

# Algebra 1 Fall Practice PBA

## Unit 1: Foundations for Algebra

- ① 9.85 less than the product of 37 and  $t$

↳ switch order  
 $37 \cdot t - 9.85 = \boxed{37t - 9.85}$

②  $(6-2)^3 \div 2$   
 $(4)^3 \div 2$   
 $64 \div 2$   
 $\boxed{32}$

PEMDAS

③  $5 \cdot 7 - 4^2 \div 2$  PEMDAS  
 $5 \cdot 7 - 16 \div 2$   
 $35 - 16 \div 2$   
 $35 - 8$   
 $\boxed{27}$

④  $-1 - 3 = \boxed{-3}$  PEMDAS

⑤  $x=5, y=2$

$x^2 + x - 12 \div y^2 = (5)^2 + (5) - 12 \div (2)^2$  PEMDAS  
 $25 + 5 - 12 \div 4$   
 $25 + 5 - 3$   
 $30 - 3$   
 $\boxed{27}$

⑥  $x=5, y=2$

$(xy)^2 \div (xy) = (5 \cdot 2)^2 \div (5 \cdot 2)$  PEMDAS  
 $10^2 \div 10$   
 $100 \div 10$   
 $\boxed{10}$

⑦  $a=3, b=4$

$3b^2 - a^2 = 3(4)^2 - (3)^2$  PEMDAS  
 $3(16) - 9$   
 $48 - 9$   
 $\boxed{39}$

⑧  $a=3, b=4$

$$\begin{aligned} 2b^2 - 7a &= 2(4)^2 - 7(3) && \text{PEMDAS} \\ &= 2(16) - 7(3) \\ &= 32 - 21 \\ &= \boxed{11} \end{aligned}$$

⑨ 15: natural, whole, integer, rational

⑩ -1.4583: rational

⑪  $\sqrt{57}$ : irrational

⑫  $\sqrt{9} = 3$ : natural, whole, integer, rational

⑬  $\frac{3}{10}$ : rational

⑭ -0.45: rational

⑮  $\sqrt{12}$ : irrational

⑯ 0: whole, integer, rational

### Unit 2: Solving Equations

①  $2x + 3y = 15$

$$\begin{array}{r} 2x + 3y = 15 \\ -3y \quad -3y \\ \hline 2x = 15 - 3y \\ \frac{2x}{2} = \frac{15 - 3y}{2} \end{array}$$

$$\boxed{x = 7.5 - 1.5y}$$

OR

$$\boxed{x = \frac{15}{2} - \frac{3}{2}y}$$

②  $10x + 5y = 80$

$$\begin{array}{r} 10x + 5y = 80 \\ -10x \quad -10x \\ \hline 5y = 80 - 10x \\ \frac{5y}{5} = \frac{80 - 10x}{5} \end{array}$$

$$\boxed{y = 16 - 2x}$$

③  $4 = 2m - 5n$

$$\begin{array}{r} 4 = 2m - 5n \\ +5n \quad +5n \\ \hline 4 + 5n = 2m \\ \frac{4 + 5n}{2} = \frac{2m}{2} \end{array}$$

$$\boxed{2 + \frac{5}{2}n = m}$$

OR

$$\boxed{2 + 2.5n = m}$$

④  $5 = \frac{1}{2}t - 3$

$$\begin{array}{r} 5 = \frac{1}{2}t - 3 \\ +3 \quad +3 \\ \hline \frac{2}{1} \cdot 8 = \frac{1}{2}t \cdot \frac{2}{1} \end{array}$$

$$\boxed{16 = t}$$

⑤  $6 = \frac{1}{7}m - 3$

$$\begin{array}{r} 6 = \frac{1}{7}m - 3 \\ +3 \quad +3 \\ \hline \frac{7}{1} \cdot 9 = \frac{1}{7}m \cdot \frac{7}{1} \end{array}$$

$$\boxed{63 = m}$$

⑥  $-8 = \frac{1}{4}s + 3$

$$\begin{array}{r} -8 = \frac{1}{4}s + 3 \\ -3 \quad -3 \\ \hline 4 \cdot -11 = \frac{1}{4}s \cdot 4 \\ \boxed{-44 = s} \end{array}$$

$$\begin{aligned} 7) \quad \frac{1}{3}x - 8 &= 4 \\ &+8 \quad +8 \\ \hline 3 \cdot \frac{1}{3}x &= 12 + 3 \\ \boxed{x} &= \boxed{36} \end{aligned}$$

$$\begin{aligned} 8) \quad 2a + 3 &= \frac{1}{2}(6 + 4a) \\ 2a + 3 &= 3 + 2a \\ -2a \quad &-2a \\ \hline 3 &= 3 \\ \boxed{\text{infinitely many solutions}} \end{aligned}$$

$$\begin{aligned} 9) \quad 5y + 2 &= \frac{1}{2}(10y + 4) \\ 5y + 2 &= 5y + 2 \\ -5y \quad &-5y \\ \hline 2 &= 2 \\ \boxed{\text{infinitely many solutions}} \end{aligned}$$

$$\begin{aligned} 10) \quad \frac{1}{2}h + \frac{1}{3}(h-6) &= \frac{5}{6}h + 2 \\ \frac{1}{2}h + \frac{1}{3}h - 2 &= \frac{5}{6}h + 2 \\ \frac{3}{6}h + \frac{2}{6}h - 2 &= \frac{5}{6}h + 2 \\ \frac{5}{6}h - 2 &= \frac{5}{6}h + 2 \\ -\frac{5}{6}h \quad &-\frac{5}{6}h \\ \hline -2 &= 2 \\ \boxed{\text{no solution}} \end{aligned}$$

$$\begin{aligned} 11) \quad \frac{b-8}{5} &= \frac{b+3}{4} \\ 4(b-8) &= 5(b+3) \\ 4b - 32 &= 5b + 15 \\ -4b \quad &-4b \\ \hline -32 &= b + 15 \\ -15 \quad &-15 \\ \hline -47 &= b \end{aligned}$$

$$\begin{aligned} 12) \quad \frac{n}{5} &= \frac{2n+4}{6} \\ 6n &= 5(2n+4) \\ 6n &= 10n + 20 \\ -10n \quad &-10n \\ \hline -4n &= 20 \\ -4 \quad &-4 \\ \hline \boxed{n} &= \boxed{-5} \end{aligned}$$

$$\begin{aligned} 13) \quad \frac{w+3}{4} &= \frac{w}{2} \\ 4w &= 2(w+3) \\ 4w &= 2w + 6 \\ -2w \quad &-2w \\ \hline 2w &= 6 \\ \frac{2}{2} \quad &\frac{6}{2} \\ \hline \boxed{w} &= \boxed{3} \end{aligned}$$

$$\begin{aligned} 14) \quad \frac{3}{x+1} &= \frac{1}{2} \\ x+1 &= 6 \\ -1 \quad &-1 \\ \hline \boxed{x} &= \boxed{5} \end{aligned}$$

15) 17.5 is 125% of what number

Method 1: Equation

$$\begin{aligned} 17.5 &= 1.25n \\ \frac{17.5}{1.25} &= \frac{1.25n}{1.25} \\ \boxed{14} &= n \end{aligned}$$

Method 2: Proportion

$$\begin{aligned} \frac{15}{of} &= \frac{90}{100} \\ 17.5 &= \frac{125}{100}n \\ 125n &= 1750 \\ \frac{125n}{125} &= \frac{1750}{125} \\ \boxed{n} &= \boxed{14} \end{aligned}$$

16) 12.5 is 30% of what number

Method 1: Equation

$$12.5 = .30n$$

$$\begin{array}{r} .30 \phantom{0} \\ \underline{.30} \\ 41.\overline{6} = n \end{array}$$

$$\boxed{41.\overline{6} = n}$$

or

$$\boxed{41\frac{2}{3} = n}$$

Method 2: Proportion

$$\frac{15}{of} = \frac{30}{100}$$

$$\frac{12.5}{n} = \frac{30}{100}$$

$$30n = 1250$$

$$\frac{30n}{30} = \frac{1250}{30}$$

$$\boxed{n = 41.\overline{6} \text{ or } 41\frac{2}{3}}$$

### Unit 3: Solving Inequalities

1)  $n > -4$  ;  $(-4, \infty)$

2)  $n \geq 2$  ;  $[2, \infty)$

3)  $n \geq 5$  ;  $[5, \infty)$

4)  $n \leq 8$  ;  $(-\infty, 8]$

5)  $n < 7$  ;  $(-\infty, 7)$

6)  $n < 2$  ;  $(-\infty, 2)$

7)  $7 + 6a > 19$

$$\begin{array}{r} -7 \phantom{0} \\ \underline{-7} \\ 6a > 12 \end{array}$$

$$\frac{6a}{6} > \frac{12}{6}$$

$$\boxed{a > 2}$$

8)  $2(t+2) - 3t \geq -1$

$$2t + 4 - 3t \geq -1$$

$$4 - t \geq -1$$

$$\begin{array}{r} -4 \phantom{0} \\ \underline{-4} \\ -t \geq -5 \end{array}$$

$$\boxed{t \leq 5}$$

9)  $6z - 15 < 4z + 11$

$$\begin{array}{r} -4z \phantom{0} \\ \underline{-4z} \\ 2z - 15 < 11 \end{array}$$

$$2z - 15 < 11$$

$$+15 \phantom{0}$$

$$\underline{+15}$$

$$2z < 26$$

$$\frac{2z}{2} < \frac{26}{2}$$

$$\boxed{z < 13}$$

10)  $18x - 5 \leq 3(6x - 2)$

$$18x - 5 \leq 18x - 6$$

$$\begin{array}{r} -18x \phantom{0} \\ \underline{-18x} \\ -5 \leq -6 \end{array}$$

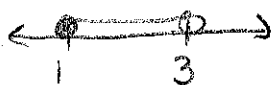
$$-5 \leq -6$$

$$\boxed{\text{no solution}}$$

11)  $-3 \leq m - 4 < -1$

$$\begin{array}{r} +4 \phantom{0} \\ \underline{+4} \\ 1 \leq m < 3 \end{array}$$

$$\boxed{1 \leq m < 3}$$



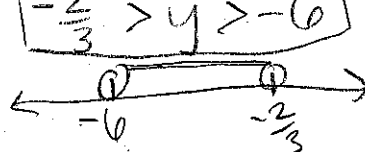
12)  $-2 < -3y - 4 < 4$

$$\begin{array}{r} +4 \phantom{0} \\ \underline{+4} \\ -2 < -3y < 4 \end{array}$$

$$-2 < -3y < 4$$

$$\begin{array}{r} -3 \phantom{0} \\ \underline{-3} \\ -\frac{2}{3} > y > -\frac{4}{3} \end{array}$$

$$\boxed{-\frac{2}{3} > y > -\frac{4}{3}}$$



$$\begin{aligned} (13) \quad & -4 \leq r-5 < -1 \\ & \begin{array}{ccc} +5 & +5 & +5 \end{array} \\ \hline & 1 \leq r < 4 \end{aligned}$$

$$\begin{aligned} (14) \quad & 8 \leq -5x < 30 \\ & \begin{array}{ccc} -5 & -5 & -5 \end{array} \\ \hline & -\frac{8}{5} \geq x > -6 \end{aligned}$$

$$\begin{aligned} (15) \quad & |3t-2|+6=2 \\ & \begin{array}{ccc} -6 & -6 \end{array} \\ \hline & |3t-2| = -4 \\ & \boxed{\text{no solution}} \end{aligned}$$

$$\begin{aligned} (16) \quad & |4f+1| - 2 = 5 \\ & \begin{array}{ccc} +2 & +2 \end{array} \\ \hline & |4f+1| = 7 \\ & 4f+1 = -7 \quad \text{or} \quad 4f+1 = 7 \\ & \begin{array}{cc} -1 & -1 \\ \hline 4f = -8 & 4f = 6 \\ \hline \frac{4}{4} & \frac{4}{4} \end{array} \\ & \boxed{f = -2 \quad \text{or} \quad f = \frac{3}{2}} \end{aligned}$$

$$\begin{aligned} (17) \quad & |1-3n| - 2 = 4 \\ & \begin{array}{cc} +2 & +2 \end{array} \\ \hline & |1-3n| = 6 \\ & \begin{array}{cc} -3n = -6 & \text{or} & -3n = 6 \\ \hline \frac{-3n}{-3} & & \frac{-3n}{-3} \end{array} \\ & \boxed{n = 2 \quad \text{or} \quad n = -2} \end{aligned}$$

$$\begin{aligned} (18) \quad & |x+3| < 5 \\ & -5 < x+3 < 5 \\ & \begin{array}{ccc} -3 & -3 & -3 \end{array} \\ \hline & \boxed{-8 < x < 2} \end{aligned}$$

$$\begin{aligned} (19) \quad & |y+8| \geq 3 \\ & y+8 \leq -3 \quad \text{or} \quad y+8 \geq 3 \\ & \begin{array}{ccc} -8 & -8 & -8 & -8 \end{array} \\ \hline & \boxed{y \leq -11 \quad \text{or} \quad y \geq -5} \end{aligned}$$

$$\begin{aligned} (20) \quad & |y-2| \leq 1 \\ & -1 \leq y-2 \leq 1 \\ & \begin{array}{ccc} +2 & +2 & +2 \end{array} \\ \hline & \boxed{1 \leq y \leq 3} \end{aligned}$$

$$\begin{aligned} (21) \quad & |p-7| \leq 3 \\ & -3 \leq p-7 \leq 3 \\ & \begin{array}{ccc} +7 & +7 & +7 \end{array} \\ \hline & \boxed{4 \leq p \leq 10} \end{aligned}$$

## Unit 4: Functions

① domain:  $\{-2, 0, 4, 5\}$   
range:  $\{0.5, 2.5, 6.5\}$

Function

② domain:  $\{6, 4, 5, 3\}$   
range:  $\{5, 3, 4, 8\}$

Not a function

③ domain:  $\{4, 2, 5, 7\}$   
range:  $\{1.5, 2.2, 4, 8, 0\}$

Not a function

④ domain:  $\{-1, -2, 4, 7\}$   
range:  $\{1, 2, -4, -7\}$

Function

⑤ domain:  $\{-2, -1, 1, 2\}$   
range:  $\{-1, 1, 2\}$

Not a function

⑥ domain: all real numbers  
range: all real numbers

Function

⑦ domain:  $x \geq 0$   
range: all real numbers

Not a function

⑧ domain: all real numbers  
range:  $y \geq 1$

Function

## Unit 5: Linear Functions

①  $m = \text{undefined}$ ;  $m = 0$

②  $m = \text{undefined}$ ;  $m = 0$

③  $(-1, 0)$   $(3, -2)$   
 $x_1$   $y_1$   $x_2$   $y_2$

④  $(1, 3)$   $(4, -1)$   
 $x_1$   $y_1$   $x_2$   $y_2$

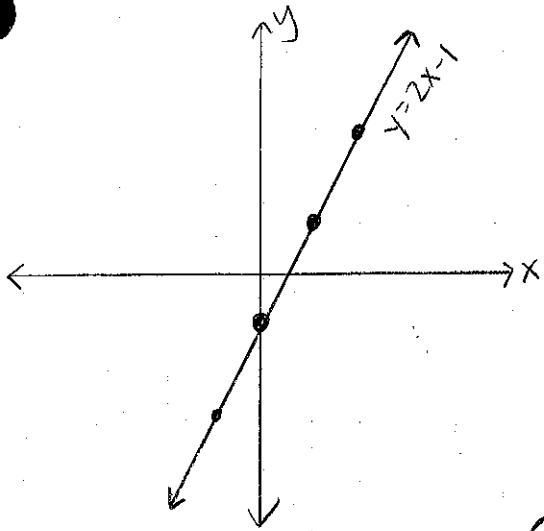
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 0}{3 - (-1)} = \frac{-2}{4} = \boxed{\frac{-1}{2}}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 3}{4 - 1} = \boxed{\frac{-4}{3}}$$

$$\textcircled{5} \quad y = 2x - 1$$

$$m = 2$$

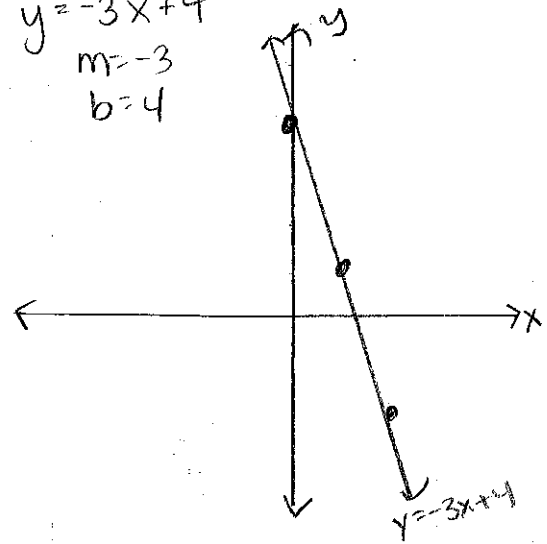
$$b = -1$$



$$\textcircled{6} \quad y = -3x + 4$$

$$m = -3$$

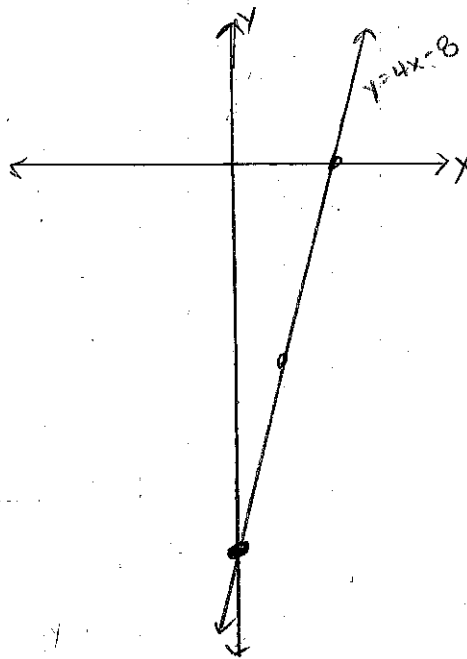
$$b = 4$$



$$\textcircled{7} \quad y = 4x - 8$$

$$m = 4$$

$$b = -8$$



$$\textcircled{8} \quad f(x) = 4x + 1$$

$$f(2) = 4(2) + 1$$

$$= 8 + 1$$

$$\boxed{f(2) = 9}$$

$$\textcircled{9} \quad f(x) = 6x - 4$$

$$f(2) = 26$$

$$26 = 6a - 4$$

$$\begin{array}{r} +4 \quad +4 \\ \hline 30 = 6a \\ \frac{30}{6} = \frac{6a}{6} \\ \hline 5 = a \end{array}$$

$$\boxed{5 = a}$$

$$\textcircled{10} \quad 3x + 4y = 24$$

$$\begin{array}{r} -3x \quad -3x \\ \hline 4y = -3x + 24 \\ \frac{4y}{4} = \frac{-3x + 24}{4} \\ \hline y = -\frac{3}{4}x + 6 \end{array}$$

$$m = -\frac{3}{4} \quad \boxed{y\text{-int} = (0, 6)}$$

$$x\text{-int} (y=0)$$

$$3x + 4(0) = 24$$

$$\begin{array}{r} 3x = 24 \\ \frac{3x}{3} = \frac{24}{3} \\ \hline x = 8 \end{array}$$

$$\boxed{(8, 0)} \quad \textcircled{7}$$

$$\textcircled{11} 5x - 6y = 60$$

$$\begin{array}{r} -5x \qquad -5x \\ \hline -6y = -5x + 60 \\ \hline \frac{-6y}{-6} = \frac{-5x + 60}{-6} \end{array}$$

$$y = \frac{5}{6}x - 10$$

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

$$y\text{-int: } (0, 10)$$

$$x\text{-int: } (y=0)$$

$$5x - 6(0) = 60$$

$$\frac{5x}{5} = \frac{60}{5}$$

$$x = 12$$

$$(12, 0)$$

$$\textcircled{12} 3x + 8y = 12$$

$$\begin{array}{r} -3x \qquad -3x \\ \hline 8y = -3x + 12 \\ \hline \frac{8y}{8} = \frac{-3x + 12}{8} \end{array}$$

$$y = -\frac{3}{8}x + \frac{3}{2}$$

$$m = -\frac{3}{8}$$

$$y\text{-int: } (0, \frac{3}{2})$$

$$x\text{-int: } (y=0)$$

$$3x + 8(0) = 12$$

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

$$x = 4$$

$$(4, 0)$$

$$\textcircled{13} y = 65 + 35x$$

$$y = 170$$

$$170 = 65 + 35x$$

$$\frac{-65}{-65} \quad \frac{-65}{-65}$$

$$\frac{105}{35} = \frac{35x}{35}$$

$$3\text{ hrs} = x$$

$\textcircled{14}$   $y$  = total amt of money you pay  
 $x$  = # yds of fabric you buy

$$y = 7.50x - 5$$

$$y = 10$$

$$10 = 7.50x - 5$$

$$+5 \qquad +5$$

$$\frac{15}{7.50} = \frac{7.50x}{7.50}$$

$$2\text{ yds} = x$$

$$\textcircled{15} y = \frac{1}{2}x - 1 \quad (-2, 3)$$

$$m = -2$$

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

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

$$\text{or } y = -2x - 1$$

$$\textcircled{16} y = 5x + 4 \quad (1, -2)$$

$$m = 5$$

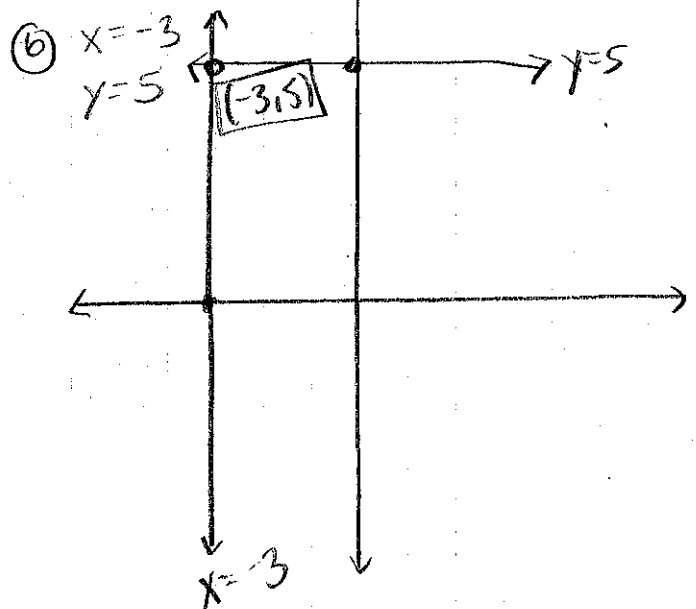
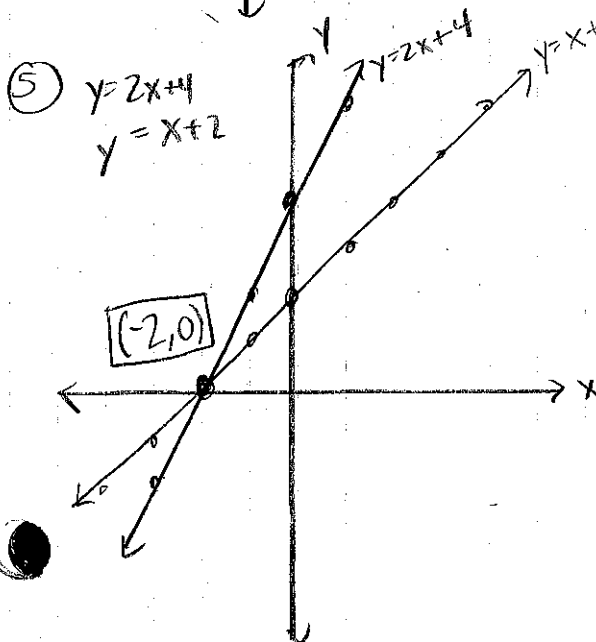
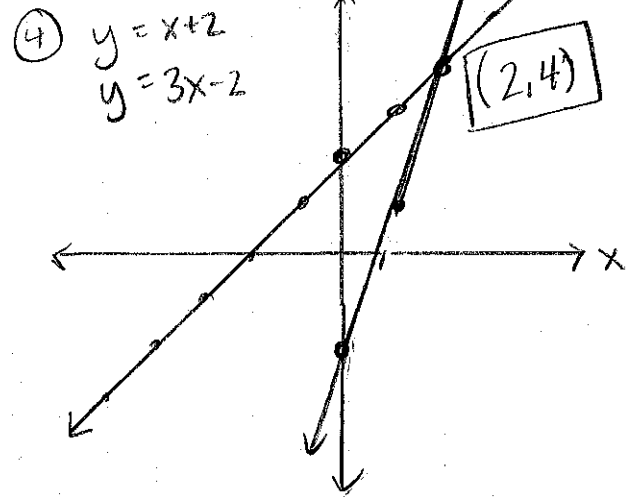
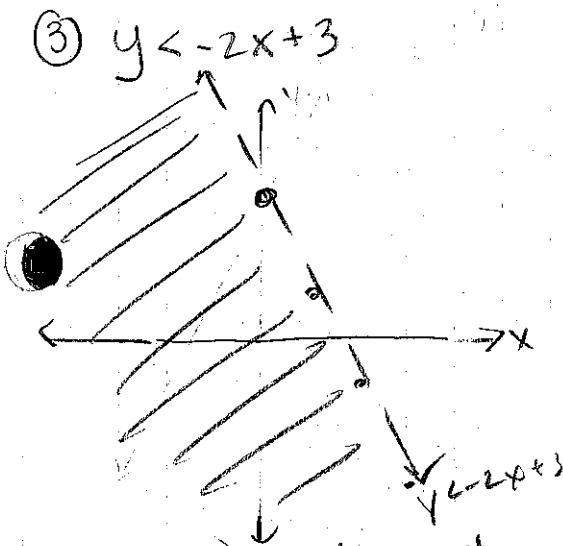
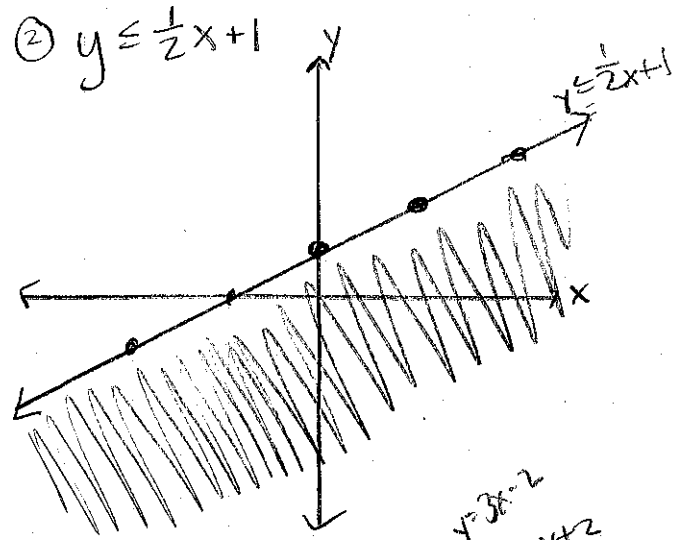
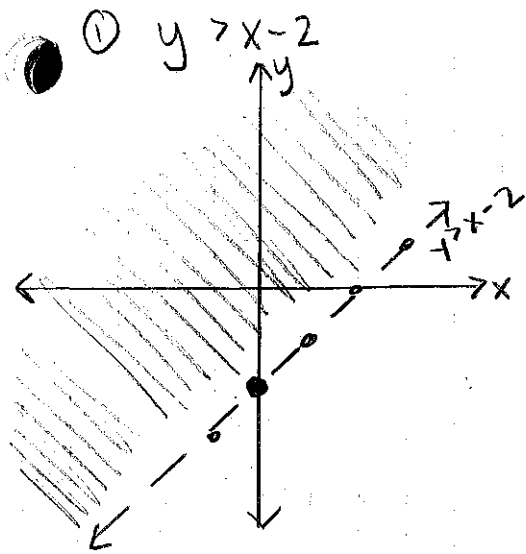
$$y + 2 = 5(x - 1)$$

$$\text{or } y = 5x - 7$$

(8)



Unit 5: Systems of Equations and Inequalities



$$\begin{aligned} \textcircled{7} \quad y &= 3x \\ x + y &= -32 \end{aligned}$$

$$\begin{aligned} x + 3x &= -32 \\ 4x &= -32 \\ \frac{4x}{4} &= \frac{-32}{4} \\ x &= -8 \end{aligned}$$

$$\begin{aligned} y &= 3(-8) \\ y &= -24 \\ \boxed{(-8, -24)} \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad y &= 2x + 7 \\ y &= x - 1 \end{aligned}$$

$$\begin{aligned} 2x + 7 &= x - 1 \\ -x & \quad -x \\ \hline x &= -8 \end{aligned}$$

$$\begin{aligned} y &= 2(-8) + 7 \\ y &= -16 + 7 \\ y &= -9 \\ \boxed{(-8, -9)} \end{aligned}$$

$$\begin{aligned} \textcircled{9} \quad 4y &= x \\ 3x - y &= 70 \end{aligned}$$

$$\begin{aligned} 3(4y) - y &= 70 \\ 12y - y &= 70 \\ \frac{11y}{11} &= \frac{70}{11} \\ y &= \frac{70}{11} \end{aligned}$$

$$\begin{aligned} 4\left(\frac{70}{11}\right) &= x \\ \frac{280}{11} &= x \\ \boxed{\left(\frac{70}{11}, \frac{280}{11}\right)} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad -2x + 15y &= -32 \\ 3(7x - 5y) &= 17 \Rightarrow 21x - 15y = 51 \end{aligned}$$

$$\begin{aligned} -2x + 15y &= -32 \\ + 21x - 15y &= 51 \\ \hline 19x + 0 &= 19 \\ 19x &= 19 \\ \frac{19x}{19} &= \frac{19}{19} \\ x &= 1 \end{aligned}$$

$$\begin{aligned} -2(1) + 15y &= -32 \\ -2 + 15y &= -32 \\ +2 & \quad +2 \\ \hline 15y &= -30 \\ \frac{15y}{15} &= \frac{-30}{15} \\ y &= -2 \end{aligned}$$

$$\boxed{(1, -2)}$$

$$\begin{aligned} \textcircled{11} \quad (-5x - 2y) &= 6 \Rightarrow -15x - 6y = 18 \\ 3x + 6y &= 6 \end{aligned}$$

$$\begin{aligned} -15x - 6y &= 18 \\ + 3x + 6y &= 6 \\ \hline -12x + 0 &= 24 \\ -12x &= 24 \\ \frac{-12x}{-12} &= \frac{24}{-12} \\ x &= -2 \end{aligned}$$

$$\begin{aligned} 3(-2) + 6y &= 6 \\ -6 + 6y &= 6 \\ +6 & \quad +6 \\ \hline 6y &= 12 \\ \frac{6y}{6} &= \frac{12}{6} \\ y &= 2 \end{aligned}$$

$$\boxed{(-2, 2)}$$

$$\textcircled{12} \begin{cases} 3p+q=7 \\ 2p-2q=-6 \end{cases} \Rightarrow \begin{cases} 6p+2q=14 \\ 2p-2q=-6 \end{cases}$$

$$\begin{array}{r} 6p+2q=14 \\ + 2p-2q=-6 \\ \hline 8p+0=8 \\ \frac{8p}{8}=\frac{8}{8} \\ p=1 \end{array}$$

$$\begin{array}{r} 3(1)+q=7 \\ 3+q=7 \\ -3 \quad -3 \\ \hline q=4 \end{array}$$

$(1,4)$

$$\textcircled{13} \begin{cases} S = \# \text{ singing acts} \\ C = \# \text{ comedy acts} \end{cases}$$

$$\begin{cases} S+C=12 \Rightarrow S=12-C \\ 5S+3C=50 \end{cases}$$

$$\begin{array}{r} 5(12-C)+3C=50 \\ 60-5C+3C=50 \\ 60-2C=50 \\ -60 \quad -60 \\ \hline -2C=-10 \\ \frac{-2C}{-2}=\frac{-10}{-2} \\ C=5 \end{array}$$

$$\begin{array}{r} S=12-5 \\ S=7 \end{array}$$

$$\textcircled{14} \begin{cases} a = \# \text{ adult tickets} \\ c = \# \text{ children tickets} \end{cases}$$

$$\begin{cases} a+c=11 \Rightarrow a=11-c \\ 22a+15c=228 \end{cases}$$

$$\begin{array}{r} 22(11-c)+15c=228 \\ 242-22c+15c=228 \\ 242-7c=228 \\ -242 \quad -242 \\ \hline -7c=-14 \\ \frac{-7c}{-7}=\frac{-14}{-7} \\ C=2 \end{array}$$

$$\begin{array}{r} a=11-2 \\ a=9 \end{array}$$

$$\textcircled{15} \begin{cases} b = \# \text{ buses} \\ v = \# \text{ vans} \end{cases}$$

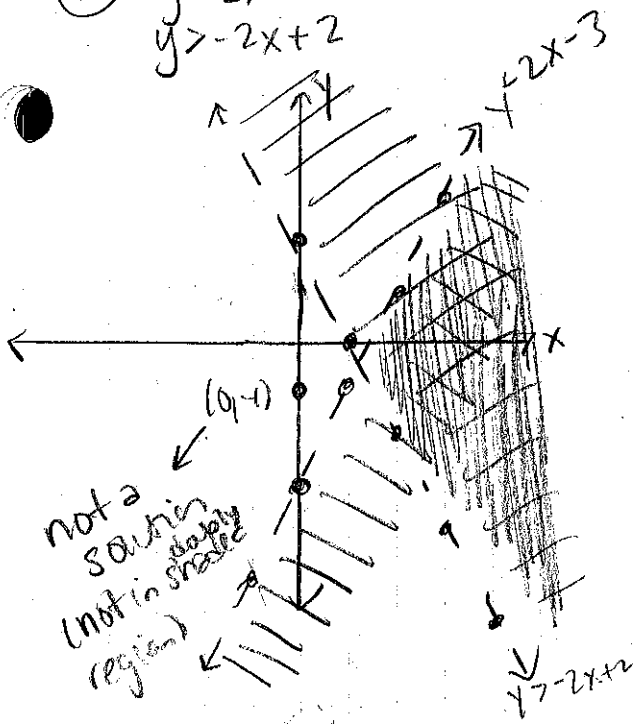
$$\begin{cases} b+v=6 \Rightarrow b=6-v \\ 51b+10v=142 \end{cases}$$

$$\begin{array}{r} 51(6-v)+10v=142 \\ 306-51v+10v=142 \\ 306-41v=142 \\ -306 \quad -306 \\ \hline -41v=-164 \\ \frac{-41v}{-41}=\frac{-164}{-41} \end{array}$$

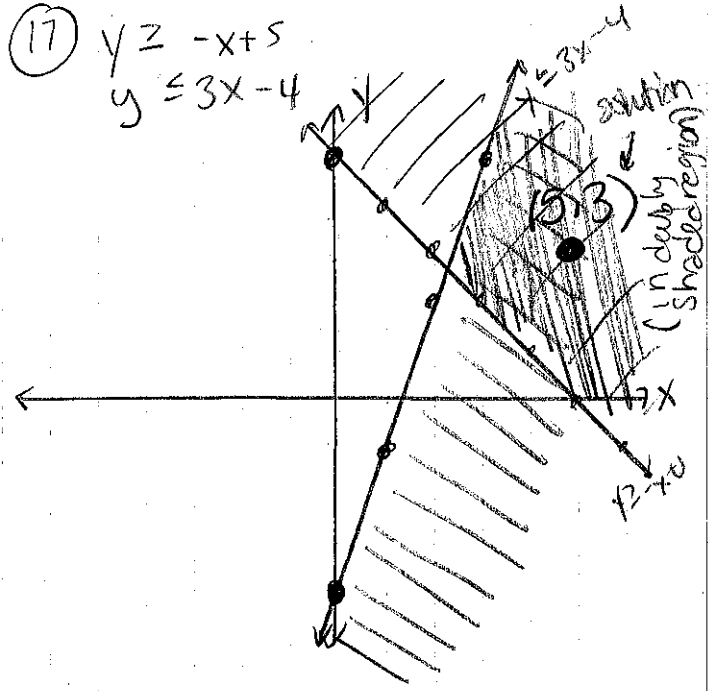
$$V=4$$

$$\begin{array}{r} b=6-4 \\ b=2 \end{array}$$

(16)  $y < 2x - 3$   
 $y > -2x + 2$



(17)  $y \geq -x + 5$   
 $y \leq 3x - 4$



(18)  $y > 3x - 2$   
 $y \leq \frac{1}{2}x + 6$

