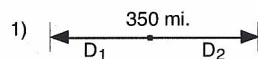


19A



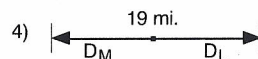
$$D_1 + D_2 = 350$$

$$R_1 T_1 + R_2 T_2 = 350$$

$$(50)(T) + (90)(T) = 350 \quad \left\{ \begin{array}{l} R_1 = 50 \\ R_2 = 90 \\ T_1 = T_2 \end{array} \right.$$

$$T = 2.5 \text{ hours}$$

$$8:30 \text{ AM} + 2:30 = 11:00 \text{ AM}$$



$$D_M + D_L = 19$$

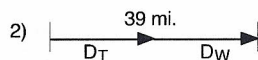
$$R_M T_M + R_L T_L = 19$$

$$(3)(T_M) + (5)(T_M - 1) = 19 \quad \left\{ \begin{array}{l} R_M = 3 \\ R_L = 5 \\ T_L = T_M - 1 \end{array} \right.$$

$$3 T_M + 5 T_M - 5 = 19$$

$$8 T_M - 5 = 19$$

$$T_M = 3 \text{ hrs.} \quad 2:30 + 3:00 = 5:30 \text{ PM}$$



$$D_T + D_W = 39$$

$$R_T T_T + R_W T_W = 39$$

$$(12)(5 - T_W) + (5)(T_W) = 39 \quad \left\{ \begin{array}{l} R_T = 12 \\ R_W = 5 \\ T_T + T_W = 5 \\ T_T = 5 - T_W \end{array} \right.$$

$$60 - 12 T_W + 5 T_W = 39$$

$$60 - 39 = 7 T_W \quad T_W = 3 \text{ hrs. walking}$$

$$5 - 3 = 2 \text{ hrs. trotting}$$



$$D_1 + D_2 = 360$$

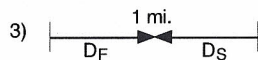
$$R_1 T_1 + R_2 T_2 = 360$$

$$(40)(7 - T_2) + (65)(T_2) = 360 \quad \left\{ \begin{array}{l} R_1 = 40 \\ R_2 = 65 \\ T_1 + T_2 = 7 \\ T_1 = 7 - T_2 \end{array} \right.$$

$$280 - 40 T_2 + 65 T_2 = 360$$

$$25 T_2 = 80 \quad T_2 = 3.2 \text{ hrs. at 65 mph}$$

$$7 - 3.2 = 3.8 \text{ hrs. at 40 mph}$$



$$D_F + D_S = 1$$

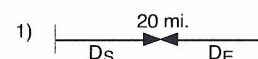
$$R_F T_F + R_S T_S = 1$$

$$(10)(T) + (5)(T) = 1 \quad \left\{ \begin{array}{l} R_F = 10 \\ R_S = 5 \\ T_F = T_S \end{array} \right.$$

$$15 T = 1$$

$$T = 1/15 \text{ hr.} = 4 \text{ min.}$$

19B



$$D_S + D_E = 20$$

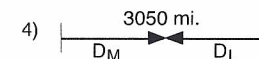
$$R_S T_S + R_E T_E = 20$$

$$(2)(T_S) + (13)(T_S + 1) = 20 \quad \left\{ \begin{array}{l} R_S = 2 \\ R_E = 13 \\ T_S = T_E \end{array} \right.$$

$$2 T_S + 13 T_S + 13 = 20$$

$$15 T_S = 7$$

$$T_S = 7/15 \text{ hours, or 28 minutes}$$



$$D_M + D_L = 3050$$

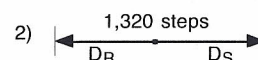
$$R_M T_M + R_L T_L = 3050$$

$$(400)(T_L + 2) + (500)(T_L) = 3050$$

$$400 T_L + 800 + 500 T_L = 3050$$

$$900 T_L = 2250$$

$$T_L = 2 \frac{1}{2} \text{ days}$$



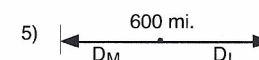
$$D_R + D_S = 1,320$$

$$R_R T_R + R_S T_S = 1,320$$

$$(30)(T) + (25)(T) = 1,320 \quad \left\{ \begin{array}{l} R_R = 30 \\ R_S = 25 \\ T_R = T_S \end{array} \right.$$

$$55 T = 1,320$$

$$T = 24 \text{ min.}$$



$$D_M + D_L = 600$$

$$R_M T_M + R_L T_L = 600$$

$$(65)(T_M) + (70)(T_M - 3) = 600$$

$$65 T_M + 70 T_M - 210 = 600$$

$$135 T_M = 810 \quad T_M = 6 \text{ hrs.}$$

$$9:00 \text{ AM} + 6:00 = 3:00 \text{ PM}$$



$$D_1 + D_2 = 500$$

$$R_1 T_1 + R_2 T_2 = 500$$

$$(130)(3 T_2) + (110)(T_2) = 500 \quad \left\{ \begin{array}{l} R_1 = 130 \\ R_2 = 110 \\ T_1 = 3 T_2 \end{array} \right.$$

$$500 T_2 = 500$$

$$T_2 = 1 \text{ hr.} \quad T_1 = 3 \times 1 = 3 \text{ hrs.}$$

19C

$$1) \text{ Jumps} = RT \Rightarrow T = \frac{J}{R} = \frac{100}{40} = 2 \frac{1}{2} \text{ min.}$$

$$2) J = RT \Rightarrow R = \frac{J}{T} = \frac{129}{3} = 43 \text{ J/m}$$

$$3) J = RT \Rightarrow 60 \frac{J}{\text{min.}} \times 2 \frac{1}{4} \text{ min.} = 135 \text{ Jumps}$$

$$4-5) \begin{array}{c} \overline{\overline{D_H = D_M}} \end{array}$$

$$\begin{array}{l} R_H T_H = R_M T_M \\ (20)(1/10) = R_M (1/6) \quad \left\{ \begin{array}{l} R_H = 20 \\ T_H = 1/10 \text{ hr.} \\ T_M = 1/6 \text{ hr.} \end{array} \right. \\ 2 = 1/6 R_M \\ 12 = R_M \end{array}$$

$$\begin{array}{l} \text{Rate of man (R}_M\text{)} = 12 \text{ mph} \\ D = RT = (12)(1/6) \text{ or } (20)(1/10) \\ D = 2 \text{ miles} \end{array}$$

$$6-8) \begin{array}{c} \overline{\overline{4,000 \text{ yds.}}} \\ \overline{D_A \quad D_E} \end{array}$$

$$\begin{array}{l} D_A + D_E = 4,000 \\ R_A T_A + R_E T_E = 4,000 \quad \left\{ \begin{array}{l} R_A = 240 \\ R_E = 200 \\ T_A = T_E + 2 \end{array} \right. \\ (240)(T_E + 2) + (200)(T_E) = 4,000 \\ 240 T_E + 480 + 200 T_E = 4,000 \\ 440 T_E = 3,520 \\ T_E = 8 \\ T_A = T_E + 2 = 8 + 2 = 10 \\ D_A = (240)(10) = 2400 \\ D_E = (200)(8) = 1600 \end{array}$$

$$9-11) \begin{array}{c} \overline{\overline{600'}} \\ \overline{D_P \quad D_E} \end{array}$$

$$\begin{array}{l} D_P + D_E = 600 \\ R_P(11) + (27)(10) = 600 \quad \left\{ \begin{array}{l} R_E = 27 \text{ fps} \\ T_E = 10 \text{ sec.} \\ T_P = 10 + 1 = 11 \text{ sec.} \end{array} \right. \\ 11 R_P + 270 = 600 \\ 11 R_P = 330 \\ R_P = 30 \\ D_P = (30)(11) = 330 \\ D_E = (27)(10) = 270 \end{array}$$

$$12) \frac{100 \cancel{\text{m}}}{1} \times \frac{1 \text{ yd.}}{36 \cancel{\text{m}}} = 2 \frac{7}{9} \text{ yd}$$

$$13) \frac{4,320 \cancel{\text{m}}}{1} \times \frac{1 \cancel{\text{ft.}}}{12 \cancel{\text{m}}} \times \frac{1 \cancel{\text{ft.}}}{12 \cancel{\text{m}}} \times \frac{1 \cancel{\text{ft.}}}{12 \cancel{\text{m}}} \times \frac{1 \text{ ft.}}{12 \cancel{\text{m}}} \times \frac{1 \text{ ft.}}{12 \cancel{\text{m}}} \times \frac{1 \text{ ft.}}{12 \cancel{\text{m}}} = 2 \frac{1}{2} \text{ ft.}^3$$

$$14) \frac{5 \cancel{\text{m}}}{1} \times \frac{100 \text{ cm}}{1 \cancel{\text{m}}} = 500 \text{ cm}$$

$$\frac{500 \cancel{\text{cm}}}{1} \times \frac{.4 \text{ in.}}{1 \cancel{\text{cm}}} = 200 \text{ in.}$$

$$15) \frac{80 \cancel{\text{qt.}}}{1} \times \frac{.95 \text{ l}}{1 \cancel{\text{qt.}}} = 76 \text{ l}$$

$$16) \frac{Mg}{MgO} = \frac{24}{24 + 16} = \frac{24}{40}$$

$$\frac{O}{MgO} = \frac{16}{40}, \quad \frac{O}{Mg} = \frac{16}{24}$$

$$17) \frac{M_O}{720} = \frac{16}{40}$$

$$M_O = \frac{720 \cdot 16}{40} = 288 \text{ g}$$

$$18) \frac{M_M}{720} = \frac{24}{40}$$

$$M_M = \frac{720 \cdot 24}{40} = 432 \text{ g}$$

$$19) (X^{1/3})^{1/2} = X^{1/6}$$

$$20) 3\sqrt{9}\sqrt{2}\sqrt{1} - 5\sqrt{4}\sqrt{2}\sqrt{1} =$$

$$3 \cdot 3i\sqrt{2} - 5 \cdot 2i\sqrt{2} =$$

$$9i\sqrt{2} - 10i\sqrt{2} = -i\sqrt{2}$$

19D

$$1) \text{ Words} = RT \Rightarrow 30 \text{ wpm} \times 7 \text{ min.} = 210 \text{ words}$$

$$2) W = RT \Rightarrow R = \frac{W}{T} = \frac{385}{11} = 35 \text{ wpm}$$

$$3) W = RT \Rightarrow R = \frac{W}{T} = \frac{820 \text{ w}}{40 \text{ wpm}} = 20.5 \text{ min. or } 20 \text{ min. and } 30 \text{ sec.}$$

$$4-5) \begin{array}{c} \overline{\overline{D_B = D_K}} \end{array}$$

$$\begin{array}{l} R_B T_B = R_K T_K \\ (6)(4 \frac{1}{2}) = R_K (4) \quad \left\{ \begin{array}{l} R_B = 6 \text{ mph} \\ T_B = 4 \frac{1}{2} \text{ hr.} \\ T_K = 4 \text{ hr.} \end{array} \right. \\ 27 = 4 R_K \\ 6 \frac{3}{4} = R_K \\ D = RT = (6)(4 \frac{1}{2}) \text{ or } (6 \frac{3}{4})(4) \\ D = 27 \text{ miles} \end{array}$$

$$6-8) \begin{array}{c} \overline{\overline{400 \text{ mi.}}} \\ \overline{D_C \quad D_D} \end{array}$$

$$\begin{array}{l} D_C + D_D = 400 \\ R_C T_C + R_D T_D = 400 \quad \left\{ \begin{array}{l} R_C = 60 \\ R_D = 60 - 5 = 55 \\ T_D = T_C + 1 \end{array} \right. \\ (60)(T_C) + (55)(T_C + 1) = 400 \\ 60 T_C + 55 T_C + 55 = 400 \\ 115 T_C = 345 \\ T_C = 3 \\ T_D = T_C + 1 \\ T_D = 3 + 1 = 4 \quad \text{met at 11:00 AM} \end{array}$$

$$9-11) \begin{array}{c} \overline{\overline{1,031 \text{ mi.}}} \\ \overline{D_S \quad D_C} \end{array}$$

$$\begin{array}{l} D_S + D_C = 1,031 \\ R_S T_S + R_C T_C = 1,031 \quad \left\{ \begin{array}{l} R_S = 52 \\ R_C = 51 \\ T_S = T_C + 2 \end{array} \right. \\ 52(T_C + 2) + 51 T_C = 1,031 \\ 52 T_C + 104 + 51 T_C = 1,031 \\ 103 T_C = 927 \\ T_C = 9 \\ 7:30 + 9:00 = 4:30 \text{ PM} \end{array}$$

$$12) \frac{8,200 \cancel{\text{mm}}}{1} \times \frac{1 \text{ m}}{1000 \cancel{\text{mm}}} = 8.2 \text{ m}$$

$$13) \frac{790 \cancel{\text{m}}}{1} \times \frac{1 \cancel{\text{km}}}{1000 \cancel{\text{m}}} \times \frac{1 \text{ km}}{1000 \cancel{\text{m}}} = .00079 \text{ km}^2 = 7.9 \times 10^{-4} \text{ km}^2$$

$$14) \frac{4 \cancel{\text{mi}}}{1} \times \frac{1000 \cancel{\text{m}}}{1 \cancel{\text{mi}}} \times \frac{1.1 \cancel{\text{yd}}}{1 \cancel{\text{mi}}} \times \frac{3 \text{ ft.}}{1 \cancel{\text{yd}}} = 13,200 \text{ ft. or}$$

$$\frac{4 \cancel{\text{mi}}}{1} \times \frac{.62 \cancel{\text{mi}}}{1 \cancel{\text{mi}}} \times \frac{5,280 \text{ ft.}}{1 \cancel{\text{mi}}} = 13,094.4 \text{ ft. (difference due to rounding)}$$

$$15) \frac{20 \cancel{\text{in.}}}{1} \times \frac{2.5 \text{ cm}}{1 \cancel{\text{in.}}} = 50 \text{ cm}$$

$$16) \frac{W}{B} = \frac{6}{5}, \quad \frac{W}{T} = \frac{6}{11}, \quad \frac{B}{T} = \frac{5}{11}$$

$$17) \frac{B}{T} = \frac{5}{11}$$

Total given, looking for black

$$18) \frac{B}{T} = \frac{5}{11} = \frac{B}{253}$$

$$B = \frac{253 \times 5}{11} = 115 \text{ black}$$

$$19) \frac{3i}{8+5i} \cdot \frac{(8-5i)}{(8-5i)} = \frac{24i-15i^2}{64-25i^2} =$$

$$\frac{24i+15}{64+25} = \frac{24i+15}{89}$$

$$20) X^3 + 3X^2 10^1 + 3X^1 10^2 + 10^3 = X^3 + 30X^2 + 300X + 1000$$

19E

$$1) \text{ Pushups} = RT \Rightarrow R = \frac{P}{T} = \frac{50}{1/2} = 100 \text{ per min.}$$

$$2) P = RT \Rightarrow R = \frac{P}{T} = \frac{20}{1/3} = 60 \text{ per min.}$$

$$3) P = RT \Rightarrow T = \frac{P}{R} = \frac{35P}{70 \text{ p/m}} = 1/2 \text{ min. or 30 sec.}$$

$$4-5) \quad \begin{array}{c} \overrightarrow{\hspace{1cm}} \\ \overleftarrow{\hspace{1cm}} \\ J_W = J_H \end{array}$$

$$\begin{aligned} R_W T_W &= R_H T_H \\ (R_H + 15)(11/4) &= R_H(4) & \begin{cases} T_W = 2 \frac{3}{4} \text{ hrs.} \\ T_H = 4 \text{ hr.} \\ T_W = R_H + 15 \end{cases} \\ [11/4 R_H + 165/4] \times 4 &= 4R_H \times 4 \\ 11 R_H + 165 &= 16 R_H \\ 165 &= 5 R_H \\ 33 &= R_H \\ R_W &= 33 + 15 = 48 \\ D &= (48)(11/4) = 132 \text{ mi.} \end{aligned}$$

$$6-8) \quad \begin{array}{c} 1600 \text{ mi.} \\ \overrightarrow{\hspace{1cm}} \\ D_1 \quad D_2 \end{array}$$

$$\begin{aligned} D_1 + D_2 &= 1600 \\ R_1 T_1 + R_2 T_2 &= 1600 & \begin{cases} R_1 = 40 \\ R_2 = 40 + 20 = 60 \\ T_2 = T_1 + 3 \end{cases} \\ 40T_1 + 60(T_1 + 3) &= 1600 \\ 40T_1 + 60T_1 + 180 &= 1600 \\ 100T_1 &= 1420 \\ T_1 &= 14.2 \text{ hrs.} \\ T_2 &= 14.2 + 3 = 17.2 \text{ hrs.} \end{aligned}$$

$$9-11) \quad \begin{array}{c} 20 \text{ mi.} \\ \overrightarrow{\hspace{1cm}} \\ J_W \quad J_R \end{array}$$

$$\begin{aligned} J_W + J_R &= 20 \\ R_W T_W + R_R T_R &= 20 & \begin{cases} R_W = 4 \\ T_W = 3 \\ R_R = 4 + 2 = 6 \end{cases} \\ (4)(3) + (6)(T_R) &= 20 \\ 12 + 6T_R &= 20 \\ 6T_R &= 8 \\ T_R &= 1 \frac{1}{3} \end{aligned}$$

$$12) \frac{9 \text{ yds.}}{1} \times \frac{3 \text{ ft.}}{1 \text{ yd.}} = 27 \text{ ft.}$$

$$13) \frac{35 \cancel{\text{m}}}{1} \times \frac{1 \cancel{\text{m}}}{1} \times \frac{100 \text{ cm}}{1 \cancel{\text{m}}} \times \frac{100 \text{ cm}}{1 \cancel{\text{m}}} = 350,000 \text{ cm}^2 = 3.5 \times 10^5 \text{ cm}^2$$

$$14) \frac{300 \cancel{\text{g}}}{1} \times \frac{.035 \text{ oz.}}{1 \cancel{\text{g}}} = 10.5 \text{ oz.}$$

$$15) \frac{16 \cancel{\text{mi}}}{1} \times \frac{1.6 \text{ km}}{1 \cancel{\text{mi}}} = 25.6 \text{ km}$$

$$16) \frac{N}{\text{NH}_3} = \frac{14}{17}, \quad \frac{H_3}{\text{NH}_3} = \frac{3}{17}, \quad \frac{H_3}{N} = \frac{3}{14}$$

$$17) \frac{M_N}{646} = \frac{14}{17}, \quad M_N = \frac{646 \times 14}{17} = 532 \text{ g}$$

$$18) \frac{M_H}{646} = \frac{3}{17}, \quad M_H = \frac{646 \times 3}{17} = 114 \text{ g}$$

$$19) 5 \text{ terms} \\ X^4 + 4X^3(-3)^1 + 6X^2(-3)^2 + 4X^1(-3)^3 + (-3)^4 \\ X^4 - 12X^3 + 54X^2 - 108X + 81$$

$$20) \frac{5 \times 4}{1 \times 2} (2X)^3 (5^2) =$$

$$1) \frac{20}{2} (8X^3)(25) = 2,000X^3$$

20A

$$1) \text{ positive } \frac{\text{up 3}}{\text{over 1}} = 3$$

$$2) b \approx -2$$

$$3) \text{ negative } \frac{\text{up 2}}{\text{over 1}} = -2$$

$$4) b \approx 1$$

$$5) 2Y = -3X + 9 \Rightarrow Y = -3/2 X + 9/2$$

$$6) 5X - Y = -1$$

$$7) 1/2 Y = -2X + 3 \Rightarrow Y = -4X + 6$$

$$8) X - Y = -8$$

$$9) m = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{(-4) - (1)}{(-3) - (-2)} = \frac{-5}{-5} = 1$$

$$10) m = \frac{(1) - (2)}{(5) - (-3)} = \frac{-1}{8} = -\frac{1}{8}$$

$$11) m = \frac{(2) - (-6)}{(5) - (1)} = \frac{8}{4} = 2$$

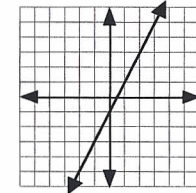
$$12) m = \frac{(-2) - (4)}{(1) - (-1)} = \frac{-6}{2} = -3$$

$$13) (-5) = 2(-2) + b$$

$$-5 = -4 + b \Rightarrow b = -1$$

$$Y = 2X - 1 \text{ slope-intercept}$$

$$2X - Y = 1 \text{ equation of a line}$$



$$14) m = \frac{(-4) - (2)}{(3) - (-2)} = -\frac{6}{5}$$

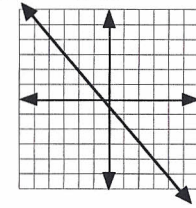
$$(2) = -6/5 (-2) + b$$

$$2 = 12/5 + b \Rightarrow b = -2/5$$

$$Y = -6/5 X - 2/5 \text{ slope-inter.}$$

$$5[6/5 X + Y = -2/5]$$

$$6X + 5Y = -2 \text{ line}$$



$$15) (5) = -1(5) + b$$

$$5 = -5 + b \Rightarrow b = 10$$

$$Y = -X + 10 \text{ slope-intercept}$$

$$X + Y = 10 \text{ equation of a line}$$

