

29E

1) $B = D + 30$ (or $B - 30 = D$)

2) $(B + 10) = 2(D + 10)$

3) $[(D + 30) + 10] = 2(D + 10)$

$D + 40 = 2D + 20$

$20 = D$

4) $B = 20 + 30 = 50$

5) $L = 5K$

6) $(K - 2) = 1/9(L - 2)$

7) $9(K - 2) = L - 2$

$9K - 18 = (5K) - 2$

$4K = 16$

$K = 4$

8) $L = 5(4) = 20$

9) $D_D = R_D \times T_D \Rightarrow 65 = R_D \times 5$

$R_D = 13 = B + W$

10) $D_U = R_U \times T_U \Rightarrow 24 = R_U \times 8$

$R_U = 3 = B - W$

11) $B + W = 13$

$B - W = 3$

$2B = 16$

$B = 8$

12) $13 = B + W$

$13 = 8 + W$

$W = 5$

13) $-10[D + Q = 12] \Rightarrow -10D - 10Q = -120$

$100[.10D + .25Q = 2.55] \Rightarrow 10D + 25Q = 255$

$15Q = 135$

$Q = 9$

14) $D = 3$ ($D + Q = 12$)

check: $3(.10) + 9(.25) = 2.55$

$2.55 = 2.55$

15) $6(N + 2) + 8 = 8(N + 1) - N$

$6N + 12 + 8 = 8N + 8 - N$

$6N + 20 = 7N + 8$

$N = 12$

16) 12, 13, 14

check: $6(14) + 8 = 8(13) - 12$

$92 = 92$

17) $(N) + (N + 2) + (N + 4) = -51$

$3N + 6 = -51$

$3N = -57$

$N = -19$

18) -19, -17, -15

check: $(-19) + (-17) + (-15) = -51$

$-51 = -51$

19) $-3[A_T + A_E = 80] \Rightarrow$

$100[.03A_T + .08A_E = .06(80)] \Rightarrow 3A_T + 8A_E = 480$

$5A_E = 240$

$A_E = 48 \text{ ml}$

20) $A_T = 32 \text{ ml}$, $48 + 32 = 80 \text{ ml}$

30A

Numbers 1 - 6

A. $3X + 6Y - 4Z = 17$

B. $-X + 5Y + 4Z = 11$

D. $2X + 11Y = 28$

E. $-2X + 58Y = 110$

x 5 B. $-5X + 25Y + 20Z = 55$

x 2 C. $4X + 4Y - 20Z = 0$

E. $-X + 29Y = 55$

D. $2X + 11Y = 28$

E. $-2X + 58Y = 110$

$69Y = 138$

$Y = 2$

D. $2X + 11(2) = 28$

$2X = 6$

$X = 3$

B. $-(3) + 5(2) + 4Z = 11$

$4Z = 4$

$Z = 1$

check 3, 2, 1

A. $3(3) + 6(2) - 4(1) = 17$

$17 = 17$

B. $-(3) + 5(2) + 4(1) = 11$

$11 = 11$

C. $2(3) + 2(2) - 10(1) = 0$

$0 = 0$

Numbers 7 - 12

A. $-3X - Y - 2Z = -13$

x 2 B. $4X + 4Y + 2Z = 32$

D. $X + 3Y = 19$

x (-3) B. $-6X - 6Y - 3Z = -48$

C. $X + 3Y + 3Z = 13$

E. $-5X - 3Y = -35$

D. $X + 3Y = 19$

E. $-5X - 3Y = -35$

$-4X = -16$

$X = 4$

D. $(4) + 3Y = 19$

$3Y = 15$

$Y = 5$

B. $2(4) + 2(5) + Z = 16$

$18 + Z = 16$

$Z = -2$

check 4, 5, -2

A. $-3(4) - (5) - 2(-2) = -13$

$-13 = -13$

B. $2(4) + 2(5) + (-2) = 16$

$16 = 16$

C. $(4) + 3(5) + 3(-2) = 13$

$13 = 13$

Numbers 13 - 18

x 2 A. $8X + 12Y + 4Z = 44$

B. $-4X + 3Y - 4Z = -10$

D. $4X + 15Y = 34$

x 3 B. $-12X + 9Y - 12Z = -30$

x (-4) C. $-20X - 16Y + 12Z = -16$

E. $-32X - 7Y = -46$

D. $32X + 120Y = 272$

E. $-32X - 7Y = -46$

$113Y = 226$

$Y = 2$

D. $4X + 15(2) = 34$

$4X = 4$

$X = 1$

A. $4(1) + 6(2) + 2Z = 22$

$16 + 2Z = 22$

$Z = 3$

check 1, 2, 3

A. $4(1) + 6(2) + 2(3) = 22$

$22 = 22$

B. $-4(1) + 3(2) - 4(3) = -10$

$-10 = -10$

C. $5(1) + 4(2) - 3(3) = 4$

$4 = 4$

30B

Numbers 1 - 6

$$\times (-1) \quad A. -4X + 4Y - 2Z = 2$$

$$B. \frac{5X + Y + 2Z = 1}{X + 5Y = 3}$$

$$D. \frac{5X + Y + 2Z = 1}{X + 5Y = 3}$$

$$\times 3 \quad B. 15X + 3Y + 6Z = 3$$

$$\times 2 \quad C. \frac{2X + 12Y - 6Z = -22}{17X + 15Y = -19}$$

$$E. 17X + 15Y = -19$$

$$\times (-3) \quad D. -3X - 15Y = -9$$

$$E. \frac{17X + 15Y = -19}{14X = -28}$$

$$X = -2$$

$$D. (-2) + 5Y = 3$$

$$5Y = 5$$

$$Y = 1$$

$$A. 4(-2) - 4(1) + 2Z = -2$$

$$2Z = 10$$

$$Z = 5$$

check -2, 1, 5

$$A. 4(-2) - 4(1) + 2(5) = -2$$

$$-2 = -2$$

$$B. 5(-2) + (1) + 2(5) = 1$$

$$1 = 1$$

$$C. (-2) + 6(1) - 3(5) = -11$$

$$-11 = -11$$

Numbers 7 - 12

$$A. X + 2Y + 3Z = 32$$

$$\times (-3) \quad B. \frac{-12X + 9Y - 3Z = -21}{-11X + 11Y = 11}$$

$$D. -11X + 11Y = 11$$

$$\times 2 \quad B. 8X - 6Y + 2Z = 14$$

$$C. \frac{-2X + 6Y - 2Z = 4}{6X = 18}$$

$$E. 6X = 18$$

$$X = 3$$

$$D. -11(3) + 11Y = 11$$

$$11Y = 44$$

$$Y = 4$$

$$A. (3) + 2(4) + 3Z = 32$$

$$11 + 3Z = 32$$

$$Z = 7$$

check 3, 4, 7

$$A. (3) + 2(4) + 3(7) = 32$$

$$32 = 32$$

$$B. 4(3) - 3(4) + (7) = 7$$

$$7 = 7$$

$$C. -2(3) + 6(4) - 2(7) = 4$$

$$4 = 4$$

Numbers 13 - 18

$$A. X - 8Y + Z = 6$$

$$B. \frac{2X + 7Y - Z = 11}{3X - Y = 17}$$

$$D. 3X - Y = 17$$

$$\times 3 \quad A. 3X - 24Y + 3Z = 18$$

$$C. \frac{2X - 10Y - 3Z = -22}{5X - 34Y = -4}$$

$$E. 5X - 34Y = -4$$

$$\times (-34) \quad D. -102X + 34Y = -578$$

$$E. \frac{5X - 34Y = -4}{-97X = -582}$$

$$X = 6$$

$$D. 3(6) - Y = 17$$

$$18 - Y = 17$$

$$Y = 1$$

$$A. (6) - 8(1) + Z = 6$$

$$-2 + Z = 6$$

$$Z = 8$$

check 6, 1, 8

$$A. (6) - 8(1) + (8) = 6$$

$$6 = 6$$

$$B. 2(6) + 7(1) - (8) = 11$$

$$11 = 11$$

$$C. 2(6) - 10(1) - 3(8) = -22$$

$$-22 = -22$$

30C

Numbers 1-6

$$A. 5X - 3Y + 3Z = 3$$

$$B. 2X - 6Y - 4Z = 2$$

$$C. 3X - 5Y + Z = -3$$

$$A + B = D$$

$$A. [5X - 3Y + 3Z = 3] \times (-2) \quad -10X + 6Y - 6Z = -6$$

$$B. [2X - 6Y - 4Z = 2] \times (1) \quad 2X - 6Y - 4Z = 2$$

Eliminate Y

$$D. \frac{-10X + 6Y - 6Z = -6}{2X - 6Y - 4Z = 2}$$

$$-8X - 10Z = -4$$

Eliminate X

$$A + C = E$$

$$A. [5X - 3Y + 3Z = 3] \times (-5) \quad -25X + 15Y - 15Z = -15$$

$$C. [3X - 5Y + Z = -3] \times (3) \quad 9X - 15Y + 3Z = -9$$

$$E. \frac{-25X + 15Y - 15Z = -15}{9X - 15Y + 3Z = -9}$$

$$-16X - 12Z = -24$$

$$(x-2) \quad 16X + 20Z = 8$$

$$(x1) \quad -16X - 12Z = -24$$

$$8Z = -16$$

$$Z = -2$$

Put Z=-2 in D.

$$D. -8X - 10(-2) = -4$$

$$-8X = -24$$

$$X = 3$$

Put Z=-2 & X=3 in A.

$$A. 5(3) - 3Y + 3(-2) = 3$$

$$9 - 3Y = 3$$

$$-3Y = -6$$

$$Y = 2$$

Check X=3, Y=2, Z=-2

$$A. 5(3) - 3(2) + 3(-2) = 3$$

$$A. \quad 9 - 6 = 3$$

$$A. \quad 3 = 3$$

$$B. 2(3) - 6(2) - 4(-2) = 2$$

$$B. \quad 6 - 12 + 8 = 2$$

$$B. \quad 2 = 2$$

$$C. 3(3) - 5(2) + (-2) = -3$$

$$C. \quad 9 - 10 - 2 = -3$$

$$C. \quad -3 = -3$$

Numbers 7-12

$$A. 3X + 2Y + 4Z = 9$$

$$B. 4X + 3Y - 2Z = 6$$

$$C. 5X + 4Y - 3Z = 8$$

$$A + B = D$$

$$A. [3X + 2Y + 4Z = 9] \times (1) \quad 3X + 2Y + 4Z = 9$$

$$B. [4X + 3Y - 2Z = 6] \times (2) \quad 8X + 6Y - 4Z = 12$$

Eliminate Z

$$D. \frac{3X + 2Y + 4Z = 9}{8X + 6Y - 4Z = 12}$$

$$11X + 8Y = 21$$

Eliminate X

$$A + C = E$$

$$A. [3X + 2Y + 4Z = 9] \times (3) \quad 9X + 6Y + 12Z = 27$$

$$C. [5X + 4Y - 3Z = 8] \times (4) \quad 20X + 16Y - 12Z = 32$$

$$E. \frac{9X + 6Y + 12Z = 27}{20X + 16Y - 12Z = 32}$$

$$29X + 22Y = 59$$

$$(x29) \quad 319X + 232Y = 609$$

$$(x-11) \quad -319X - 242Y = -649$$

$$-10Y = -40$$

$$Y = 4$$

Put Y=4 in D.

$$D. 11X + 8(4) = 21$$

$$11X = -11$$

$$X = -1$$

Put Y=4 & X=-1 in A.

$$A. 3(-1) + 2(4) + 4Z = 9$$

$$-3 + 8 + 4Z = 9$$

$$5 + 4Z = 9$$

$$Z = 1$$

Numbers 13-16

$$(P - 3) = 4(C - 3)$$

$$(P - 33) = C \text{ or } P = C + 33$$

$$[(C + 33) - 3] = 4(C - 3)$$

$$C + 30 = 4C - 12$$

$$42 = 3C \quad C = 14$$

$$P = 14 + 33 = 47 \quad P = 47$$

Numbers 17-20

$$D_D = R_D T_D = 34 = R_D (2)$$

$$R_D = 17 = B + W$$

$$D_U = R_U T_U = 15 = R_U (3)$$

$$R_U = 5 = B - W$$

$$22 = 2B \quad B = 11 \quad 17 = 11 + W \quad W = 6$$

30D

Numbers 1-6

A. $6X + 3Y - 5Z = 5$	A + B = D	A. $[6X + 3Y - 5Z = 5](x1)$	$6X + 3Y - 5Z = 5$
B. $-2X - 3Y - Z = -1$		B. $[-2X - 3Y - Z = -1](x1)$	$-2X - 3Y - Z = -1$
C. $4X + 2Y - 6Z = -2$	Eliminate Y		
		D	$4X - 6Z = 4$
	A + C = E	A. $[6X + 3Y - 5Z = 5](x-2)$	$-12X - 6Y + 10Z = -10$
		C. $[4X + 2Y - 6Z = -2](x3)$	$12X + 6Y - 18Z = -6$
	Eliminate X		
		E	$-8Z = -16 \quad Z = 2$
Put Z=2 in D.		D $4X - 6(2) = 4$	Put Z=2 & X=4 in A.
		$4X = 16$	A $6(4) + 3Y - 5(2) = 5$
		X = 4	$14 + 3Y = 5$
			$3Y = -9$
			$Y = -3$

Numbers 7-12

[illegible]

Numbers 13-16

$$\begin{aligned}(S + 1) &= 2(G + 1) & S &= 2G + 2 - 1 = 2G + 1 \\(G - 5) &= 4/9(S - 5) & 9(G - 5) &= 4(S - 5) \\& & 9G - 45 &= 4S - 20 \\& & 9G - 25 &= 4(2G + 1) \\& & 9G - 25 &= 8G + 4 & G &= 29 \\& & G &= 29 \text{ so } S = 2(29) + 1 = 59 & S &= 59\end{aligned}$$

Numbers 17-20

$$\begin{array}{l} D_D = R_D T_D = 42 = R_D \quad (3) \\ R_D = 14 = B + W \\ \\ D_U = R_U T_U = 30 = R_U \quad (5) \\ R_U = 6 = B - W \end{array}$$

30E

Numbers 1-6

A. $-2X + 3Y + 5Z = -7$ A + B = D
 B. $-6X - 2Y - Z = -15$ B. $[-6X - 2Y - Z = -15] \times (-1) \rightarrow 6X - 2Y - Z = 15$
 C. $-4X + 4Y + 5Z = -15$

Eliminate X

A + C = E A. $[-2X + 3Y + 5Z = -7] \times (-2) \rightarrow 4X - 6Y - 10Z = 14$
 C. $[-4X + 4Y + 5Z = -15] \times (1) \rightarrow -4X + 4Y + 5Z = -15$

Eliminate Y

E $-11Y - 16Z = 6$
 $-11Y - 16Z = 6$
 $x(-2) \rightarrow 22Y + 32Z = -12$
 $(x11) \rightarrow -22Y - 55Z = -11$
 $-23Z = -23$
 $Z = 1$

Put $Z=1$ in D. D. $-11Y - 16(1) = 6$ Put $Z=1$ & $Y = -2$ in A. A. $-2X + 3(-2) + 5(1) = -7$
 $-11Y = 22$ $-11Y = 22$ $-2X - 1 = -7$
 $Y = -2$ $-2X = -6$
 $X = 3$

Check $X=3, Y=-2, Z=1$ A. $-2(3) + 3(-2) + 5(1) = -7$ B. $-6(3) - 2(-2) - 1 = -15$ C. $-4(3) + 4(-2) + 5(1) = -15$
 A. $-12 + 5 = -7$ B. $-14 - 1 = -15$ C. $-20 + 5 = -15$
 A. $-7 = -7$ B. $-15 = -15$ C. $-15 = -15$

Numbers 7-12

A. $2X - 5Y + 2Z = -5$	A + B = D	A. $[2X - 5Y + 2Z = -5] \times (2)$	$4X - 10Y + 4Z = -10$	
B. $-3X + 4Y - 4Z = 6$		B. $[-3X + 4Y - 4Z = 6] \times (1)$	$-3X + 4Y - 4Z = 6$	
C. $5X + 6Y - Z = 18$				
	Eliminate Z	D	$X - 6Y = -4$	Eliminate X
A + C = E		A. $[2X - 5Y + 2Z = -5] \times (1)$	$2X - 5Y + 2Z = -5$	$x(-12) - 12X + 72Y = 48$
		C. $[5X + 6Y - Z = 18] \times (2)$	$10X + 12Y - 2Z = 36$	$x(1) - 12X + 7Y = 31$
		E	$12X + 7Y = 31$	$79Y = 79$ $Y = 1$
Put Y=1 in D.		D $X - 6(1) = -4$	Put Y=1 & X=2 in A.	A $2(2) - 5(1) + 2Z = -5$
		$X - 6 = -4$		$4 - 5 + 2Z = -5$
		$X = 2$		$2Z = -4$
				$Z = -2$

Numbers 13-16

$$\begin{aligned}(W + 15) &= 1.4(C + 15) = (1.4C + 21) - 15 = 1.4C + 6 \\(C - 5) &= .6(W - 5) = (.6W - 3) + 5 = .6W + 2 \\C &= .6W + 2 \text{ and } W = 1.4C + 6 \\W &= 1.4(.6W + 2) + 6 = .84W + 8.8 \\W &= .84W + 8.8 \text{ so } W = 55 \text{ and since } C = .6(55) + 2 \text{ then } C = 35\end{aligned}$$

Numbers 17-20

$$\begin{array}{l} D^O = R_D T_D = 20 = R_D (2) \\ R_D = 10 = B + W \\ D_U = R_U T_U = 20 = R_U (5) \\ R_U = 4 = B - W \end{array}$$

$$14 = 2B \quad B = 7 \quad 10 = 7 + W \quad W = 3$$