18A

1) $D = RT \Rightarrow D = 45 \text{ mph} \times 4 \text{ hrs.} = 180 \text{ mi.}$

2) $D = RT \Rightarrow R = \frac{D}{T} = \frac{36 \text{ yds.}}{72 \text{ min.}} = 1/2 \text{ ypm}$

3) $D = RT \Rightarrow T = \frac{D}{R} = \frac{36 \text{ yds.}}{12 \text{ ypm}} = 3 \text{ min.}$

4) $\longrightarrow$ $\longrightarrow$ $D_B = D_S$

$R_BT_B = R_ST_S$

$(60)(9) = (50)(T_S)$ ← $R_B = 60$, $T_B = 9$, $R_S = 60 - 10 = 50$

$540 = 50\ T_S$

$10.8 = T_S = 10 \text{ hrs. } 48 \text{ min.}$

6:00 AM + 10:48 = 4:48 PM

5) $\longrightarrow$ $\longrightarrow$ $D_1 = D_2$

$R_1T_1 = R_2T_2$

$(45)(T_1) = (35)(T_1 + .4)$ ← $R_1 = 45$, $R_2 = 35$, $T_2 = T_1 + .4$

$45\ T_1 = 35\ T_1 + 14$

$10\ T_1 = 14$

$T_1 = 1.4 \text{ hrs.}$

$D = RT \Rightarrow 45(1.4) = 63 \text{ mi.}$

6) $\longrightarrow$ $\longrightarrow$ $D_G = D_J$

$R_GT_G = R_JT_J$

$(55)(5) = (R_J)(4)$ ← $R_G = 55$, $T_G = 5$, $T_J = 4$

$275 = 4\ R_J$

68.75 mph

18B

1) $D = RT \Rightarrow R = \frac{D}{T} = \frac{336 \text{ mi.}}{6 \text{ hrs.}} = 56 \text{ mph}$

2) $D = RT \Rightarrow T = \frac{D}{R} = \frac{21 \text{ mi.}}{3.5 \text{ mph}} = 6 \text{ hrs.}$

3) $D = RT \Rightarrow D = 4.5 \text{ fpm} \times 120 \text{ min.} = 540 \text{ ft.}$

4) $\longrightarrow$ $\longleftarrow$ $D_C = D_W$

$R_CT_C = R_WT_W$

$(50)(.3) = (R_W)(3.75)$ ← $T_C = .3$, $R_C = 50$, $T_W = 3.75$

$15 = 3.75\ R_W$

$R_W = 4 \text{ mph}$

$D = RT \Rightarrow (50)(.3) = 15 \text{ mi.}$

5) $\longrightarrow$ $\longrightarrow$ $D_{Jo} = D_{Je}$

$R_{Jo}T_{Jo} = R_{Je}T_{Je}$

$(4)(2) = (3)(T_{Je})$ ← $R_{Jo} = 4$, $R_{Je} = 3$, $T_{Jo} = 2$

$8 = 3\ T_{Je}$

$T_{Je} = 2\ 2/3 \text{ hrs. or } 2 \text{ hrs. } 40 \text{ min.}$

$D = RT \Rightarrow (4)(2) = 8 \text{ mi.}$

6) $\longrightarrow$ $\longleftarrow$ $D_1 = D_2$

$R_1T_1 = R_2T_2$

$9 = (12)(T_2)$ ← $D_1 = R_1T_1 = 9$, $R_2 = 15 - 3 = 12$

$T_2 = .75 \text{ hrs. or } 45 \text{ min.}$

18C

1) $D = RT \Rightarrow T = \frac{D}{R} = \frac{10.5 \text{ km}}{3 \text{ km/h}} = 3.5 \text{ hrs.}$

2) $D = RT \Rightarrow D = 7 \text{ km/h} \times 4\ 1/4 \text{ h} = 29\ 3/4 \text{ km}$

3) $D = RT \Rightarrow R = \frac{D}{T} = \frac{10 \text{ km}}{1.5 \text{ h}} = 6\ 2/3 \text{ km/h}$

4 - 5) $\xrightarrow[D_L = D_V]{420 \text{ m}}$

$D_L = D_V$

$R_LT_L = R_VT_V$

$(60)(7) = (50)(T_V)$ ← $R_V = R_L - 10$, $R_V = 60 - 10 = 50$, $T_L = 3{:}30 - 8{:}30 = 7 \text{ hrs.}$

$420 = 50\ T_V$

$8.4 \text{ hrs.} = T_V$

$T_V = 8 \text{ hrs.} + (.4 \times 60 \text{ min.})$

$T_V = 8{:}24$, 8:00 AM + 8:24 = 4:24 arrival

6 - 7) $\xrightarrow[D_L = D_V]{?}$

$D_L = D_V$

$R_LT_L = R_VT_V$

$R_L(7\ 1/2) = (R_L - 6)(8\ 1/3)$ ← $T_V = 5{:}00 \text{ PM} - 8{:}40 \text{ AM} = 8\ 1/3 \text{ hrs.}$, $T_L = 5{:}00 \text{ PM} - 9{:}30 \text{ AM} = 7\ 1/2 \text{ hrs.}$, $R_V = R_L - 6$

$6(15/2\ R_L = 25/3\ R_L - 50)$

$45R_L = 50R_L - 300$

$-5R_L = -300 \Rightarrow R_L = 60$

$R_V = 60 - 6 = 54 \Rightarrow \text{Dist.} = (60)(7.5) = 450 \text{ m}$ or $(54)(8.33)$

8) $\frac{12{,}500 \text{ lbs.}}{1} \times \frac{1 \text{ ton}}{2{,}000 \text{ lbs.}} = 6.25 \text{ tons}$

9) $\frac{3.4 \text{ m}}{1} \times \frac{100 \text{ cm}}{1 \text{ m}} = 340 \text{ cm}$

10) $\frac{500 \text{ in.}}{1} \times \frac{1 \text{ in.}}{1} \times \frac{1 \text{ ft.}}{12 \text{ in.}} \times \frac{1 \text{ ft.}}{12 \text{ in.}} = 3.47 \text{ ft.}^2$

11) $\frac{14{,}000 \text{ mm}}{1} \times \frac{1 \text{ mm}}{1} \times \frac{1 \text{ m}}{1000 \text{ mm}} \times \frac{1 \text{ m}}{1000 \text{ mm}} =$

$.014 \text{ m}^2$

12) $\frac{4 \text{ gal.}}{1} \times \frac{4 \text{ qts.}}{1 \text{ gal.}} \times \frac{.95 \text{ l}}{1 \text{ qt.}} = 15.2 \text{ l}$

13) $\frac{75 \text{ cm}}{1} \times \frac{.4 \text{ in.}}{1 \text{ cm}} = 30 \text{ in.}$

14) $\frac{C}{CO} = \frac{12}{28}$, $\frac{O}{CO} = \frac{16}{28}$, $\frac{C}{O} = \frac{12}{16}$

15) $\frac{M_O}{1204} = \frac{16}{28}$

$M_O = \frac{16 \cdot 1{,}204}{28} = 688 \text{ g}$

16) $\frac{M_H}{1204} = \frac{12}{28}$

$M_C = \frac{12 \cdot 1{,}204}{28} = 516 \text{ g}$

17) $C = \frac{5}{9}(F - 32) \Rightarrow \frac{9}{5}C = F - 32$

$\frac{9}{5}C + 32 = F$

18) $\frac{Na}{NaCl} = \frac{23}{23 + 35} = \frac{23}{58} = 39.7\%$

19) $\frac{Cl}{NaCl} = \frac{35}{58} = 60.3\%$

20) $[8]^{2/3} = 4$

18D

1) $D = RT \Rightarrow T = \frac{D}{R} = \frac{1750 \text{ yds.}}{1000 \text{ yds./h}} = 1\ 3/4 \text{ hrs.}$

(If R = 500 yds./30 min., then R = 1000 yds./hr.)

2) $D = RT \Rightarrow D = 12 \text{ m/h} \times 9/4 \text{ h} = 27 \text{ mi.}$

3) $D = RT \Rightarrow T = \frac{D}{R} = \frac{16}{2.5 \text{ m/h}} = 6.4 \text{ hrs.}$

4 - 5) jet ski $\rightarrow$; $D_A = D_M$

$R_AT_A = R_MT_M$
$(24)(T_A) = (20)(T_A + 1/4)$
$24T_A = 20T_A + 5$
$4T_A = 5$, so $T_A = 1\ 1/4$
$T_M = 1\ 1/2$ hr.
$D = (24)(1\ 1/4)$ or $(20)(1\ 1/2)$
$D = 30$ km

$R_A = 24$ kph
$R_M = 20$ kph
$T_M = T_A + 1/4$ hr.
(15 min. is 1/4 hr.)

6 - 7) canoe $\leftarrow$; $D_A = D_M$

$R_A(T_M + 1) = R_MT_M$
$6(T_M + 1) = 7.5\ T_M$
$6T_M + 6 = 7.5\ T_M$
$6 = 1.5\ T_M$
$4 = T_M \Rightarrow T_A = 4 + 1 = 5$
$D = (6)(5)$ or $(7.5)(4)$
$D = 30$ km

$R_A = 6$ kph
$R_M = 7.5$ kph
$T_A = T_M + 1$

8) $\frac{78 \text{ qts.}}{1} \times \frac{1 \text{ gal.}}{4 \text{ qts.}} = 19.5 \text{ gal.}$

9) $\frac{105{,}600 \text{ oz}}{1} \times \frac{1 \text{ lb}}{16 \text{ oz}} \times \frac{1 \text{ ton}}{2{,}000 \text{ lbs.}} = 3.3 \text{ tons}$

10) $\frac{7 \text{ yds}}{1} \times \frac{1 \text{ yd.}}{1} \times \frac{3 \text{ ft.}}{1 \text{ yd.}} \times \frac{3 \text{ ft.}}{1 \text{ yd.}} = 63 \text{ ft.}^2$

11) $\frac{100 \text{ km}}{1} \times \frac{1 \text{ km}}{1} \times \frac{1000 \text{ m}}{\text{km}} \times \frac{1000 \text{ m}}{\text{km}} =$

$100{,}000{,}000 \text{ m}^2$ or $1 \times 10^8 \text{ m}^2$

12) $\frac{23 \text{ m}}{1} \times \frac{100 \text{ cm}}{\text{m}} \times \frac{.4 \text{ in.}}{\text{cm}} = 920 \text{ in.}$

13) $\frac{15 \text{ m}}{1} \times \frac{1.1 \text{ yds.}}{1 \text{ m}} = 16.5 \text{ yds.}$

14) $\frac{H}{NH} = \frac{2}{1}$, $\frac{H}{T} = \frac{2}{3}$, $\frac{NH}{T} = \frac{1}{3}$

15) $\frac{H}{NH} = \frac{2}{1}$

Need H and are given NH

16) $\frac{H}{NH} = \frac{2}{1} = \frac{H}{32}$

$(32)(2) = H \Rightarrow$ days of homework = 64

17) $\frac{1}{X} = \frac{2Z + 3Y}{ZY}$

$\left(\frac{ZY}{2Z + 3Y}\right)\frac{1}{X} = 1$

$\frac{ZY}{2Z + 3Y} = X$

18) $\frac{K}{KCN} = \frac{39}{39 + 12 + 14} = \frac{39}{65} = 60\%$

19) $\frac{N}{KCN} = \frac{14}{65} = 21.5\%$

20) $i^5 = i^4(i)$ or $(i^2)(i^2)(i) = (-i)(-i)(i) = i$

18E

1) $D = RT \Rightarrow T = \frac{D}{R} = \frac{180 \text{ yds.}}{15 \text{ ypm}} = 12 \text{ min.}$

2) $D = RT \Rightarrow 18 \text{ ypm} \times 15 \text{ min.} = 270 \text{ yds.}$

3) $D = RT \Rightarrow R = \frac{D}{T} = \frac{525 \text{ yds.}}{21 \text{ min.}} = 25 \text{ y/m}$

4 - 5) $\rightarrow$; $D_F = D_G$

$R_FT_F = R_GT_G$
$(500)(3.5) = (R_G)(5)$
$350 = R_G$
$D = R_FT_F = (500)(3.5)$ or $D = R_GT_G = (350)(5)$
$D = 1{,}750$ mi. $D = 1{,}750$ mi.

$R_F = 500$
$T_F = 3.5$ hrs.
$T_G = 5$ hrs.

6 - 7) $\rightarrow$; $D_B = D_T$

$R_BT_B = R_TT_T$
$(50)(T_T + 10) = (70)(T_T)$
$50\ T_T + 500 = 70\ T_T$
$500 = 20\ T_T$
$25 = T_T$
$T_B = T_T + 10 = 25 + 10 = 35$

$R_B = 50$
$T_B = T_T + 10$
$R_T = R_B + 20$
$R_T = 70$

8) $\frac{17 \text{ gals.}}{1} \times \frac{4 \text{ qts.}}{1 \text{ gal.}} \times \frac{2 \text{ pts.}}{1 \text{ qt.}} = 136 \text{ pts.}$

9) $\frac{1 \text{ qt.}}{1} \times \frac{2 \text{ pts.}}{1 \text{ qt.}} = 2 \text{ pts.}$

10) $\frac{2 \text{ yds}}{1} \times \frac{1 \text{ yd.}}{1} \times \frac{1 \text{ yd.}}{1} \times \frac{36 \text{ in.}}{1 \text{ yd.}} \times \frac{36 \text{ in.}}{1 \text{ yd.}} \times \frac{36 \text{ in.}}{1 \text{ yd.}}$

$= 93{,}312 \text{ in.}^3$

11) $\frac{5.6 \text{ cm}}{1} \times \frac{1 \text{ cm}}{1} \times \frac{1 \text{ cm}}{1} \times \frac{10 \text{ mm}}{1 \text{ cm}} \times \frac{10 \text{ mm}}{1 \text{ cm}} \times \frac{10 \text{ mm}}{1 \text{ cm}}$

$= 5{,}600 \text{ mm}^3$

12) $\frac{18 \text{ oz.}}{1} \times \frac{28 \text{ g}}{1 \text{ oz.}} = 504 \text{ g}$

13) $\frac{17 \text{ l}}{1} \times \frac{1.06 \text{ qts.}}{1 \text{ l}} = 18.02 \text{ qts.}$

14) $\frac{N}{NF_3} = \frac{14}{71}$, $\frac{F_3}{NF_3} = \frac{57}{71}$, $\frac{N}{F_3} = \frac{14}{57}$

15) $\frac{M_N}{2{,}059} = \frac{14}{71}$

$M_N = \frac{14 \times 2{,}059}{71} = 406 \text{ g}$

16) $\frac{M_F}{2{,}059} = \frac{57}{71}$

$M_F = \frac{14 \times 2{,}059}{71} = 1{,}653 \text{ g}$

17) $(F + 32) = \frac{9}{5}C \Rightarrow \frac{5}{9}(F + 32) = C$

18) $\frac{C}{CF_2Cl_2} = \frac{12}{12 + 38 + 70} = \frac{12}{120} = 10\%$

19) $\frac{Cl_2}{CF_2Cl_2} = \frac{70}{120} = 58.3\%$

20) $7 - 5i$