1. For what value of z would the following system of equations be true for all real integers?

$$3x-2y=14$$
$$-12x+8y=8z$$

A. -56
B. -32
C. -14
D. -8
E. -7

2. What value of y solves the following system of equations?

$$3x+y+4=50$$
$$x+3y=50$$

A. 12
B. 13
C. 11
D. 49
E. 18.4

3. What is the x-coordinate of the solution of the following system, if the system has a solution?

$$5x-14y=47$$
$$2x+7y=53$$

A. 0
B. $2\frac{5}{7}$
C. $11\frac{1}{9}$
D. 17
E. The system has no solution.

4. Candice, Jill, and Kivo raised money for their school's golf team through a bake sale. They sold over-stuffed brownies for $4.50 each, and they sold gourmet cupcakes for $6 each. After selling 125 baked goods, they collected $633 total. How much of the total did the trio collect from selling the cupcakes?

A. $351
B. $282
C. $150
D. $78
E. $47

5. Tyler spends $11.50 at Very Berry Frozen Custard on 2 large custards and 4 brownies. The price of each brownie is one-fifth the price of one large custard. Which of the following systems of equations, when solved, gives the price, b dollars, of a brownie and the price, c dollars, of one, large custard at Very Berry Frozen Custard?

A. $\begin{cases} 4c+2b=11.50 \\ b=\frac{1}{5}c \end{cases}$

B. $\begin{cases} 4c+b=11.50 \\ 4b=2c \end{cases}$

C. $\begin{cases} 4b+c=11.50 \\ 2b=4c \end{cases}$

D. $\begin{cases} 2c+4b=11.50 \\ b=\frac{1}{5}c \end{cases}$

E. $\begin{cases} 4c+b=11.50 \\ b=5c \end{cases}$

6. For what value of a would the following system of equations have an infinite number of solutions?

$$3x-7y=14$$
$$28y-12x=7a$$

A. -8
B. -2
C. -56
D. -7
E. -64

7. The solution to $ax=y$ is $x=-5$, and the solution to $ax+6=y$ is $x=3$. What is the value of a?

A. $-\frac{8}{6}$
B. $-\frac{6}{7}$
C. $-\frac{7}{9}$
D. $-\frac{3}{4}$
E. $\frac{7}{9}$

8. Given that $4x+3y=11$ and $3x+2y=13$, what is the value of $x-y$?

A. 5
B. -2
C. 36
D. 6
E. -36

9. If $x+y=5$, and $y-x=-7$, then $x^3+y^3=?$

A. 215
B. 217
C. -215
D. -217
E. 216

10. What is the value of c in the system of equations below?

$$3c-5d=a$$
$$2c+4d=-b$$

A. $a-b+d$
B. $a+b+d$
C. $-\left(\dfrac{a-b+d}{5}\right)$
D. $\dfrac{a+b+d}{3}$
E. $\dfrac{a-b+d}{5}$

11. Let $x+4y=12$ and $4x+2y=2.5$. What is the value of $5x+6y$?

A. 14.5
B. 9.5
C. 2
D. -9.5
E. -14.5

12. The solution of the system of equations below is the set of all (x,y) such that $3x+4y=12$. What is the value of w?

$$21x+28y=84$$
$$15x-wy=-6w$$

A. -10
B. -2
C. 3
D. 4
E. 5

13. Emily has printer paper and lined paper for her classroom. The reams of printer paper have 50 sheets per ream and cost \$10. The reams of lined paper have 75 sheets and cost \$12. Emily will order a total 45 reams of paper and her total cost is \$490. What system of equations gives the correct relationship between the p reams of printer paper and l reams of lined paper?

A. $\begin{cases} l+p=45 \\ 10l+12p=490 \end{cases}$

B. $\begin{cases} l-p=45 \\ 12l+10p=490 \end{cases}$

C. $\begin{cases} l+p=45 \\ 12l-10p=490 \end{cases}$

D. $\begin{cases} l-p=45 \\ 10l-12p=490 \end{cases}$

E. $\begin{cases} l+p=45 \\ 12l+10p=490 \end{cases}$

14. On opening, a high school play set a record by selling 630 tickets. They collected \$4350. If child tickets sold for \$5 and adult tickets sold for \$8, what is the difference between the number of adult and child tickets sold?

A. 230
B. 400
C. 200
D. 150
E. 170

ANSWER KEY

1. E **2. B** **3. D** **4. B** **5. D** **6. A** **7. D** **8. C** **9. A** **10. E** **11. A** **12. A** **13. E** **14. E**

ANSWER EXPLANATIONS

1. **E.** We can solve this problem using elimination. Multiplying the first equation $3x-2y=14$ by 4, we get $12x-8y=56$. Adding this equation to the second equation, we can cancel out the x and y variables.

$$\begin{array}{r} 12x-8y=56 \\ +\left(-12x+8y=8z\right) \\ \hline 0=56+8z \end{array}$$

Subtracting 56 on both sides and then dividing both sides by 8, we get $-56=8z$ and $-7=z$.

2. **B.** We can solve this problem using elimination. We want to find the value of y, so we wish to cancel out the x variable. Subtracting 4 from both sides of the first equation, we get $3x+y=46$. Multiplying the second equation by -3, we get $-3x-9y=-150$. Adding this to the first equation, we get:

$$\begin{array}{r} 3x+y=46 \\ +\left(-3x-9y=-150\right) \\ \hline -8y=-104 \end{array}$$

Dividing both sides of the equation by -8, we get $y=13$.

3. **D.** We can solve this problem using elimination. We wish to find the value of x so we want to cancel out the y value. Multiplying the second equation by 2, we get $4x+14y=106$. Adding this to the first equation, we get:

$$\begin{array}{r} 5x-14y=47 \\ +4x+14y=106 \\ \hline 9x=153 \end{array}$$

Dividing each side of this equation by 9, we get $x=17$.

4. **B.** Let b be the number of brownies they sold and c be number of cupcakes they sold. The money they made by selling brownies can be expressed as $4.5b$ and the money they made by selling cupcakes can be expressed by $6c$. We are given that they sold a total of 125 baked goods, so $b+c=125$. We also know that they made a total of 633 dollars, so $4.5b+6c=633$. We now take the first equation and write b in terms of c. So, $b+c=125$ yields $b=125-c$. Now, we can plug in $b=125-c$ to the second equation $4.5b+6c=633$, giving us $4.5\left(125-c\right)+6c=633$. Distributing out 4.5, we get $562.5-4.5c+6c=633$. Combining like terms, we get $1.5c=70.5 \to c=47$. The total amount that they made from selling cupcakes alone is then $6c=6\left(47\right)=282$.

5. **D.** Let $c=$ the price of a custard and $b=$ the price of a brownie. The amount of money Tyler spends on custards can be calculated as c multiplied by the number of custards bought and likewise for brownies. We know that Tyler spent a total of $\$11.50$ on 2 custards and 4 brownies, so this information can be written as the equation $2c+4b=11.50$. We also know that the price of each brownie is one-fifth the price of one custard. This means $b=\frac{1}{5}c$. We look for the answer choice that has both of these equations displayed, and we see that answer choice (D) matches our equations.

6. **A.** If a system of two equations has an infinite number of solutions, then the equations given must be equal to each other. This is the only way that none of the variables will cancel out, and the only way the variables can have infinite solutions. So, we wish to find the value of a such that the two equations are equal. Multiplying the first equation by -4, we get $-12x+28y=-56$. We see that the left side of this equation is already equal to the left side of the second equation. Now, we only need to find the value of a that makes the right sides of both equations equal to each other. This means $-56=7a$ or $a=-8$.

7. **D.** We can solve this problem using substitution and elimination. Plugging in $x=-5$ to $ax=y$, we get $-5a=y$. Plugging in $x=3$ to $ax+6=y$ is $3a+6=y$. Now, we have two new equations we want to use to solve for the value of a. Subtracting the second equation by the first, we get:

$$\begin{array}{r} -5a=y \\ -\left(3a+6=y\right) \\ \hline -8a-6=0 \end{array}$$

Adding 6 to both sides of the equation, we get $-8a=6$. Now, dividing both sides by -8, we get $a=-\frac{6}{8}=-\frac{3}{4}$.

8. **C**. We can solve this problem using elimination. Subtracting the first equation by the second, we get:

$$\begin{array}{r} 4x+3y=11 \\ -\left(3x+2y=13\right) \\ \hline x+y=-2 \end{array}$$

Then, subtracting y on both sides, we get $x=-y-2$. Substituting this in for the value of x in $4x+3y=11$, we get $4\left(-y-2\right)+3y=11$. Distributing out the 4 and then simplifying this, we get $-4y-8+3y=11 \rightarrow -y=19$. So $y=-19$. Now we can find the value of $x-y$ by taking the equation $x+y=-2$ and subtracting both sides by $2y$. This yields $x+y-2y=-2-2y \rightarrow x-y=-2-2y$. So the value of $x-y$ can be found by substituting in $y=-19$ to $-2-2y$. This is $-2-2\left(-19\right)=-2+38=36$.

9. **A.** We can solve this problem using elimination. Adding the first two given equations, we get:

$$\begin{array}{r} y+x=5 \\ +\left(y-x=-7\right) \\ \hline 2y=-2 \end{array}$$

Dividing both sides of the result by 2, we get $y=-1$. Now, we can plug $y=-1$ into the first equation to get $-1+x=5$. Adding 1 on both sides of this equation gives us $x=6$. Now we have the values of y and x, we can plug these in $x^3+y^3=\left(6\right)^3+\left(-1\right)^3=216-1=215$.

10. **E.** We can solve this problem using elimination. Adding the two given equations, we get:

$$\begin{array}{r} 3c-5d=a \\ +\left(2c+4d=-b\right) \\ \hline 5c-d=a-b \end{array}$$

To find the value of c, we add d to both sides of the equation and divide both sides by 5. This gives $c=\frac{a-b+d}{5}$.

11. **A.** We can solve this problem using elimination. Multiplying the second equation by 2, we get: $2\left(4x+2y=2.5\right)\rightarrow$ $8x+4y=5$. Now, we subtract the first equation by this to get:

$$\begin{array}{r} 8x+4y=5 \\ -\left(x+4y=12\right) \\ \hline 7x=-7 \end{array}$$

So, dividing $7x=-7$ by 7 gives us $x=-1$. Plugging $x=-1$ into the first equation gives us $(-1)+4y=12 \to 4y=13 \to y=\frac{13}{4}$. To find the value of $5x+6y$, we plug in $x=-1$ and $y=\frac{13}{4}$ to get $5(-1)+6\left(\frac{13}{4}\right)=-5+\frac{39}{2}=\frac{29}{2}=14.5$.

12. **A.** We can solve this problem quickly by simply plugging in values, since we know that we can plug in any valid combination of (x,y) for $3x+4y=12$. Plugging in $y=0$ gives us $x=4$ and we can now plug these values into the second original equation $15x-wy=-6w$, giving us $60=-6w$. Dividing both sides by -10 leaves us with $w=-10$.

13. **E.** Let p = reams of printer paper and l = reams of lined paper Emily gets for her classroom. We are given that Emily gets a total of reams, so $p+l=45$. Then, the amount of money spent on printer paper is calculated as $10p$ since each ream of printer paper is $\$10$. Likewise, the amount of money spent on lined paper is calculated as $12l$ since each ream of lined paper is $\$12$. The total cost $\$490$ can then be represented as $10p+12l=490$. So, the two equations are $l+p=45$ and $10p+12l=490$.

14. **E.** Let c = the number of child tickets sold and a = the number of adult tickets sold. Then, the money made by selling child tickets is $5c$ and the money made from adult tickets is $8a$. The total amount of money, which is given, allows for this equation: $5c+8a=4350$. Our second equation, $c=630-a$, calculates the total number of tickets. Subtracting a on both sides of that equation, we get $c=630-a$. Substituting this value in for c in the first equation $5c+8a=4350$, we get $5(630-a)+8a=4350$. Distributing and simplifying, we get $3150-5a+8a=4350 \to 3a=1200 \to a=400$. Because $c=630-a$ and we now know $a=400$, $c=630-400$, which is 230. We can now find the difference between the number of adult and child tickets sold. It is $|a-c|=|230-400|=170$.