192} \\
J & \quad \frac{17}{24}
\end{align*} \]

43. Which function could have the values in the table as a domain and range?

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>5</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>13</td>
</tr>
</tbody>
</table>

\[ \begin{align*}
A & \quad y = x + 7 \\
B & \quad y = -2x + 1 \\
C & \quad y = 2x^2 + 1 \\
D & \quad y = 2|x| + 1
\end{align*} \]

44. Divide and simplify.
\[ \frac{\frac{20x^3}{x^3(x^2 - 16)}}{\frac{4x^2}{x^2 - 8x + 16}} \]

\[ \begin{align*}
F & \quad \frac{5(x - 4)}{x^2(x + 4)} \\
G & \quad \frac{5(x + 4)}{x^2(x - 4)} \\
H & \quad \frac{5}{x^2} \\
J & \quad \frac{(x - 4)}{x^2(x + 4)}
\end{align*} \]

45. Which of the following is equal to \( c^{-\frac{1}{3}} \)?

\[ \begin{align*}
A & \quad \frac{1}{\sqrt[3]{c}} \\
B & \quad -\sqrt[3]{c} \\
C & \quad -c^3 \\
D & \quad \frac{1}{c^3}
\end{align*} \]

46. Multiply and simplify.
\[ \frac{\frac{5x^2 + 25x}{x^2 + 2x - 15}}{\frac{x^2 - 6x + 9}{30x^2}} \]

\[ \begin{align*}
F & \quad \frac{x + 3}{6x^3} \\
G & \quad \frac{x^4 + x^2}{6x} \\
H & \quad \frac{x - 3}{6x} \\
J & \quad \text{none of the above}
\end{align*} \]

47. In triangle \( ABC \), angle \( B \) is a right angle. \( AB = 8 \), and \( AC = 17 \). What is \( BC \)?

\[ \begin{align*}
A & \quad 7 \\
B & \quad 8 \\
C & \quad 15 \\
D & \quad 17
\end{align*} \]

48. How many real zeros does the graph of \( y = 5(x + 3)^2 + 2 \) have?

\[ \begin{align*}
F & \quad 0 \\
G & \quad 1 \\
H & \quad 2 \\
J & \quad 3
\end{align*} \]

49. Which of the following equations is graphed below?

\[ \begin{align*}
A & \quad y = -\frac{5}{3}x + 1 \\
B & \quad y = -\frac{5}{3}x + \frac{3}{5} \\
C & \quad y = -\frac{3}{5}x + 1 \\
D & \quad y = -\frac{3}{5}x + \frac{5}{3}
\end{align*} \]
50. A model predicts that the number of electoral votes \( v \) won by a certain party in the year \( y \) will be given by the function \( v = (y - 2000) \cdot 3.5 \). Using this model, how many seats would it be reasonable to predict the party would win in 2016?
F 52
G 56
H 58
J 62

51. What are the real zeros of the function below?
\( f(x) = x^3 - 8x^2 - 23x + 30 \)
A 0, 3, 10
B −3, 1, 10
C −10, −1, 3
D This function has no real zeros.

52. If \( f(x) = 5x - 3 \) and \( g(x) = -2x + 3 \), which of the following has the value of \(-1\)?
F \( g(x - 2) - g(1) \)
G \( g(f(1)) \)
H \( f(g(1)) \)
J \( g(-2) \)

53. Complete the following statement:
The quadratic equation \( 7x^2 - 3x + 5 = 4 \) has \_\_\_.
A 2 imaginary solutions
B 2 real solutions
C 1 real solution
D none of these

54. Billy delivers newspapers. With his little brother it takes him 1 hour to deliver 150 newspapers. Billy works 3 times as fast as his brother. Which equation can be used to determine how long it would take Billy to deliver all of the newspapers alone?
\[ \frac{100}{x} + \frac{50}{3x} = \frac{150}{2x} \]
\[ \frac{150}{x} + \frac{150}{3x} = 150 \]
\[ \frac{x}{150} + \frac{3x}{150} = \frac{1}{150} \]
\[ \frac{150}{\frac{1}{3}x} + \frac{150}{x} = 150 \]

55. A cookie manufacturer requires that one cookie weighs 7.5 ± 0.04 grams. Which of the following cookie weights would not be acceptable?
A 7.46 grams
C 7.51 grams
B 7.49 grams
D 7.55 grams

56. For which interval is the function below increasing?

\[ \text{Height of Ball} \]

\[ \text{Height} \]

\[ \text{Time (seconds)} \]

F from \( x = 0 \) to \( x = 3 \)
G from \( x = 2 \) to \( x = 4 \)
H from \( x = 3 \) to \( x = 6 \)
J from \( x = 5 \) to \( x = 6 \)

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57. An embroidery pattern calls for 5 stitches in the first row and for 3 more stitches in each successive row. The 25th row, which is the last row, has 77 stitches. Find the total number of stitches in the pattern.

A  385  C  1,155
B  1,025  D  2,050

58. Rewrite the expression so that the denominator is a rational number.

\[
\frac{\sqrt{x^5}}{\sqrt{3xy^3}}
\]

F  \( \frac{\sqrt{x^5}}{3y^2} \)  H  \( \frac{3x^2 \sqrt{xy}}{3xy^3} \)

G  \( \frac{3x^2y \sqrt{y}}{3y^2} \)  J  \( \frac{x^2 \sqrt{3y}}{3y^2} \)

59. For which interval does the function below appear to be decreasing?

A  from \( x = -1 \) to \( x = 0 \)
B  from \( x = 0 \) to \( x = 1 \)
C  from \( x = 1 \) to \( x = 1.6 \)
D  from \( x = 1.6 \) to \( x = 2 \)

60. Which of the following is a graph of \( y = x + 2 \)?

F  

G  

H  

J  

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