19E

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

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

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

4 - 5) $J_W = J_H$

$R_WT_W = R_HT_H$

$(R_H + 15)(11/4) = R_H(4)$ ← $T_W = 2\ 3/4$ hrs., $T_H = 4$ hr., $T_W = R_H + 15$

$[11/4\ R_H + 165/4 = 4R_H] \times 4$

$11\ R_H + 165 = 16\ R_H$

$165 = 5R_H$

$33 = R_H$

$R_W = 33 + 15 = 48$

$D = (48)(11/4) = 132$ mi.

6 - 8) 1600 mi. (D_1, D_2)

$D_1 + D_2 = 1600$

$R_1T_1 + R_2T_2 = 1600$

$40T_1 + 60(T_1 + 3) = 1600$ ← $R_1 = 40$, $R_2 = 40 + 20 = 60$, $T_2 = T_1 + 3$

$40T_1 + 60T_1 + 180 = 1600$

$100T_1 = 1420$

$T_1 = 14.2$ hrs.

$T_2 = 14.2 + 3 = 17.2$ hrs.

9 - 11) 20 mi. (J_W, J_R)

$J_W + J_R = 20$

$R_WT_W + R_RT_R = 20$

$(4)(3) + (6)(T_R) = 20$ ← $R_W = 4$, $T_W = 3$, $R_R = 4 + 2 = 6$

$12 + 6T_R = 20$

$6T_R = 8$

$T_R = 1\ 1/3$

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

13) $\frac{35\ \text{m}}{1} \times \frac{1\ \text{m}}{1} \times \frac{100\ \text{cm}}{1\ \text{m}} \times \frac{100\ \text{cm}}{1\ \text{m}}$

$= 350{,}000\ \text{cm}^2 = 3.5 \times 10^5\ \text{cm}^2$

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

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

16) $\frac{N}{NH_3} = \frac{14}{17}$,

$\frac{H_3}{NH_3} = \frac{3}{17}$, $\frac{H_3}{N} = \frac{3}{14}$

17) $\frac{M_N}{646} = \frac{14}{17}$

$M_N = \frac{646 \times 14}{17} = 532$ g

18) $\frac{M_H}{646} = \frac{3}{17}$

$M_H = \frac{646 \times 3}{17} = 114$ g

19) 5 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) $\frac{5 \times 4}{1 \times 2}(2X)^3(5^2) =$

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

20A

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

2) $b \approx -2$

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

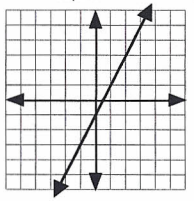
12) $m = \frac{(-2) - (4)}{(1) - (-1)} = \frac{-6}{2} = -3$

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

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

$Y = 2X - 1$ slope-intercept

$2X - Y = 1$ equation of a line



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

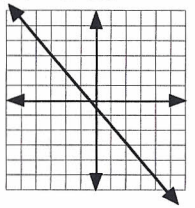
$(2) = -6/5\ (-2) + b$

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

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

$5[6/5\ X + Y = -2/5)$

$6X + 5Y = -2$ line

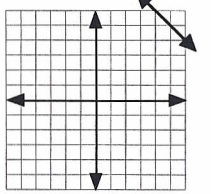


15) $(5) = -1(5) + b$

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

$Y = -X + 10$ slope-intercept

$X + Y = 10$ equation of a line



20B

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

2) $b \approx 1$

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

4) $b \approx -4$

5) $7Y = -X + 14 \Rightarrow Y = -1/7\ X + 2$

6) $3[2/3\ X - Y = -6] \Rightarrow 2X - 3Y = -18$

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

8) $5X - Y = 4$

9) $m = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{(-3) - (4)}{(-2) - (6)} = \frac{-7}{-8} = \frac{7}{8}$

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

11) $m = \frac{(8) - (-3)}{(1) - (2)} = \frac{11}{-1} = -11$

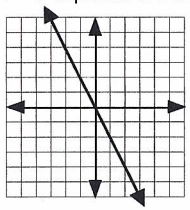
12) $m = \frac{(-4) - (3)}{(1) - (-5)} = \frac{-7}{6} = -\frac{7}{6}$

13) $m = \frac{(0) - (-6)}{(0) - (3)} = \frac{6}{-3} = -2$

$(0) = -2(0) + b \qquad b = 0$

$Y = -2X$ slope-intercept

$2X + Y = 0$ equation of a line

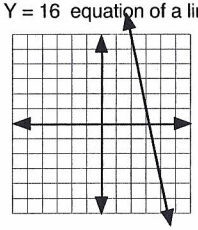


14) $(6) = -5(2) + b$

$6 = -10 + b \Rightarrow b = 16$

$Y = -5X + 16$ slope-intercept

$5X + Y = 16$ equation of a line

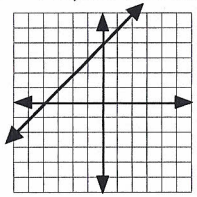


15) $m = \frac{(5) - (0)}{(1) - (-4)} = \frac{5}{5} = 1$

$(5) = 1\ (1) + b \qquad b = 4$

$Y = X + 4$ slope-intercept

$X - Y = -4$ equation of a line



20C

1) positive $\frac{\text{up } 12}{\text{over } 6} = 2$

2) $b \approx 1$

if $m = 2$ and $b = 1$, then $Y = 2X + 1$

3) $Y = m\ X + b$

$(2) = 1/2\ (6) + b$

$2 = 3 + b \Rightarrow b = -1$

4) $Y = 1/2\ X - 1$

5) $[Y = 1/2\ X - 1]\ 2 \Rightarrow 2Y = X - 2$

$X - 2Y = 2$

6) on the graph

7) $m = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{5 - (-1)}{1 - 5} =$

$\frac{6}{-4} = -\frac{3}{2}$

$Y = -3/2\ X + b \Rightarrow (-1) = -3/2\ (5) + b$

$-1 = -15/2 + b \Rightarrow b = 13/2$

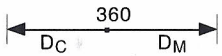
8) $Y = -3/2X + 13/2$

9) $2Y = -3X + 13$

$3X + 2Y = 13$

10) on the graph

11 -13)



$D_C + D_M = 360$

$R_C T_C + R_M T_M = 360$

$(R_M + 2)(15) + R_M(15) = 360$

$30\ R_M = 330$

$R_M = 11$

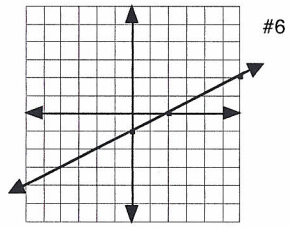
$R_C = R_M + 2 = 11 + 2 = 13$

$D_M = (11)(15) = 165, \quad D_C = (13)(15) = 195$

$R_M = R_C - 2$ or $R_C = R_M + 2$

$T_M = 15$

$T_C = 15$



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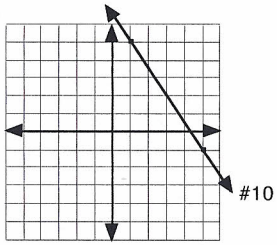

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14 -15)

$G_W + G_R = 14$

$R_W T_W + R_R T_R = 14$

$(5)(4T_R) + (8)(T_R) = 14$

$20T_R + 8T_R = 14$

$28T_R = 14$

$T_R = 1/2, \quad T_W = 4(1/2) = 2$

$D_W = (5)(2) = 10, \quad D_R = (8)(1/2) = 4$

$T_W = 4T_R$

$R_W = 5$

$R_R = R_W + 3 = 8$

16) $\frac{5{,}000\ \text{ft}}{1} \times \frac{1\ \text{ft}}{1} \times \frac{1\ \text{ft}}{1} \times$

$\frac{12\ \text{in.}}{1\ \text{ft}} \times \frac{12\ \text{in.}}{1\ \text{ft}} \times \frac{12\ \text{in.}}{1\ \text{ft}} =$

$8{,}640{,}000$ or $8.64 \times 10^6\ \text{in.}^3$

17) $\frac{100\ \text{oz}}{1} \times \frac{28\ \text{g}}{1\ \text{oz}} = 2800\ \text{g} = 2.8 \times 10^3\ \text{g}$

18) $\frac{12}{12 + 1 + 57} = \frac{12}{70} = 17.1\%$

19) $\frac{1}{70} = 1.4\%$

20) $\frac{57}{70} = 81.4\%$

20D

1) negative $\frac{\text{up } + 10}{\text{over } - 10} = -1$

2) b = +2
if m = -1 and b = 2, then Y = -X + 2

3) Y = -4/3 X + b
(2) = -4/3 (3) + b
2 = -4 + b ⇒ b = 6

4) Y = -4/3 X + 6

5) [Y = -4/3 X + 6] 3 ⇒ 3Y = -4X + 18
4X + 3Y = 18

6) on the graph

7) $m = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{4 - 2}{-3 - 1} = -\frac{1}{2}$
Y = -1/2X + b ⇒ (2) = -1/2(1) + b
b = 2 1/2

8) Y = -1/2X + 2 1/2

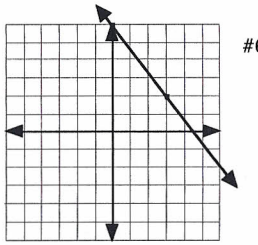
9) [Y = -1/2 X + 5/2] 2
2Y = -X + 5
X + 2Y = 5

10) on the graph

11 -13)

$D_C + D_M = 12$
$R_CT_C + R_MT_M = 12$
$(9)(T_M + 1/3) + (45)(T_M) = 12$ ← $R_C = 9$, $R_M = 45$, $T_C = T_M + 1/3$ hr.
$9T_M + 3 + 45T_M = 12$
$54T_M = 9$
T_M = 1/6 hr. or 10 min. 6:20 + :10 = 6:30 PM

$D_C = (9)(1/2) = 4\ 1/2$
$D_M = (45)(1/6) = 7\ 1/2$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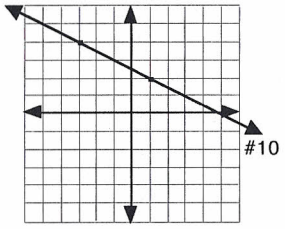
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14 -15)

$D_1 + D_2 = 2{,}800$
$R_1T_1 + R_2T_2 = 2{,}880$
$(R_2+12)(32)+(R_2)(16)=2880$ ← $R_1 = R_2 + 12$, $T_1 = 32$, $T_2 = 16$
$32R_2 + 384 + 16R_2 = 2880$
$48R_2 = 2{,}496$
$R_2 = 52$ $R_1 = 52 + 12 = 64$
$D_1 = (64)(32) = 2{,}048$, $D_2 = (52)(16) = 832$

16) $\frac{1300\ \text{ft}}{1} \times \frac{1\ \text{ft.}}{1} \times \frac{12\ \text{in.}}{1\ \text{ft.}} \times \frac{12\ \text{in.}}{1\ \text{ft.}} =$
1300 x 144 =187,200 or 1.872×10^5 in.^{2}

17) $\frac{20\ \text{lbs}}{1} \times \frac{.45\ \text{kg}}{1\ \text{lbs.}} = 9$ kg

18) $\frac{M_C}{350} = \frac{12}{70} = \frac{12(350)}{70} = 60$ g

19) $\frac{M_H}{350} = \frac{1}{70} = \frac{1(350)}{70} = 5$ g

20) $\frac{M_F}{350} = \frac{57}{70} = \frac{57(350)}{70} = 285$ g

20E

1) positive $\frac{\text{up } 6}{\text{over } 12} = \frac{1}{2}$

2) b ≈ -3
if m = 1/2 + b = -3, then Y = 1/2X - 3

3) Y = 5/2 X + b
(-1) = 5/2 (-2) + b
-1 = -5 + b ⇒ b = 4

4) Y = 5/2 X + 4

5) [Y = 5/2 X + 4] 2 ⇒ 2Y = 5X + 8
2Y = 5X + 8
-5X + 2Y = 8

6) on the graph

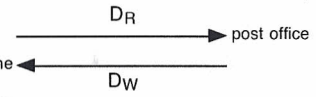
7) $m = \frac{Y_2 - Y_1}{X_2 - X_1} = \frac{5 - (-3)}{1 - (-1)} =$
$\frac{8}{2} = 4$
Y = 4X + b ⇒ (5) = 4(1) + b
b = 1

8) Y = 4X + 1

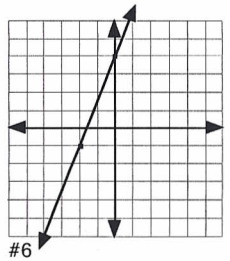
9) -4X + Y = 1

10) on the graph

11 -13)



$D_R = D_W$
$R_RT_R = R_WT_W$
$(R_W + 6)(1/2) = R_W(2)$ ← $T_R = 1/2$, $T_W = 2$, $R_R = R_W + 6$
$1/2\ R_W + 3 = 2R_W$
$3 = 3/2\ R_W$
$R_W = 2$, so $R_R = 2 + 6 = 8$
$D = R_RT_R = (8)(1/2)$, or $D = R_WT_W\ (2)(2) = 4$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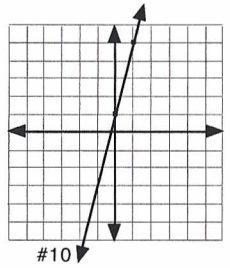
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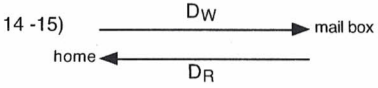
14 -15)



$D_W = D_R$
$R_WT_W + R_RT_R$
$(225)(3.6 + T_R) = 900T_R$ ← $R_W = 225$ fpm, $R_R = 4R_W = (4)(225) = 900$ fpm, $T_W = 3.6 + T_R$
$810 + 225T_R = 900T_R$
$810 = 675T_R$
$T_R = 1.2$, $T_W = 3.6 + 1.2 = 4.8$
$D_W = (4.8)(225) = 1{,}080$ ft.

16) $\frac{400\ \text{ft}}{1} \times \frac{1\ \text{ft.}}{1} \times \frac{1\ \text{yd.}}{3\ \text{ft.}} \times \frac{1\ \text{yd.}}{3\ \text{ft.}} = 44.4$ yds.^{2}

17) $\frac{.75\ \text{kg}}{1} \times \frac{2.2\ \text{lbs.}}{1\ \text{kg.}} = 1.65$ lbs.

18) $\frac{69}{69 = 31 + 64} = \frac{69}{164} = .42 = 42\%$

19) $\frac{31}{164} = .19 = 19\ \%$

20) $\frac{64}{164} = .39 = 39\%$