Algebra II Individual 2018
St. Paul's Tournament

1. It takes Ryan eight hours to pick forty busbels of apples. Scott can pick the same amount in ten hours. Find how long it would take them if they worked together. Round your answer to the nearest hundredth.

2. Solve the compound inequality:

$$6 - 9p \geq 24 \text{ or } p + 8 \geq 15$$

3. The school that Castel goes to is selling tickets to a choral performance. On the first day of ticket sales the school sold 6 adult tickets and 5 student tickets for a total of $88. The school took in $148 on the second day be selling 12 adult tickets and 8 student tickets. Find the price of an adult ticket and the price of a student ticket.

4. Solve the system:

$$-2x + y + 2z = -2$$
$$x + 5y - z = -21$$
$$5x - y + 6z = 10$$

5. Evaluate the determinant: $\begin{vmatrix} 4 & 1 & -5 \\ 3 & 0 & -5 \\ 4 & 3 & 5 \end{vmatrix}$

6. Simplify $2(-1 + i) + (3i)(2 + 6i)$

7. Solve the following equation with the quadratic formula: $8v^2 - 3v = -12$

8. Find the 2nd term in expansion of $(5n - m)^3$

9. Find $(x^3 - 15x^2 + 52x + 20) \div (x - 6)$

10. Factor the following expression completely: $64a^3 + 27$

11. Evaluate the following function at the given value: $f(a) = a^3 + 2a^2 - 23a - 4$ at $a = -6$

12. Write a polynomial of least degree with integer coefficients that has the given zeros: 5 multiplicity 2, -3

13. Find all roots of $x^3 + 4x^2 + 2x + 8$

14. If $g(n) = n^2 - 3 - 2n$, find $g(n + 1)$

15. Simplify $(1 + \sqrt{5v})(-4 - 4\sqrt{5v})$

16. Identify the domain and range of $y = 2\sqrt{x + 5} + 1$

17. Identify the vertex of $y = \frac{1}{2}x^2 + 6x + 24$

18. Simplify $\frac{p+4}{8p-80} \div \frac{p^2+5p+4}{4p^2+4p}$

19. Solve the following equation and make sure to check for extraneous solutions: $\frac{k+1}{k^2} - \frac{1}{6k^2} = \frac{2}{k^2}$

20. Solve the equation: $6^{3v+1} \cdot 6^{1-2v} = 1$

21. Find the inverse of the following function: $y = \log(2x)$

22. Solve the equation: $\log_6 x + \log_6(x + 1) = 1$

23. Find the 8th term of the following sequence: 3, -9, 27, -81, . . .

24. State if the following scenario involves a permutation or a combination, then find the number of possibilities:

    Danielle has homework assignments in six subjects. She only has time to do three of them.

Answers

1. 4.44 hours

2. $(-\infty, -2] \cup [7, \infty)$
   Alternate Solution: $p \leq -2$ or $p \geq 7$

3. adult ticket price: \$3
   student ticket price: \$14

4. $x = 0, \; y = -4, \; z = 1$

5. -20

6. $8i - 20$

7. no solution

8. $-75n^2 m$

9. $x^2 - 9x - 2 + \frac{8}{x-6}$

10. $(4a + 3)(16a^2 - 12a + 9)$

11. -10

12. $x^3 - 7x^2 - 5x + 75$

13. $-4, \pm i\sqrt{2}$

14. $n^2 - 4$

15. $-20v - 8\sqrt{5v} - 4$

16. domain: $[-5, \infty)$
    range: $[1, \infty)$

17. $(-6, 6)$

18. $\frac{p}{2(p-10)}$

19. $7/6$

20. $v = -2$

21. $\frac{10^x}{2}$

22. 2

23. -6561

24. combination; 20