

4 Linear functions

Student ID No.						Name					
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1 Each of the following, find an equation of the line and write it in slope-intercept form $y = mx + n$.

a) Slope is -3 , and passes through $(-2, -1)$.

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

$$y = -3x - 7$$

b) Passes through two points $(3, -2)$ and $(-2, 1)$.

slope: $\frac{1 - (-2)}{-2 - 3} = -\frac{3}{5}$

$$y - 1 = -\frac{3}{5}(x - (-2))$$

$$y = -\frac{3}{5}x - \frac{1}{5}$$

2 Solve the following equations with respect to the unknown indicated in [].

$$V = C \left(1 - \frac{T}{N}\right) [T]$$

$$V = C \frac{N-T}{N} \Rightarrow N\bar{V} = C(N-T)$$

$$\Rightarrow N-T = \frac{NV}{C} \Rightarrow T = N - \frac{NV}{C}$$

$$\Rightarrow T = N \left(1 - \frac{V}{C}\right)$$

3 Solve the following systems of equations

$$\begin{cases} 4x + 5y = 2 & \dots \textcircled{1} \\ 3x - 2y = 3 & \dots \textcircled{2} \end{cases}$$

$$\begin{array}{r} \textcircled{1} \times 3 \quad 12x + 15y = 6 \\ \textcircled{2} \times 4 \quad 12x - 8y = 12 \\ \hline \phantom{\textcircled{1} \times 3} \quad 23y = -6 \\ \phantom{\textcircled{1} \times 3} \quad y = -\frac{6}{23} \end{array}$$

$$\textcircled{2} \quad 3x - 2x\left(-\frac{6}{23}\right) = 3$$

$$x = 1 - \frac{4}{23} = \frac{19}{23}$$

$$\therefore (x, y) = \left(\frac{19}{23}, -\frac{6}{23}\right)$$

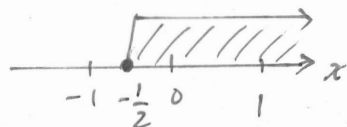
4 Solve each of the following inequalities and express the solution on a number line.

a) $1 - 3x \leq \frac{2x + 11}{4}$

$$\Leftrightarrow 4 - 12x \leq 2x + 11$$

$$\Leftrightarrow -14x \leq 7$$

$$\Leftrightarrow x \geq -\frac{1}{2}$$

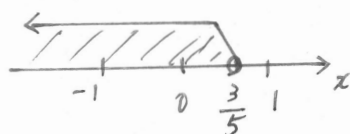


b) $3x < 13 - 7(x + 1)$

$$\Leftrightarrow 3x < 13 - 7x - 7$$

$$\Leftrightarrow 10x < 6$$

$$\Leftrightarrow x < \frac{3}{5}$$

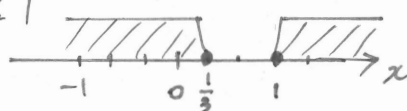


c) $|3x - 2| \geq 1$

$$\Leftrightarrow 3x - 2 \leq -1 \text{ or } 3x - 2 \geq 1$$

$$\Leftrightarrow 3x \leq 1 \text{ or } 3x \geq 3$$

$$\Leftrightarrow x \leq \frac{1}{3} \text{ or } x \geq 1$$



5 Solve each of the following systems of inequalities and express the solution on a number line.

a) $\begin{cases} 2x - 1 \geq 3x + 4 & \dots \textcircled{1} \\ -x + 4 > 2(x - 2) & \dots \textcircled{2} \end{cases}$

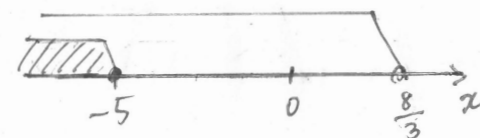
$$\textcircled{1} \Leftrightarrow -x \geq 5$$

$$\Leftrightarrow x \leq -5$$

$$\textcircled{2} \Leftrightarrow -x + 4 > 2x - 4$$

$$\Leftrightarrow -3x > -8$$

$$x < \frac{8}{3}$$



Ans. $x \leq -5$

b) $\begin{cases} \frac{2x+1}{3} < \frac{3x-1}{2} & \dots \textcircled{1} \\ \frac{3}{2}x - 2 \leq x - \frac{2}{3} & \dots \textcircled{2} \end{cases}$

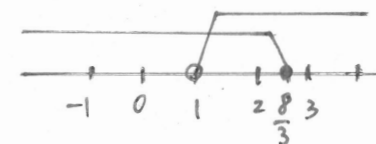
$$\textcircled{1} \Leftrightarrow 2(2x+1) < 3(3x-1)$$

$$\Leftrightarrow -5x < -5$$

$$\Leftrightarrow x > 1$$

$$\textcircled{2} \Leftrightarrow \frac{1}{2}x \leq \frac{4}{3}$$

$$\Leftrightarrow x \leq \frac{8}{3}$$



Ans. $1 < x \leq \frac{8}{3}$

6 At an apparel shop, during Golden Week, all products in the store were sold at 30% off. In addition, Internet members are given a special discount of 20% off discount prices. What percentage of the original price will the final discount price be?

P : original price.

$$30\% \text{ off} \Rightarrow (1 - 0.3)P$$

$$20\% \text{ off of it} \Rightarrow (1 - 0.2)(1 - 0.3)P$$

$$= 0.8 \times 0.7 P$$

$$= 0.56 P$$

Ans. 56% of the original price

7 The relationship between Fahrenheit ($^{\circ}F$) and Celsius ($^{\circ}C$) is represented by $C = \frac{5}{9}(F - 32)$. In the United States, it is common to express temperature in degrees Fahrenheit. For example, if the body temperature rises above $100^{\circ}F$, medical treatment is said to be required, but what will that mean in Celsius?

$$C = \frac{5}{9}(F - 32), F \geq 100$$

$$\Rightarrow C \geq \frac{5}{9}(100 - 32) = \frac{5 \times 68}{9} = 37.\bar{7}^{\circ}C$$

Ans. $37.8^{\circ}C$ or above