HEART OF ALGEBRA ANSWERS AND EXPLANATIONS

Heart of Algebra Drill 1

1. **A** Plug in! Make $s = 5$. If there are 5 students at the school, the students will throw away $5 \times 2 = 10$ pounds of garbage. The non-students throw away 350 pounds, so in total there will be $10 + 350 = 360$ pounds of garbage. This is your target. Plug In $s = 5$ and eliminate any choice which does not equal 360. The only choice which works is (A).

2. **B** Start by combining like terms. Add 2 to both sides: $\begin{array}{r} 2x - 2 = -1 \\ +2 \quad +2 \\ \hline 2x \quad = \quad 1 \end{array}$

   Then divide both sides by 2: $\frac{2x}{2} = \frac{1}{2}$, $x = 0.5$, which is (B).

3. **B** Start by getting rid of the fraction. Multiply both sides by 3, which will cancel with the denominator of the fraction: $(3)q = (3)\frac{q+6}{3}$, $3q = q + 6$.

   Next, combine like terms by subtracting q from both sides, which leaves you with $2q = 6$. Finally, divide both sides by 2, and you find that $q = 3$, which is (B).

4. **D** Rather than distributing the 2 on the left side of the equation, you can divide both sides by 2 (which will cancel the 2 on the left side) and save yourself a couple of steps: $\frac{2(z+3)}{2} = \frac{6}{2}$, $z + 3 = 3$. Then subtract 3 from both sides, and you find that $z = 0$, which is (D).

5. **C** Start by multiplying both sides by 3 to cancel out the denominators. You are left with $2x + 1 = 4$. Then subtract 1 from both sides, so you have $2x = 3$. Finally, divide both sides by 2, and you find that $x = 1.5$, which is (C).

6. **B** Start by multiplying both sides by 3 to eliminate the denominator: $(3)\frac{x+2}{3} = 2(3)$ $x + 2 = 6$. Next, subtract 2 from both sides: $x = 4$. This is (B).

7. **C** Multiply both sides by 3: $(3)\frac{z+1}{3} = (3)0$, $z + 1 = 0$. Note that the question is asking for the value of $z + 1$, so you're done!

8. **D** Start by distributing the 4 on the left side of the equation: $4k + 4 = k + 10$. Next, combine like terms by subtracting k from both sides: $3k + 4 = 10$. Last, subtract 4 from both sides: $3k = 6$, which is (D).

9. **B** Multiply both sides by the denominator, a: $(a)\frac{3a+2}{a} = (a)11$, $3a + 2 = 11a$

Combine like terms by subtracting $3a$ from both sides:

$$\begin{array}{r} 3a + 2 = 11a \\ -3a \quad\quad -3a \\ \hline 2 = 8a \end{array}$$

Divide both sides by 8, so $a = \frac{1}{4}$. However, the question asks for the value of $\frac{1}{a}$, so you need to take the reciprocal of both sides and find that $\frac{1}{a} = 4$, which is (B).

10. **D** This problem can be solved by starting with adding 1 to both sides:

$$\frac{5(p-1)}{4} - 1 = 0$$

$$\underline{\quad +1 \quad +1}$$

$$\frac{5(p-1)}{4} = 1$$

Next, eliminate the denominator by multiplying both sides by 4:

$$(4)\frac{5(p-1)}{4} = (4)1, \quad 5(p-1) = 4$$

Next, divide both sides by 5:

$$\frac{5(p-1)}{5} = \frac{4}{5}, \quad p - 1 = \frac{4}{5}$$

Finally, add 1 to both sides:

$p - 1 + 1 = \frac{4}{5} + 1$, $p = \frac{9}{5}$ That matches (D).