

# Smackdown

Questions for the Smackdown will come from Algebra I, Geometry and Algebra II.

**Round 1: Multiple Choice - Single Elimination.** In this round, questions will be projected onto the screens in the front of the auditorium. Each question will have a time limit of either 20 seconds or 30 seconds. When time is called (and not before), the students will display their answers using colored cards. Students with the correct answer stay in the competition, and those with incorrect answers are eliminated. This round continues until either 23 questions are given, or 5 or fewer students remain. If only 1 student answers a question correctly, then the competition is over, and the student wins. If no student answers a question correctly, then the question is skipped.

**Round 2: Speed and Accuracy.** In this round, students will be given timed question. However, at any point prior to time expiring, a student can raise their hand to indicate that they have the answer. When time expires, students will be called upon in the order that they raised their hand. The first of these to give the correct answer receives a star. If no student gives the correct answer, then the closest answer receives a star. If no student raises their hand, then time is extended until the judge determines that the question should be skipped. The first student to receive 2 stars is the winner.

Sample questions are given below:

1. What is the slope of the line  $2x - 4y = 6$ ?
2. What is the vertex of the parabola  $f(x) = x^2 - 4x + 4$ ?
3. What is the length of the line segment from  $(5, 3)$  to  $(9, 7)$ ?
4. Given  $f(x) = 5x + 15$ , what is  $x$  when  $y = -20$ ?
5. Given  $2x + 3y = 5$  and  $2x + y = -9$ , which of the following statements is true?
  - A. The lines are parallel.
  - B. The lines intersect at  $(2, 7)$ .
  - C. It's only one line, repeated twice.
  - \*D. The lines intersect at  $(-8, 7)$ .
  - E. The lines are perpendicular.
6. Find a value  $t$  so that points  $(0, 2)$  and  $(12, t)$  are 13 units apart.

7. Solve for  $x$ :  $\frac{x}{5-x} = \frac{-2}{11-x}$ .

8. Give the smallest value of  $x$  solving  $2x^2 - 8x = 24 + 4x$ .

9. Find the equation of the line that has the same  $x$  and  $y$  intercepts as  $x^2 + y^2 + 4x - 4y + 4 = 0$ .

10. Simplify  $\frac{(x^{-2} + 2x)^{-1}}{x^2}$ .

11. Simplify  $|x-6| + |x-7|$  given that  $6 < x < 7$ .

12. Simplify  $\frac{6x\sqrt{1-x^2} - 3x^2(1-x^2)^{3/2}}{(1-x^2)^{1/2}}$ .

13. Give the average of the solutions to  $x^3 + x^2 = 3x$ .

14. Given that all real numbers are in the domains and ranges of  $f$  and  $f^{-1}$ , and that  $f^{-1}(1) = -4$ , solve the equation  $2 + f(3x+5) = 3$ .

15. Specify the  $y$ -intercept for  $f(x) = \begin{cases} x^2, & x < -3 \\ x-5, & -3 \leq x \leq 3 \\ x+2, & x > 3 \end{cases}$

16. Simplify  $(\sqrt{x+x+1} + \sqrt{a-x+1})(\sqrt{x+x+1} - \sqrt{a-x+1})$ .