

# Ch 6

21 a)  $(-1, 2)$   $m = \frac{y_2 - y_1}{x_2 - x_1}$

(i)  $(4, -2)$   $m = \frac{-2 - 2}{4 - -1}$

$m = \left(-\frac{4}{5}\right)$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = -\frac{4}{5}(x - -1)$$

$$5(y - 2) = 5 - \frac{4}{5}(x + 1)$$

$$5y - 10 = -4x - 4 + 10$$
$$5y = -4x + 6$$

$$4x + 5y = 6$$

(I choose Standard Form to make it easier to get intercepts!)

Let  $x = 0$

$$4x + 5y = 6$$

$$\frac{5y}{5} = \frac{6}{5}$$

$$y = \frac{6}{5}$$

$$\left(0, \frac{6}{5}\right)$$

Let  $y = 0$

$$4x + 5y = 6$$

$$\frac{4x}{4} = \frac{6}{4}$$

$$x = 1.5$$

$$(1.5, 0)$$

21 ii

$$\begin{matrix} x_1 & y_1 \\ (-2, & -3) \\ x_2 & y_2 \\ (2, & 5) \end{matrix}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

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

$$m = \frac{5+3}{2+2}$$

$$m = \frac{8}{4} = 2$$

$$y - y_1 = m(x - x_1)$$

$$y - (-3) = 2(x - (-2))$$

$$y + 3 = 2(x + 2)$$

$$y + 3 = 2x + 4 - 3$$

$$y = 2x + 1$$

Let  $x = 0$

$$y = 2x + 1$$

$$y = 1$$

$$(0, 1)$$

Let  $y = 0$

$$0 = 2x + 1$$

$$-1 = 2x$$

$$\frac{-1}{2} = \frac{2x}{2}$$

$$-\frac{1}{2} = x$$

$$\left(-\frac{1}{2}, 0\right)$$

$$23a) 7x + y + 14 = 0$$

$$\text{Let } y = 0$$

$$7x + 0 + 14 = 0$$

$$7x + 14 = 0$$

$$\frac{7x}{7} = \frac{-14}{7}$$

$$x = -2$$

$$(-2, 0)$$

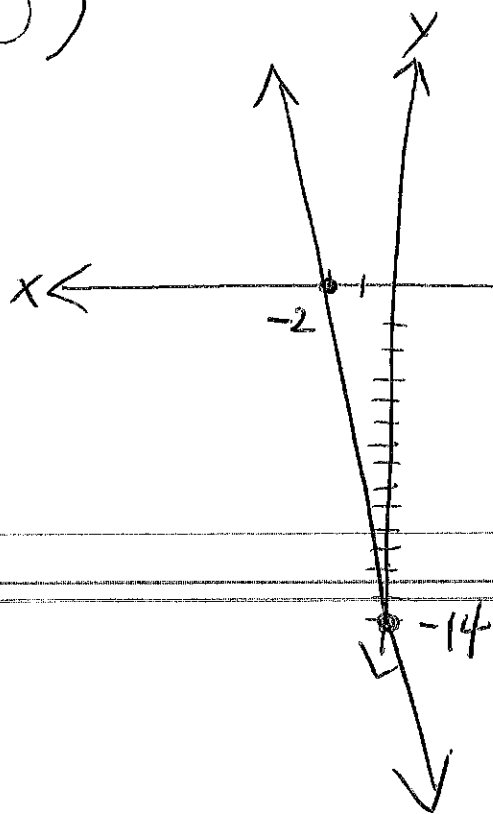
$$\text{Let } x = 0$$

$$7x + y + 14 = 0$$

$$y + 14 = 0$$

$$y = -14$$

$$(0, -14)$$



$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-14 - 0}{0 - (-2)}$$

$$m = \frac{-14}{2} = \textcircled{-7}$$



$$24 \text{ a) }^{(i)} y = \frac{5}{4}x - \frac{3}{5}$$

5x4=20  
(Look at denominators)

$$\frac{20y}{1} = \frac{20}{1} \left( \frac{5x}{4} \right) + \frac{20}{1} \left( -\frac{3}{5} \right)$$

$$20y = \frac{100x}{4} - \frac{60}{5}$$

$$20y = 25x - 12$$

$$\boxed{0 = 25x - 20y - 12}$$

$$\text{(ii) } 3(y+4) = 2(x-1)$$

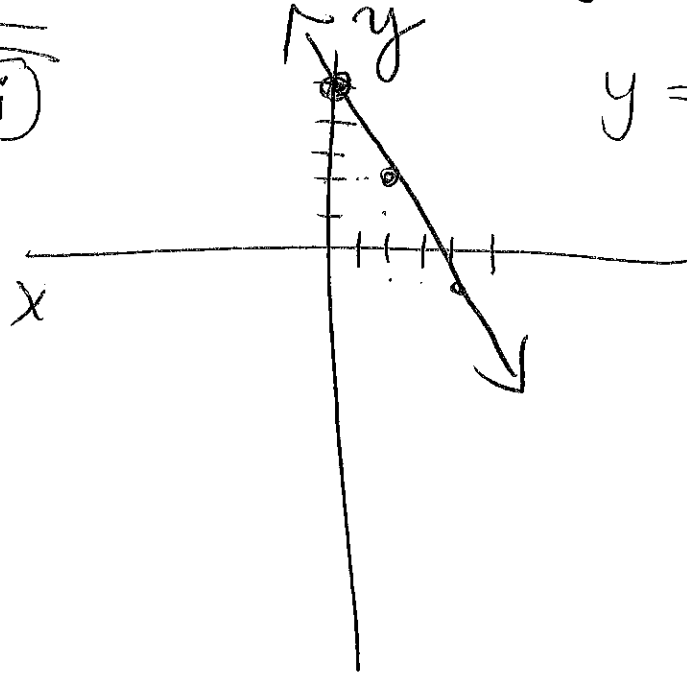
$$3y + 12 = 2x - 2$$

$$3y = 2x - 14$$

$$\boxed{0 = 2x - 3y - 14}$$

Pg 391

3a) (i)



$$y = -\frac{3}{2}x + 5$$

$$y = mx + b$$

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

$$b = 5$$

$$(ii) (y - \frac{y_1}{3}) = \frac{1}{3}(x + \frac{x_1}{2})$$

$\uparrow$   
 $m = \frac{1}{3}$

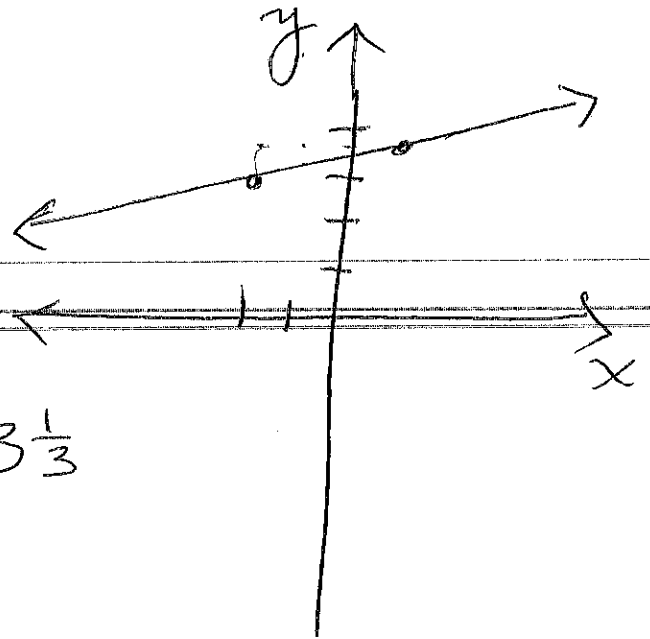
$$(x_1, y_1) = (-2, 3)$$

$$3y - 9 = x + 2 + 9$$

$$\frac{3y}{3} = \frac{x}{3} + \frac{11}{3}$$

$$y = \frac{x}{3} + \frac{11}{3} = 3\frac{1}{3}$$

$\uparrow$   
 $b$



$$(iii) \quad 3x - 4y - 12 = 0$$

$$3x - 4y = 12$$

Let  $x = 0$

Let  $y = 0$

$$3x - 4y = 12$$

$$\begin{array}{r} -4y = 12 \\ \hline -4 \quad -4 \end{array}$$

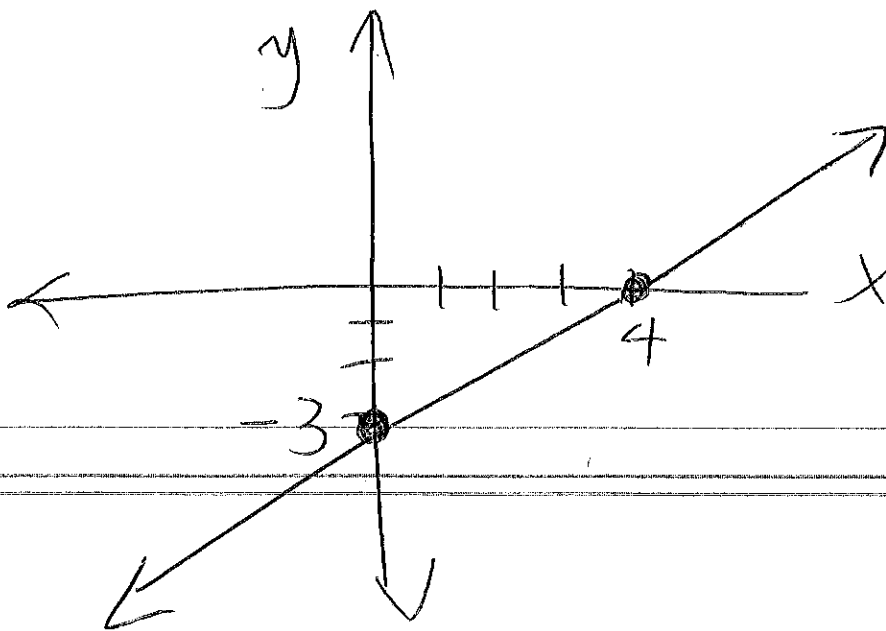
$$y = -3$$

$$(0, -3)$$

$$\frac{3x}{3} = \frac{12}{3}$$

$$x = 4$$

$$(4, 0)$$



$$y = mx + b$$

3b)  $y = \frac{-3}{2}x + 5$

$$m = \frac{-3}{2} \quad \therefore \boxed{m_{||} = \frac{-3}{2}}$$

$$(6, 2)$$

$$y - y_1 = m(x - x_1)$$
$$2(y - 2) = \left(\frac{-3}{2}\right)(x - 6)$$

$$2(y - 2) = -3(x - 6)$$

$$2y - 4 = -3x + 18 + 4$$

$$\frac{2y}{2} = \frac{-3x}{2} + \frac{22}{2}$$

$$y = \frac{-3}{2}x + 11$$



same  $m$ ,  $\therefore$  parallel!  
diff.  $b$



$$2c) \quad y - y_1 = m(x - x_1)$$
$$y - 3 = \frac{1}{3}(x + 2)$$

$$m = \frac{1}{3} \quad \therefore \quad m_{\perp} = -\frac{3}{1} = -3$$

$$(x_1, y_1)$$
$$(-1, 2)$$

$$y - y_1 = m(x - x_1)$$

$$y - 2 = -3(x + 1)$$

$$y - 2 = -3x - 3 + 2$$

$$y = -3x - 1 \quad y = \text{form}$$

$$0 = \frac{-3x}{-1} - \frac{y}{-1} - \frac{1}{-1}$$

$$0 = 3x + y + 1 \quad \text{general form}$$

(not required but fun! 😊)

$$3(d) \quad 3x - 4y - 12 = 0$$

$$\frac{-4y}{-4} = \frac{-3x - 12}{-4}$$

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

x	$y = \frac{3}{4}x + 3$
4	$y = \frac{3}{4}(4) + 3$ $y = \frac{12}{4} + 3$ $y = 3 + 3$ $y = 6$

one point P

$$(4, 6)$$

$$Q(1, 5)$$

$$m_{PQ} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m_{PQ} = \frac{6 - 5}{4 - 1} = \frac{1}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 6 = \frac{1}{3}(x - 4)$$

$$3(y - 6) = x - 4$$
$$3y - 18 = x - 4 + 18$$

$$\frac{3y}{3} = \frac{x + 14}{3}$$
$$y = \frac{x + 14}{3}$$

Pg 461, 462

32 more students

$$\boxed{x + 32 = y}$$

# 26 Let  $x =$  <sup># of</sup> adult tickets

Let  $y =$  # of student tickets

$$8x + 5y = 1122$$

$$\boxed{x + 32 = y}$$

$$8x + 5(x + 32) = 1122$$

$$8x + 5x + 160 = 1122$$

$$\frac{13x}{13} = \frac{962}{13}$$

$$\boxed{x = 74}$$

$$x + 32 = y$$

$$74 + 32 = y$$

$$\boxed{106 = y}$$

74 adults  
and 106 students

28

Let  $a$  = part a total marks

Let  $b$  = part b total marks

$$a + b = 108$$

$$87.5\% a + 75\% b = 87$$

$$1000(0.875a) + 1000(0.75b) = 87(1000)$$

$$875a + 750b = 87,000$$

$$-875a - 875b = -94,500$$

---

$$-125b = -7500$$

$$\frac{-125}{-125} \cdot \frac{-7500}{-125}$$

$$b = 60$$

$$a + b = 108$$

$$a + 60 = 108$$

$$a = 108 - 60$$

$$a = 48$$

Part A is 48 points.  
Part B is 60 points.

$$\textcircled{1} \quad \overset{-3x}{3x} - 2y = 4.5$$

$$\textcircled{B} \quad \frac{-2y}{-2} = \frac{\overset{-3x}{-3x} + 4.5}{-2}$$

$$m = \frac{3}{2}$$

$$\overset{2}{-2}x + \overset{2}{2}y = \overset{2}{-1.25}$$

$$\overset{+2x}{-2x} + y = \overset{+2x}{-2.5}$$

$$y = 2x - 2.5$$

$$m = 2$$

Slopes are different  
therefore 1 solution!

---

---

2 A) Slopes are different

$$y = \textcircled{3}x - 2 \quad \therefore 1 \text{ solution}$$

$$y = \textcircled{-4}x + 5$$

Pg 455

$$5 a) \begin{cases} -3x - 4y = -2 \\ x + 2y = 3 \end{cases} \Rightarrow x = \boxed{3 - 2y}$$

$$\begin{aligned} -3x - 4y &= -2 \\ -3(3 - 2y) - 4y &= -2 \\ -9 + 6y - 4y &= -2 \\ -9 + 2y &= -2 \end{aligned}$$

$$x = 3 - 2(3.5)$$

$$x = 3 - 7$$

$$\boxed{x = -4}$$

$$\begin{aligned} \frac{2y}{2} &= \frac{7}{2} \\ y &= 3.5 \text{ or } \frac{7}{2} \end{aligned}$$

$$(-4, 3.5)$$

$$\begin{aligned} 511 \quad -0.5x + 0.2y &= -1 \quad \times 10 \\ 0.3x - 0.6y &= -1.8 \quad \times 10 \end{aligned}$$

---

$$\textcircled{3x} \quad -5x + 2y = -10$$

$$\textcircled{5x} \quad 3x - 6y = -18$$

---

$$\begin{aligned} -15x + 6y &= -30 \\ 15x - 30y &= -90 \end{aligned}$$

---

$$\begin{aligned} -24y &= -120 \\ \underline{-24} & \quad \underline{-24} \end{aligned}$$

$$\textcircled{y = 5}$$

$$3x - 6y = -18$$

$$3x - 6(5) = -18$$

$$3x - 30 = -18$$

$$3x = -18 + 30$$

$$\frac{3x}{3} = \frac{12}{3}$$

$$\rightarrow x = 4$$

$$(4, 5)$$

5 iii) ①  $x - \frac{1}{3}y = \frac{4}{3}$  } mult. by ③

②  $\frac{5x}{6} + \frac{1y}{2} = \frac{3}{2}$  } mult. by ⑥

①  $6x - \frac{6}{3}y = 6\left(\frac{4}{3}\right)$

$6x - 2y = 8$

②  $6\left(\frac{5x}{6}\right) + 6\left(\frac{1y}{2}\right) = 6\left(\frac{3}{2}\right)$

$5x + 3y = 9$

$6x - 2y = 8$   
 $6x - 2(0.5) = 8$   
 $6x - 1 = 8$   
 $6x = 9$

$5x$   
 $6x - 2y = 8 \Rightarrow 30x - 10y = 40$   
 $-6x$   $5x + 3y = 9 \Rightarrow -30x - 18y = -54$   
 $x = 1.5$

$(1.5, 0.5)$

$\frac{-28y}{-28} = \frac{-14}{-28} \Rightarrow y = \frac{1}{2} = 0.5$