# The Weekly Rigor

No. 143 "A mathematician is a machine for turning coffee into theorems." March 18, 2017

## SAT Math Test Problem Children: Randomized Problem Set 1

(Part 3)

**16.** What are the solutions to the equation

$$2x^2 - 72 = 0 \text{ ?}$$

**17.**

$$y = x - 3$$
$$2y + 2x = 6$$

The system of equations above consists of two equations, and the graph of each equation in the *xy*-plane is a line. Which of the following statements is true about these two lines?

A) The lines are parallel.

B) The lines are the same.

C) The lines are perpendicular.

D) The lines intersect at $(-3, 6)$.

**18.**

$$x^2 - \frac{k}{2}x = 2p$$

In the quadratic equation above, *k* and *p* are constants. What are the solutions for *x* ?

A) $x = \frac{k}{4} \pm \frac{\sqrt{k^2+2p}}{4}$

B) $x = \frac{k}{2} \pm \frac{\sqrt{k^2+32p}}{4}$

C) $x = \frac{k}{4} \pm \frac{\sqrt{k^2+2p}}{8}$

D) $x = \frac{k}{4} \pm \frac{\sqrt{k^2+32p}}{4}$

**19.** For $i = \sqrt{-1}$, what is the sum $(2 + 3i) + (4 + 5i)$?

**20.**

$$3x^2 + 6x - 9 = 0$$

If *r* and *s* are two solutions of the equation above and $r > s$, what is the value of $r - s$ ?

**21.**

$$\frac{6 - i}{3 - 2i}$$

If the expression above is rewritten in the form $a + bi$, where *a* and *b* are real numbers, what is the value of *a*? (Note: $i = \sqrt{-1}$)

**22.** In triangle *ABC*, the measure of $\angle B$ is 90º, $BC = 9$, and $AC = 15$. Triangle *DEF* is similar to triangle *ABC*, where vertices *D*, *E*, and *F* correspond to vertices *A*, *B*, and *C*, respectively, and each side of triangle *DEF* is $\frac{1}{3}$ the length of the corresponding side of triangle *ABC*. What is the value of sin *F* ?

**23.** What are the solutions to $2x^2 + 8x + 2 = 0$ ?