The Weekly Rigor

No. 118 "A mathematician is a machine for turning coffee into theorems." September 24, 2016

SAT Math Test Problem Children: Solving Simple Equations

(Part 3)

ANSWERS

1. 10	5. $\{6\}$	9. 225
2. 21	6. $\{4, 5\}$	10. 441
3. 9	7. $\{10\}$	11. 81
4. 17	8. $\{5\}$	12. 64

SELECTED SOLUTIONS

1. There are two steps to solve the first problem: 1. Substitute the given value of *k* into the equation; 2. Solve for *x*. To wit:

$$\frac{x-1}{3} = 3$$

$$x - 1 = 9 \quad \Longrightarrow \quad x = 10$$

5. The second problem has three steps: 1. Substitute the given value of *a* into the equation; 2. Solve for *x*; 3. Test the solutions in the original equations to check for extraneous solutions. Following this procedure, we have:

$$\sqrt{x-2} = x - 4$$

$$\left(\sqrt{x-2}\right)^2 = (x-4)^2 \quad \Longrightarrow \quad x - 2 = x^2 - 8x + 16 \quad \Longrightarrow \quad 0 = x^2 - 9x + 18$$

$$\Longrightarrow \quad 0 = (x-6)(x-3) \quad \Longrightarrow \quad x = 6 \text{ and } x = 3$$

Testing the solutions, we have

$$\sqrt{6-2} \overset{?}{=} 6-4$$

$$\sqrt{4} \overset{\checkmark}{=} 2$$

However,

$$\sqrt{3-2} \overset{?}{=} 3-4$$

$$\sqrt{1} \neq -1$$

Hence, the solution set must omit 3.

9. The third question has two steps: 1. Substitute the given value of *a* into the second equation; 2. Solve for *x*. This guidance gives us:

$$3\left(5\sqrt{2}\right) = \sqrt{2x}$$

$$15\sqrt{2} = \sqrt{2}\sqrt{x} \quad \Longrightarrow \quad 15 = \sqrt{x} \quad \Longrightarrow \quad 15^2 = \left(\sqrt{x}\right)^2 \quad \Longrightarrow \quad 225 = x$$