



Algebra – 8th Grade

1. **2 points:** Here are some facts about the American Flag:

- The rectangle containing the stars is $\frac{2}{5}$ of the width of the flag and $\frac{7}{13}$ of the height, and is a mix of blue and white.
- Each stripe is $\frac{1}{13}$ of the height of the flag.
- The top seven stripes (4 red and 3 white) are $\frac{3}{5}$ of the length of the flag, and the other six stripes (3 red and 3 white) are the full length of the flag.

What fraction of the entire flag is colored red? **Express your answer as a reduced fraction.**

2. **2 points:** An amateur street biker is jumping from a platform that ends at 10 feet above the ground to another platform (opposite the first) that starts at the same height. In practice, he has found that he can ride such that he consistently leaves the platform following the curve $y = -16x^2 + 100x + 6$, where y is his vertical height at any given point. What is the maximum horizontal distance, in feet, that there could be between the platforms so that he just barely makes it onto the other platform safely? **Express your answer as a decimal.**

3. **2 points:** A yo-yo is thrown down a distance of 40 inches. Every time it comes back up, it only returns 80% of the distance it did previously. Assuming no other force acts upon it, how many inches would the yo-yo have traveled by the time it comes to rest?

4. **3 points:** A rival math competition, the CMSW, has crazy rules where four points are earned for each correct answer, and 3 points are lost for each incorrect answer or answer left blank. If after 100 grueling questions, a student has a score of 36, how many questions did the student answer correctly?

5. **3 points:** Three robots can work tirelessly on painting a large number of identical fences, but each requires a different length of time to finish painting a fence. The first robot starts at 2:00 PM, and takes 5 hours to finish each fence. The second robot starts at 3:00 PM, and takes 6 hours to finish each fence. The third robot starts at 4:00 PM, and takes 7 hours to finish each fence. Assuming the robots take no breaks and start immediately on the next fence upon finishing the previous one, what will the time be when all three robots finish at the same time for the first time? **Express your answer as a:bc AM or a:bc PM.**

6. **3 points:** What is the sum of all of the possible values of x , if $\frac{3}{x + 2x^2} = \frac{4 - x}{2x + 1}$?

7. **3 points:** Andi is at the arcade, playing a variety of games to aim for her goal of 24 tickets so she can buy the new “Four Direction” CD. Winning an easy game earns her 2 tickets, winning a medium difficulty game earns her 3 tickets, and winning a high difficulty game earns her 5 tickets. In how many distinct ways can Andi win 24 tickets?
8. **4 points:** When $20(x + 3)^4$ is expanded and like terms are combined, what is the sum of the coefficients of the resulting polynomial?
9. **4 points:** How many integral values of x satisfy the inequality $\left| \frac{4 - 3x}{5} \right| < 12$?
10. **4 points:** What is the sum of the values of x that satisfy the equation $64^{2x-1} \times 4^{x^2+9} = \frac{1}{16}$?