29A

1) $R = 5D$
$(R + 5) = 3(D + 5)$ → $(R + 5) = 3(D + 5)$
$R = 3D + 10$
$(5D) = 3D + 10$
$2D = 10$
$D = 5$ years, $R = 5(5) = 25$ years

2) $J + 1 = 6(N + 1)$ → $J = 6N + 5$
$1/3(J + 7) = (N + 7)$ → $3[1/3(J + 7) = (N + 7)]$
$J + 7 = 3N + 21$
$J = 3N + 14$
$6N + 5 = 3N + 14$
$3N = 9$
$N = 3$ years, $J = 6(3) + 5 = 23$ years

3) $D - 2 = 2(T - 2)$ → $D = 2T - 2$
$2/3(D + 23) = (T + 23)$ → $3[2/3(D + 23) = (T + 23)]$
$2D + 46 = 3T + 69$
$2D = 3T + 23$
$2(2T - 2) = 3T + 23$
$4T - 4 = 3T + 23$
$T = 27$ years, $D = 2(27) - 2 = 52$ years

4) $(C + 5) = 6(H + 5)$ → $C = 6H + 25$
$.2(C + 7) = (H + 7)$ → $.2(C + 7) = H + 7$
$10[.2C + 1.4 = H + 7]$
$2C + 14 = 10H + 70$
$C = 5H + 28$
$6H + 25 = 5H + 28$
$H = 3$ years,
$C = 6(3) + 25 = 43$ years

5) $D_D = R_D \times T_D \Rightarrow D_D = (B + W)T \Rightarrow D_D = (12 + W)2$
$D_U = R_U \times T_U \Rightarrow D_U = (B - W)T \Rightarrow D_U = (12 - W)6$

speed of current = 6 mph
distance = (12 + 6)2 = 36 miles

$D_D = D_U$
$(12 + W)2 = (12 - W)6$
$24 + 2W = 72 - 6W$
$W = 6$

6) $D_D = R_D \times T_D \Rightarrow D_D = (B + W)T \Rightarrow 36 = (B + W)3$
$D_U = R_U \times T_U \Rightarrow D_U = (B - W)T \Rightarrow 2 = (B - W)1$

speed of wind = 5 mph
speed of bird = (5) + 2 = 7 mph

$36 = 3B + 3W$
$B = W + 2$
$36 = 3(W + 2) + 3W$
$W = 5$

7) $D_D = R_D \times T_D \Rightarrow D_D = (B + W)T \Rightarrow 21 = (B + 2)T$
$D_U = R_U \times T_U \Rightarrow D_U = (B - W)T \Rightarrow 9 = (B - 2)T$

time = 3 hours
rate of barge $21 = (B + 2)(3)$ $B = 5$ mph

$21 = BT + 2T$
$-9 = -BT + 2T$
$12 = 4T$
$T = 3$

8) $D_D = R_D \times T_D \Rightarrow D_D = (P + W)T \Rightarrow D_D = (200 + W)9$
$D_U = R_U \times T_U \Rightarrow D_U = (P - W)T \Rightarrow D_U = (200 - W)11$

speed of wind = 20 mph
distance = (200 + 20)9 = 1,980 miles

$D_D = D_U$
$(200 + W)9 = (200 - W)11$
$1800 + 9W = 2200 - 11W$
$W = 20$

29B

1) $S - 1 = 2(J - 1)$ → $S = 2J - 1$
$2/3(S + 19) = (J + 19)$ → $3[2/3(S + 19) = (J + 19)]$
$2S + 38 = 3J + 57$
$2S = 3J + 19$
$2(2J - 1) = 3J + 19$
$4J - 2 = 3J + 19$
$J = 21$ years, $S = 2(21) - 1 = 41$ years

2) $S = 3B$
$3/5\ (S + 30) = (B + 30)$ → $5[(3/5\ (S + 30) = (B + 30)]$
$3S + 90 = 5B + 150$
$3S = 5B + 60$
$3(3B) = 5B + 60$
$4B = 60$
$B = 15$ years, $S = 3(15) = 45$ years

3) $C = 4S$
$(S - 10) = 1/6(C - 10)$ → $6[(S - 10) = 1/6(C - 10)]$
$6S - 60 = C - 10$
$6S = C + 50$
$6S = (4S) + 50$
$2S = 50$
$S = 25$ years, $C = 4(25) = 100$ years

4) $Je = 1/2\ Ja$ → $Ja = 2Je$
$5/7(Ja + 15) = (Je + 15)$ → $7[5/7(Ja + 15) = (Je + 15)]$
$5Ja + 75 = 7Je + 105$
$5Ja = 7Je + 30$
$5(2Je) = 7Je + 30$
$3Je = 30$
$Je = 10$ years, $Ja = 2(10) = 20$ years

5) $D_D = (F + W)T \Rightarrow 25 = (F + 2)T \Rightarrow 25 = FT + 2T$
$D_U = (F - W)T \Rightarrow 35 = (F - 2)(7T) \Rightarrow [35 = (F - 2)(7T)] \div 7$
$5 = FT - 2T$

time downstream = 5 hours
speed of fish $25 = (F + 2)(5)$ $F = 3$ mph

$25 = FT + 2T$
$-5 = -FT + 2T$
$20 = 4T$
$T = 5$

6) $D_D = (B + W)T \Rightarrow 60 = (B + 4)T$
$D_U = (B - W)T \Rightarrow 12 = (B - 4)T$

time = 6 hours, total time = 12 hours
rate of paddling $12 = (B - 4)(6)$ $B = 6$ mph

$60 = BT + 4T$
$-12 = -BT + 4T$
$48 = 8T$
$T = 6$

7) $D_D = (B + W)T \Rightarrow D_D = (100 + W)6$
$D_U = (B - W)T \Rightarrow D_U = (100 - W)9$

speed of wind = 20 mph
distance = (100 + 20) 6 = 720 miles

$D_D = D_U$
$(100 + W)6 = (100 - W)9$
$600 + 6W = 900 - 9W$
$W = 20$

8) $D_D = (P + W)T \Rightarrow 240 = (C + W)4$
$D_U = (P - W)T \Rightarrow 160 = (C - W)4$

speed of car = 50 mph
speed of wind $240 = (50 + W)4$ $W = 10$ mph

$240 = 4C + 4W$
$160 = 4C - 4W$
$400 = 8C$
$C = 50$

29C

1) $(P + 2) = 2(E + 2)$

2) $(P - 16) = 4.25(E - 16)$

3) 1st equation $P = (2E + 4) - 2$
$P = 2E + 2$
$[(2E + 2) - 16] = 4.25E - 68$
$2E - 14 = 4.25E - 68$
$54 = 2.25E$
$24 = E$

4) $P = 2(24) + 2 = 50$

5) $K = 2.75M$

6) $(M - 2) = 1/3(K - 2)$

7) $(M - 2) = 1/3\ (2.75M - 2)$
$3M - 6 = 2.75M - 2$
$.25M = 4$
$M = 16$

8) $K = (2.75)(16) = 44$

9) $D_D = R_D \times T_D \Rightarrow 36 = R_D \times 4$
$R_D = 9 = B + W$

10) $D_U = R_U \times T_U \Rightarrow 15 = R_U \times 3$
$R_U = 5 = B - W$

11) $B + W = 9$
$B - W = 5$
$2B = 14$
$B = 7$

12) $(7) + W = 9$
$W = 2$

13) $-1[P + N = 24] \Rightarrow -P - N = -24$
$100[.01P + .05N = .72] \Rightarrow P + 5N = 72$
$4N = 48$
$N = 12$

14) $P + N = 24, \quad P = 12$
check: $12(.01) - 12(.05) = .72$
$.72 = .72$

15) $4(N + 2) - 8(N + 1) = 9N$
$4N + 8 - 8N - 8 = 9N$
$N = 0$

16) 0, 1, 2
check: $4(2) - 8(1) = 9(0)$
$0 = 0$

17) $(N) + (N + 2) + (N + 4) = 84$
$3N + 6 = 84$
$3N = 78$
$N = 26$

18) 26, 28, 30
check: $(26) + (28) + (30) = 84$
$84 = 84$

19) $C_T = 20\%, C_F = 5\%$
$-5\ [C_T + C_F = 12] \Rightarrow$
$100[.20C_T + .05C_F = .15(12)] \Rightarrow 20C_T + 5C_F = 180$
$15C_T = 120$
$C_T = 8$ oz.

20) $C_T = 8$ oz., $C_F = 4$ oz.

29D

1) $(S - 1) = 1/2(K - 1)$
$2(S - 1) = K - 1$
$2S - 1 = K$

2) $(K + 7) = 1\ 1/2\ (S + 7)$

3) $(2S - 1) + 7 = 1.5S + 10.5$
$2S + 6 = 1.5S + 10.5$
$.5S = 4.5$
$S = 9$

4) $2(9) - 1 = K$
$17 = K$

5) $(K - 1) = 1/2\ (D - 1)$
$2(K - 1) = D - 1$
$2K - 1 = D$

6) $(D + 11) = 3/2\ (K + 11)$

7) $[(2K - 1) + 11] = 3/2\ (K + 11)$
$2K + 10 = 3/2\ K + 16.5$
$1/2\ K = 6.5$
$K = 13$

8) $2(13) - 1 = D$
$26 - 1 = D$
$25 = D$

9) $R_D = B + W \Rightarrow 48 = B + W$

10) $R_U = B - W \Rightarrow 24 = B - W$

11) $48 = B + W$
$24 = B - W$
$72 = 2B$
$36 = B$

12) $48 = B + W$
$48 = 36 + W$
$12 = W$

13) $-5[D + N = 19] \Rightarrow -5D - 5N = -95$
$100[.10D + .05N = 1.30] \Rightarrow 10D + 5N = 130$
$5D = 35$
$D = 7$

14) $D + N = 19, \quad N = 12$
check: $7(.10) + 12(.05) = 1.30$
$1.30 = 1.30$

15) $3(N) - 5(N + 1) = 3 + 2(N + 2)$
$3N - 5N - 5 = 3 + 2N + 4$
$-2N - 5 = 2N + 7$
$-4N = 12$
$N = -3$

16) -3, -2, -1
check: $3(-3) - 5(-2) = 3 + 2(-1)$
$1 = 1$

17) $8(N + 4) = 5(N) - 28$
$8N + 32 = 5N - 28$
$3N = -60$
$N = -20$

18) -20, -18, -16
check: $8(-16) = 5(-20) - 28$
$128 = 128$

19) $B_F = 25\%, B_T = 10\%$
$-10[B_F + B_T = 90] \Rightarrow$
$100[.25B_F + .10B_T = .20(90)] \Rightarrow 25B_F + 10B_T = 1800$
$15B_F = 900$
$B_F = 60$ ml

20) $B_T = 30$ ml, $B_S = 60 + 30 = 90$ ml

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) $-3[A_T + A_E = 80] \Rightarrow$
$100[.03A_T + .08A_E = .06(80)] \Rightarrow 3A_T + 8A_E = 480$
$5A_E = 240$
$A_E = 48$ ml

20) $A_T = 32$ ml, $48 + 32 = 80$ ml

30A

Numbers 1 - 6

A. $3X + 6Y - 4Z = 17$
B. $-X + 5Y + 4Z = 11$
D. $2X + 11Y = 28$

x 2
D. $2X + 11Y = 28$
E. $-2X + 58Y = 110$
$69Y = 138$
$Y = 2$

x 5 B. $-5X + 25Y + 20Z = 55$
x 2 C. $4X + 4Y - 20Z = 0$
E. $-X + 29Y = 55$

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. $X + 3Y = 19$

D. $X + 3Y = 19$
E. $-5X - 3Y = -35$
$-4X = -16$
$X = 4$

x (-3) B. $-6X - 6Y - 3Z = -48$
C. $X + 3Y + 3Z = 13$
E. $-5X - 3Y = -35$

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 8
D. $32X + 120Y = 272$
E. $-32X - 7Y = -46$
$113Y = 226$
$Y = 2$

x 3 B. $-12X + 9Y - 12Z = -30$
x (-4) C. $-20X - 16Y + 12Z = -16$
E. $-32X - 7Y = -46$

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