Algebra 2 Semester 2 Final Exam Review

Chapter 5
Simplify.

1. $\sqrt{64x^3y^6}$
2. $2\sqrt{x^3y^2} \cdot \frac{1}{2}\sqrt{x^2y^2}$
3. $(8x^3)^\frac{2}{3}$
4. $(4x^2)^{-\frac{1}{2}}$
5. $\frac{4\sqrt{x^3}}{3\sqrt{x^2}}$
6. $(27 \cdot 8)^\frac{2}{3}$
7. $\sqrt[4]{14}$
8. $\left(\frac{3}{9}\right)^2$

9. Create a table, a graph and identify the Starting Point, Domain, and Range for the function:
   
   $y = -\sqrt{x - 3} + 2$

11. Create a table, a graph and identify the Starting Point, Domain, and Range for the function:
   
   $y = \frac{3}{2}\sqrt{x} + 1 + 2$

Solve.

13. $\sqrt{x + 2} - 3 = 7$
14. $4\sqrt{x - 1} = -8$
15. $\frac{1}{3} \sqrt{2x - 4} - 1 = 1$
16. $\sqrt{x - 1} + 3 = 0$

Chapter 6
Match each parent graph with the appropriate equation.

| 1. | 2. |
|---|---|---|---|
| 3. | 4. | Equations to choose from. {you should be able to graph and recognize each of these graphs).|
| A. $y = \frac{1}{x}$ | B. $y = \frac{1}{x^2}$ | C. $y = |x|$ | D. $y = x^3$ |
| E. $y = \sqrt{x}$ | F. $y = x^2$ | G. $y = \frac{3}{x}$ | H. $y = 3$ |

5. Write the equation of a cube root function that is shifted up 7 and left 13. Assume that $a = 1$.

7. Describe the transformation without graphing the equation.
   
   $y = \frac{1}{x - 12} + 7$

6. Write the equation of an absolute value function that is shifted down 2. Assume that $a = 1$.

8. Describe the transformation without graphing the equation.
   
   $y = -(x - 8)^3 + 6$
Evaluate each function for \( x = -2, x = 0, \) and \( x = 4 \).

9. \( g(x) = \begin{cases} -3 & \text{if } x < -1 \\ 2 & \text{if } -1 \leq x < 3 \\ 5 & \text{if } x \geq 3 \end{cases} \)

\[ g(-2) = \ldots \quad g(0) = \ldots \quad g(4) = \ldots \]

10. \( h(x) = \begin{cases} 2x + 1 & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases} \)

\[ h(-2) = \ldots \quad h(0) = \ldots \quad h(4) = \ldots \]

Create a table and graph for the function.

11. \( h(x) = \begin{cases} 2x + 1 & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases} \)

12. Given \( f(x) = 2x^2 - 1, g(x) = \sqrt{x - 5}, \text{ and } h(x) = 2x - 1, \) find each function.

   a. \( h(f(-2)) \)
   b. \( f(g(6)) \)
   c. \( h(g(x)) \)
   d. \( h(f(x)) \)

13. Most functions are compositions of basic functions. Work backwards to determine the basic functions that created the composition.

   a. \( f(g(x)) = \sqrt[3]{3x - 4} + 9 \)

14. Find the inverse of each function then determine whether the inverse is a function.

   a. \( f(x) = 5 + 8x \)
   b. \( f(x) = \left(\frac{1}{3}x + 2\right)^2 \)
   c. \( f(x) = \frac{6}{2x+1} \)
   d. \( f(x) = \sqrt[3]{x + 4} - 1 \)

\textbf{Chapter 4}

Create a table and graph each function.

1. \( f(x) = 2^x \)

2. \( f(x) = \left(\frac{1}{3}\right)^x \)

3. Match each of the following without graphing.

   _____ \( f(x) = (2.8)^x \)  a. growth
   _____ \( f(x) = 3(2)^x \)  b. growth reflected across the x-axis
   _____ \( f(x) = (.7)^x \)  c. decay
   _____ \( f(x) = -(3)^x \)

4. Paul bought his truck new for $32,000. It’s value decreases 9% each year. Which function represents the yearly value of Paul’s truck?

   a. \( f(x) = 32000(1+0.09)^x \)
   b. \( f(x) = 32000(1-0.09)^x \)
   c. \( f(x) = 32000(1+0.9)^x \)
   d. \( f(x) = 32000(1-0.9)^x \)

Write each exponential function as a logarithmic function.

8. \( \log_{10} 1000 = 3 \)  9. \( \log_{mn} p \)  10. \( \log_{\frac{1}{25}} = -2 \)

Use the Log Properties to simplify each expression completely.

11. \( \log_{4} 41 = \ldots \)

12. \( \log_{4} 23 = \ldots \)

13. \( \log_{2} 2 + \log_{3} 6 - \log_{3} 4 = \ldots \)

14. \( \log_{2} 200 - \log_{5} 4 = \ldots \)

15. \( \log_{2} 4^3 = \ldots \)

16. \( 7^{\log_{7} 3} = \ldots \)
Solve each equation.
17. \(3^{5x-6} = 81\)  \hspace{1cm} 18. \(2^{x-1} = \frac{1}{4}\)  \hspace{1cm} 19. \(25^{x+1} = 125^x\)
20. \((\frac{1}{9})^{x+7} = 27^{2x-10}\)  \hspace{1cm} 21. \(16^x = 4^{x+3}\)  \hspace{1cm} 22. \(9^x = 3^{4x}\)

23. Suppose you deposit $700 into an account paying 3\% annual interest, compounded continuously.
   a. What is the balance after 8 years?
   b. How long will it take for the balance in your account to reach $1200?
   c. How much would have to be deposited in order to reach a balance of $1500 after 12 years?

24. How much do you pay back in total if you borrow $10,000 for 2 years at 5\% interest, compounded monthly?

Chapter 10
1. Complete the chart for each angle.

<table>
<thead>
<tr>
<th>Angle</th>
<th>(\frac{3}{4}\pi)</th>
<th>(-\frac{\pi}{2})</th>
<th>200(^\circ)</th>
<th>30(^\circ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Coterminal Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Coterminal Angle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conversion (degree to radian or vice versa)</td>
<td></td>
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<tr>
<td>What quadrant does the original angle lie in?</td>
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<tr>
<td>Graph of the original angle in standard position</td>
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</tr>
</tbody>
</table>

Use your unit circle to find each of the following.
2. \(\sin^{-1}\left(-\frac{1}{2}\right)\)
3. \(\cos^{-1}(1)\)
4. \(\tan^{-1}(-\sqrt{3})\)

Find the area of each triangle.
5.
6.

Find the missing info for each triangle.
7.
8.

Find the reference angle for each of the following in the measurement given.
9. 201\(^\circ\)
10. \(\frac{5}{3}\pi\)
11. -160\(^\circ\)
12. \(\frac{7}{4}\pi\)
Convert each angle (degrees to radians or radians to degrees).

13. 110°  
14. \( \frac{3}{5} \pi \)  
15. True or false: A reference angle is an obtuse angle.  
16. True or false? \( \pi = 180^\circ \)

17. Use your unit circle to complete the chart:

<table>
<thead>
<tr>
<th>( \theta )</th>
<th>Quadrant of ( \theta ) (or axis)</th>
<th>Reference angle (degrees)</th>
<th>Sin ( \theta )</th>
<th>Cos ( \theta )</th>
<th>Tan ( \theta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>450°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-225°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300°</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Find the indicated measures. Show work to support your answers.

18.  

19.  

20.  

21.  

22. Sin 32° = Cos x  

23. What does SohCahToa stand for?  

24. Is a triangle with sides of length 20, 21, and 29 a right triangle? Support your answer.  

25. Find the missing length

26. Find the missing lengths.

27. Find the missing lengths.
Use your unit circle and your knowledge of coterminal angles to find each of the following values (mind your signs).

28. Sin 45° = __________
29. Tan (-270°) = __________
30. Tan 30° = __________
31. Sin 240° = __________
32. Cos (-30°) = __________
33. Cos 390° = __________

Chapter 11
Using \( y = a \sin b \theta + k \) and \( y = a \cos b \theta + k \), graph each function. Identify the amplitude, period and vertical shift for each equation. (Don’t forget to create a table).

1. \( y = 2 \sin \theta \)
2. \( y = -\cos \theta + 1 \)

Is the graph periodic or not?

3

4.

Identify the amplitude, period and vertical shift for each equation.

5. \( y = -\sin 2\theta + 1 \)
6. \( y = -3 \cos \theta - 2 \)
7. \( y = \cos \frac{1}{2} \theta \)
8. \( y = 4 \sin \theta - 4 \)

Write the equation for the sine function with the given information.

9. Amp = 2/3
10. Amp = 3
11. Amp = 1
12. amp = 1

period = 2\( \pi \)
period = 2\( \pi \)
period = 4\( \pi \)
period = \( \pi/2 \)

vertical shift up 5/6
vertical shift down 6
vertical shift down 2
no shifts

flipped over the x-axis

13. Given: \( \sin \theta = -0.766 \) with \( \{\pi < \theta < \frac{3}{2} \pi\} \)

Find the Cos \( \theta \) and the Tan \( \theta \)

The terminal side of \( \theta \) is in quadrant ________, where the sine is __________, the cosine is __________, and the tangent is __________.

14. Identify each of the following for the equation:

\[ y = -\frac{2}{3} \cos \frac{1}{4} \theta + 16 \]

Find the period, amplitude, and vertical shift.

How do you know that the graph reflected across the x-axis?

15. Write an equation for the cos function with a period of \( \pi \), an amplitude of 9, shifted down 13 and flipped across the x-axis.

Chapter 14

1. Create a probability model for the experiment below and explain whether it is uniform or non uniform and why. Then find the probabilities in problems 2-6.

Consider the 12 months in a year. Suppose the name of each month is written on a separate piece of folded paper and placed in a bag. You reach into the bag and choose one piece of paper.

2. \( P(\text{Choosing August}) \)
3. \( P(\text{month with exactly 31 days}) \)
4. \( P(\text{month with no Mondays}) \)

5. \( P(\text{not choosing August}) \)
6. \( P(\text{month that begins with a J}) \)
7. \( P(\text{month with at least one Monday}) \)
8. Use the Counting Principle to determine how many possible outcomes there are.

a. You pick a marble from a bag with 1 blue, 1 red and 1 green marble, then replace the marble and pick again. How many different outcomes are possible?

b. You arrange a family of 5 for a photograph. How many different pictures can be taken?

c. You pick a student from our class (35 students) and then another student from the next class (32 students). How many different pairs of students can be created?

d. You pick a password that consists of two letter and one number with no repeats. How many passwords can you create?

Find each probability.
9. Two marbles are chosen from a bag (without replacement). The bag contains 2 purple marbles, 1 white marble, and 3 green marbles.

a. P(Purple first and Green second)  
b. P(Green first)  
c. P(Purple first and second)

10. You roll two six sided number cubes.

a. P(1 and 6)  
b. P(1 or 6)  
c. P(even or odd)

11. Draw a tree diagram on the back of this quiz and create a list for flipping a coin 2 times. Find the P(H first or T second) if you flip the coin two times.

12. There are 4 white, 6 blue and 2 purple shirts. You reach in and pick one, replace it and then pick another. Find the probability for each.

a. P(W or B)  
b. P(W and B)

13. There are 4 white, 6 blue and 2 purple shirts. You reach in and pick one, without replacing the first shirt you pick another. Find the probability of each.

a. P(B or W/B)  
b. P(B and B/B)

14. Roll two die.  
15. Flip a coin and pick a marble.  
16. Pick two boys from the same class.  
17. Choose a shirt and a tie.  
18. Listening to two songs from the same list without repetition

Statistics Unit

Frequency distributions (grouped, contingency etc), Graphs (pie chart, bar graph, dotplot, histogram, box plot), Mean median and mode, scatterplot, correlation, normal distribution

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**Algebra 2 Semester 1 Review ANSWERS**

<table>
<thead>
<tr>
<th>Chapter 5</th>
<th>Chapter 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (8x^2\sqrt{x}) 9. SP: (3, 2); D: (x \geq 3);</td>
<td>1. C 2. B 3. F 4. G</td>
</tr>
<tr>
<td>2. (xy\sqrt{x}) 10. (y = 2\sqrt{x} + 2 + 3)</td>
<td>12a. 13; 1b. 1;</td>
</tr>
<tr>
<td>3. (4x^2) 11. SP: (-1, 2); D: (\mathbb{R}); R: (\mathbb{R})</td>
<td>c. (2\sqrt{x} - 5 - 1);</td>
</tr>
<tr>
<td>4. (\frac{1}{2}) 12. (y = \frac{1}{2}\sqrt{x} + 1)</td>
<td>d. (4x^2 - 3);</td>
</tr>
<tr>
<td>5. (x\sqrt{2}) 13. (x = 98)</td>
<td>13a. (f(x) = \frac{7}{3}\sqrt{x} + 9); (g(x) = 3x - 4);</td>
</tr>
<tr>
<td>6. 36 14. (x = -7)</td>
<td>b. (f(x) = x^4 + 9); (g(x) = x^2 - 3);</td>
</tr>
<tr>
<td>7. 16 15. (x = 6)</td>
<td>14a. (y = \frac{1}{3}x - \frac{5}{6}) function</td>
</tr>
<tr>
<td>8. 3 16. (\emptyset)</td>
<td>c. (y = 3x^2 - 6) function</td>
</tr>
<tr>
<td>11. graph</td>
<td>d. (y = (x + 1)^3 - 4) function</td>
</tr>
</tbody>
</table>
Chapter 4
1. Graph, function, \( D: \mathbb{R}; R: y > 0 \)
2. Graph, function, \( D: \mathbb{R}; R: y > 0 \)
3. A; A; C; B
4. B
5. \( 3 = \log_2 8 \)
6. \( b = \log_{ac} \)
7. \( 0 = \log_3 1 \)
8. \( 10^3 = 1000 \)
9. \( m^n = n \)
10. \( 5^{-2} = \frac{1}{25} \)
11. 3.38
12. 2.26
13. 1
14. 1
15. 6
16. 3
17. x = 2
18. x = -1
19. x = 2
20. x = 2
21. x = 3
22. x = 2
23a.
b.
c.
24.

Chapter 10
1. \[
\begin{array}{ccc}
11 & \pi & \frac{3}{2} \\
\frac{-5}{4} & -\frac{5}{2} & -160^\circ & -330^\circ \\
135^\circ & -90^\circ & \frac{5}{9} & \frac{1}{6} \\
2 & y-axis & 3 & 1
\end{array}
\]
2. 330°
3. 0°
4. 300°
5. 665.1 mm²
6. 453.2 mm²
7. \( x=53^\circ; y = 85.8ft; \)
\( z = 71.3ft \)
8. \( x=4.3cm; y = 9.8cm; \)
\( z = 120^\circ \)
9. \( m = 21^\circ \)
10. \( \frac{\pi}{3} \)
11. \( 20^\circ \)
12. \( \frac{\pi}{4} \)
13. \( \frac{11}{36} \pi \)
14. 108°
15. False
16. True
17. y-axis
18. \( y = 9\sin\theta - 13 \)

Chapter 11
1. \( \text{Amp} = 2; \text{Per} = 2\pi; \) no shift
2. \( \text{amp} = 1; \text{per} = 2\pi; \) up 1; flipped
3. no
4. yes
5. \( \text{amp} = 2; \text{per} = \pi; \) up 1; flipped
6. \( \text{amp} 3; \text{per} = 2\pi; \) down 2, flipped
7. \( \text{amp} = 1; \text{per} = 4\pi; \) no shift, no flip
8. \( \text{amp} = 4; \text{per} = 2\pi; \) down 4; no flip
9. \( y = \frac{2}{3}\sin\theta + \frac{5}{6} \)
10. \( y = 3\sin\theta - 6 \)
11. \( y = \sin\frac{1}{2}\theta - 2 \)
12. \( y = -\sin4\theta \)
13. \( \cos\theta = -0.643; \tan\theta = 1.191 \)
3; neg; neg; pos
14. \( \text{amp} = 2/3; \text{per} = 8\pi; \) up 16; flipped. The negative out front makes it flip.
15. \( y = -9\cos2\theta - 13 \)

Chapter 14
1. Uniform since all probabilities are the same.
2. \( \frac{1}{12} \)
3. \( \frac{7}{12} \)
4. 0
5. \( \frac{11}{12} \)
6. \( \frac{1}{4} \)
7. 1
8a. 9 outcomes
b. 120 arrangements
c. 1120 outcomes
d. 6500 codes
9a. \( \frac{1}{5} \)
b. \( \frac{1}{2} \)
c. \( \frac{1}{15} \)
10a. \( \frac{1}{36} \)
b. \( \frac{11}{36} \)
c. \( \frac{3}{4} \)
11. \( \frac{3}{4} \)
12a. 2/3 b. 1/6
13a. 43/66 b. 5/22
14. Independent, Disjoint
15. Independent; disjoint
16. dependent; intersecting
17. dependent, intersecting
18. dependent; intersecting

Chapter 15
19. \( \text{Uniform since all \ probabilities are the same.} \)
20. \( \frac{1}{12} \)
21. \( \frac{7}{12} \)
22. \( 0 \)
23. \( \frac{11}{12} \)
24. \( \frac{1}{4} \)
25. \( \frac{3}{4} \)
26. \( \frac{3}{4} \)
27. \( \frac{1}{4} \)
28. \( \frac{3}{4} \)
29. \( \frac{5}{3} \)
30. \( \frac{3}{5} \)
31. \( \frac{\sqrt{3}}{2} \)
32. \( \frac{\sqrt{3}}{2} \)
33. \( \frac{\sqrt{3}}{2} \)