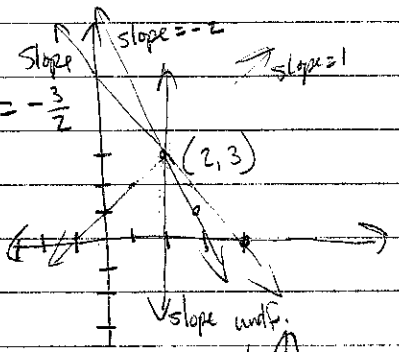
P.2 Linear Models and Rates of Change

p.16, #1-13 odds, 19-27 odds, 30, 40, 45-45, 47, 59, 63-65, 69, 77, 78, 97, 98

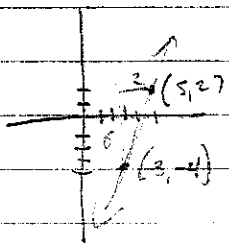
(1) Slope ≈ 1 (3) Slope = 0 (5) Slope ≈ -12

(7)



Slope $= -\frac{3}{2}$

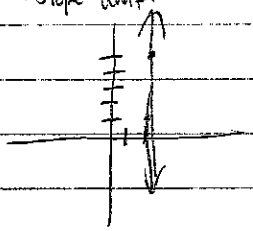
(9)



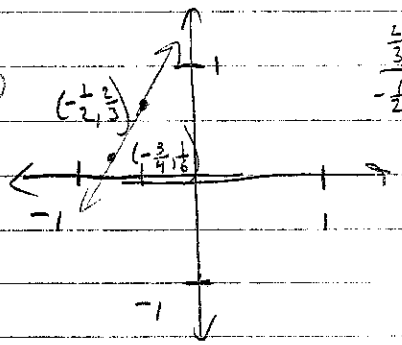
Slope = 3

(11) (2, 1) (2, 5)

slope = undf.



(13)



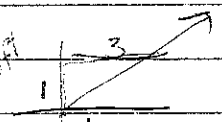
$\frac{\frac{2}{3} - \frac{1}{6}}{-\frac{1}{2} + (+\frac{3}{4})} = \frac{\frac{4}{6} - \frac{1}{6}}{-\frac{2}{4} + \frac{3}{4}}$

$\frac{\frac{3}{6}}{\frac{1}{4}} = \frac{\frac{1}{2}}{\frac{1}{4}}$

$\frac{1}{2} \cdot \frac{4}{1} = \boxed{2}$

30 ft

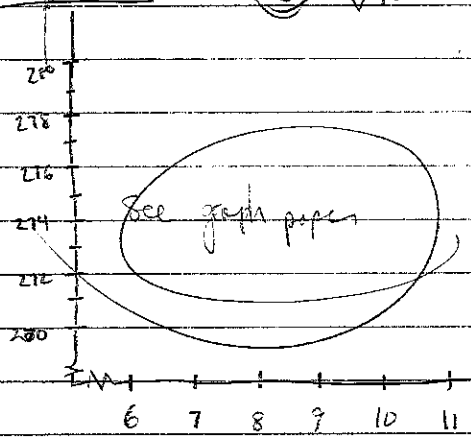
(19)



(a) slope $= \frac{1}{3}$

(b) $\sqrt{10^2 + 30^2} = 31.6$ ft

(21)



See graph paper

$y = 12x + 3$

$24 + 3$

27

$(\frac{3}{4}, 12)$ $(2, 27)$

$\frac{27 - 12}{2 - \frac{3}{4}} = \frac{15}{\frac{5}{4}} = 12$

what form? point slope

(59) parallel to $4x - 2y = 3$

through (2, 1)

$\frac{-2y}{-2} = \frac{-4x + 3}{-2}$

$y = 2x - \frac{3}{2}$

parallel $y - 1 = 2(x - 2)$

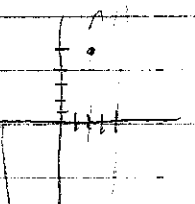
perp $y - 1 = -\frac{1}{2}(x - 2)$

(63) $x = 4$

$x = 2$ parallel

$y = 5$ perp

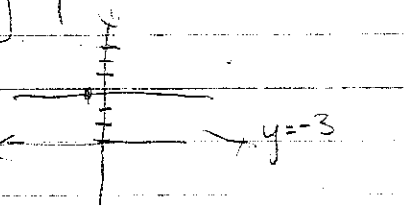
(2, 5)



(64) (-1, 0)

parallel: $y = 0$

perp: $x = -1$



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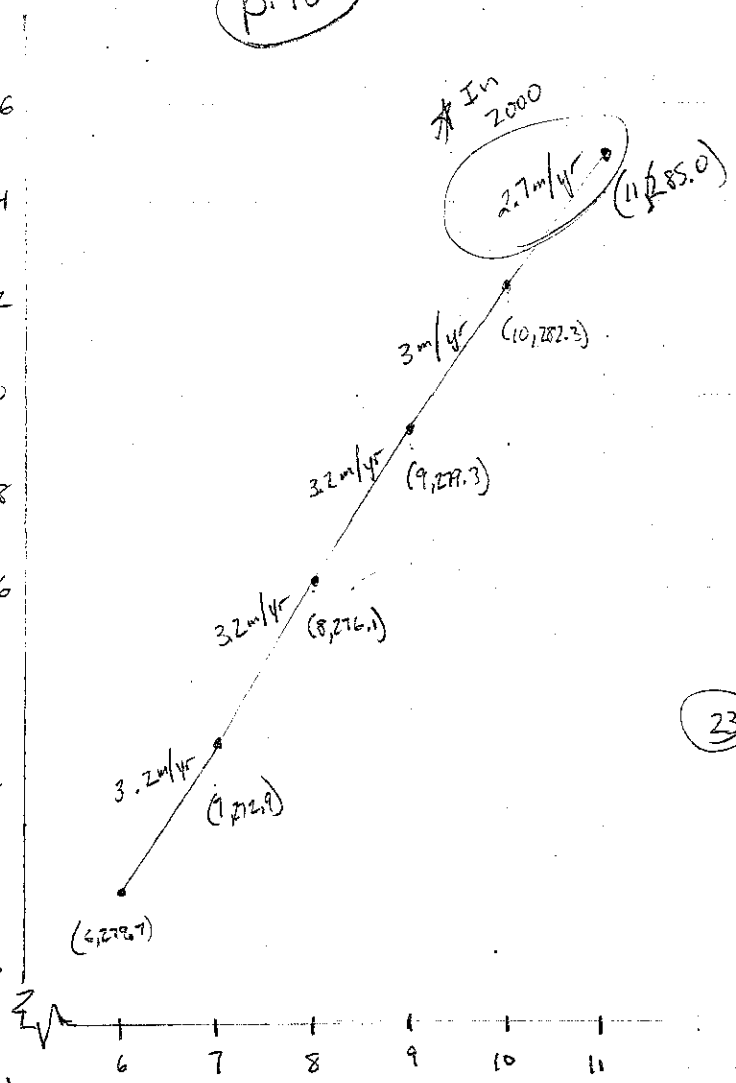
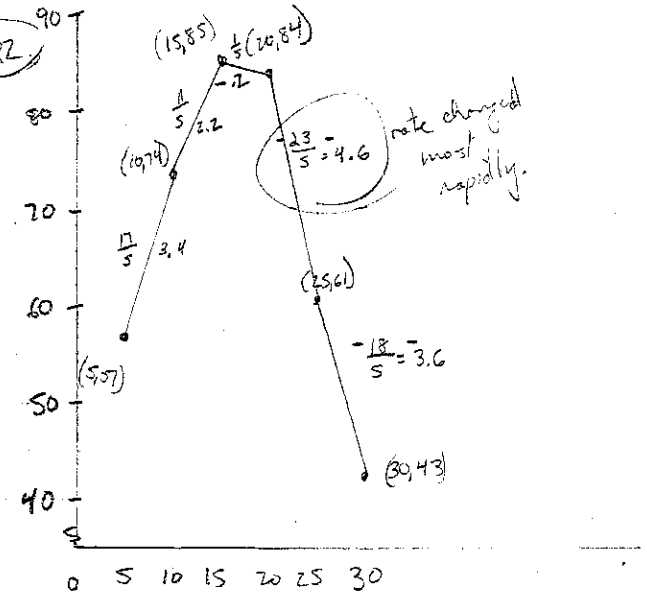
(21)



(22)



(23) $x + 5y = 20$

$\frac{5y}{5} = \frac{-x}{5} + \frac{20}{5}$

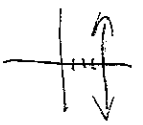
$y = -\frac{1}{5}x + 4$

Slope, y-int

(25) $x = 4$

Slope = undef.

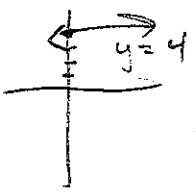
No y-int.



(26) $y = -1$

slope = 0,

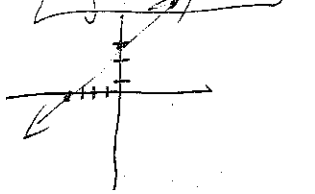
y-int = -1



use slope-int.

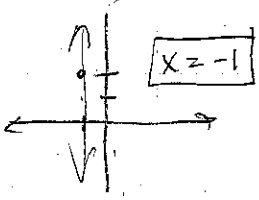
(27) (0,3) $m = \frac{3}{4}$

$y = \frac{3}{4}x + 3$



(28) (−1,2) m undef.

$x = -1$

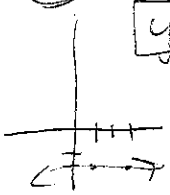


(30) (0,4) $m = 0$.

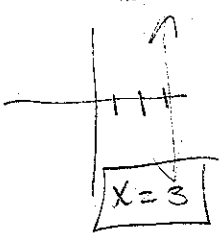
$y = 4$

(40) (1,−2) (3,−2)

$y = -2$



(43)



$x = 3$

(44) (a,0) and (0,b)

slope $= \frac{b-0}{0-a} = \frac{b}{-a}$ y-int = b.

$y = -\frac{b}{a}x + b$

$+\frac{b}{a}x \quad +\frac{b}{a}x$

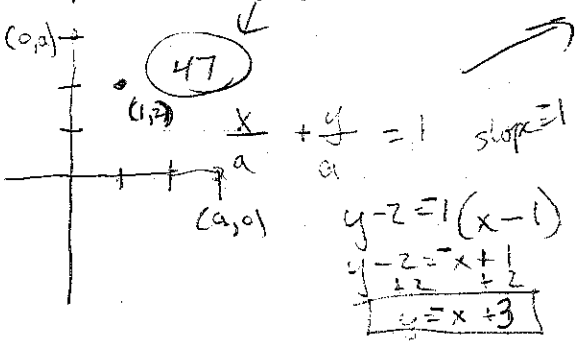
$\frac{b}{a}x + y = b$

$\div b$

$\frac{x}{a} + \frac{y}{b} = 1$

$\frac{a-0}{0-a} = \frac{a}{-a} = -1$

(47)



$\frac{x}{a} + \frac{y}{a} = 1$ slope = 1

$y - 2 = 1(x - 1)$

$y - 2 = x - 1$

$+2 \quad +2$

$y = x + 3$

(45) In standard form

$\frac{x}{2} + \frac{y}{3} = 1$

$3x + 2y = 6$

p.16, # 65, 69, 77, 78, 97, 98

★

(65) $t=0$ represents 2000 (4, 2540) rate: \$125/yr

$y = mx + b$

$V = mt + b$

$2540 = (125)(4) + b$

$2540 = 500 + b$

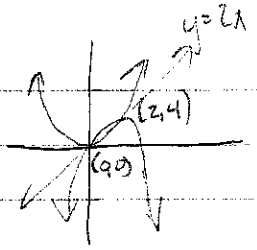
$-500 \quad -500$

$2040 = b$

$\boxed{V = 125t + 2040}$

(69) $y = x^2$

$y = 4x - x^2$



$x^2 = 4x - x^2$

(0,0) and (2,4)

Line thru points:

$\boxed{y = 2x}$

(77) (0°C, 32°F) (100°C, 212°F)

$\frac{212-32}{100-0} = \frac{180}{100} = 1.8$

$\frac{9}{5}$

$F - 32 = 1.8(C - 0)$

$F = 1.8C + 32$

$72 = 1.8C + 32$

$-32 \quad -32$

$\frac{40}{1.8} = \frac{1.8C}{1.8}$

$\boxed{22.2°C = C}$

(78) \$150/day and \$.34/mi

$\boxed{C = .34x + 150}$

$C = .34(137) + 150$

$\boxed{C = \$196.50}$

★ (97) $ax + by = c_1$ $\quad -ax \quad -ax$

$bx - ay = c_2$ $\quad -bx \quad -bx$

$\frac{by}{b} = \frac{-ax}{b} + \frac{c_1}{b}$ $\quad \frac{-ay}{-a} = \frac{-bx}{-a} + \frac{c_2}{-a}$

$y = \boxed{-\frac{a}{b}}x + \frac{c_1}{b}$ $\quad y = \boxed{\frac{b}{a}}x - \frac{c_2}{a}$

True, perp! as long as $\frac{c_1}{b} \neq -\frac{c_2}{a}$

(98) False. Perp. lines have opposite signs unless the lines are horiz and vertical.