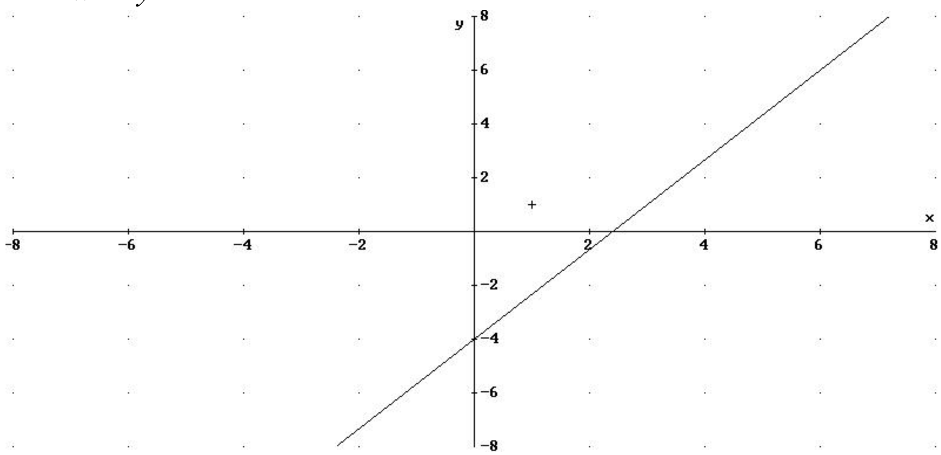
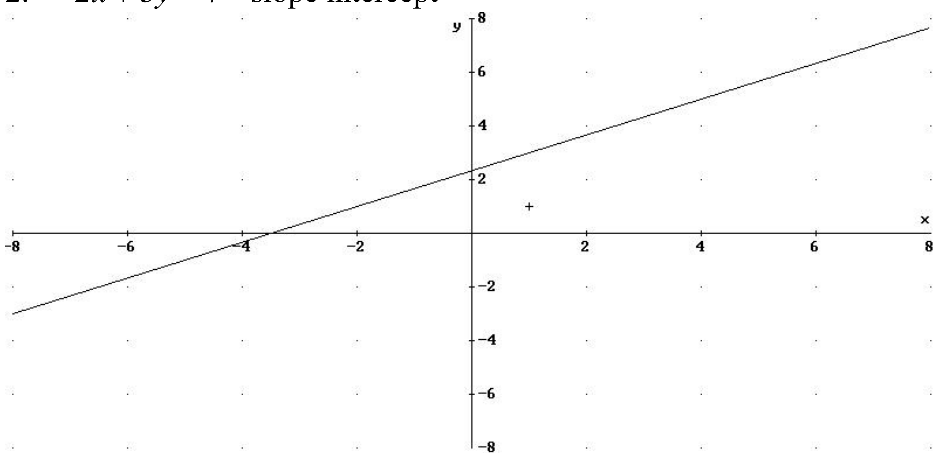
Linear Functions

A. Graph the following equations using the indicated method:

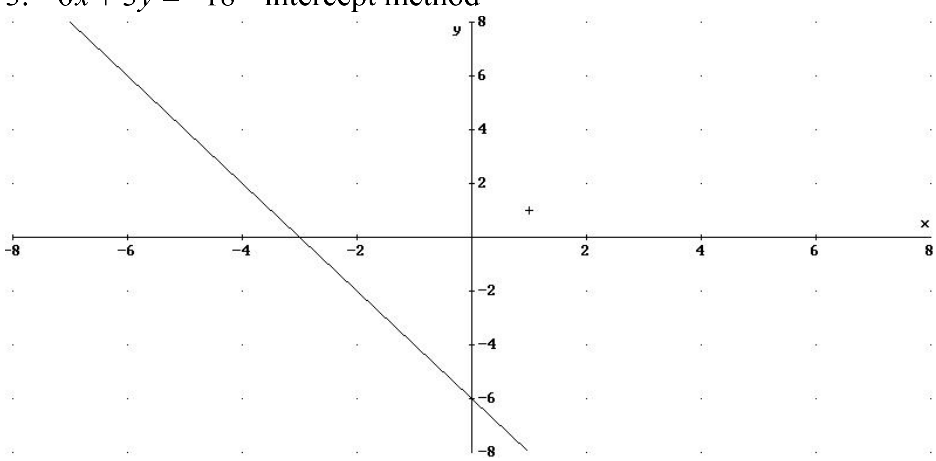
1. $5x - 3y = 12$ - Table of values



2. $-2x + 3y = 7$ - slope intercept



3. $6x + 3y = -18$ - intercept method



B. For each pair of points determine:

a) slope of the line joining the two points
b) midpoint of the line segment joining the two points
c) distance between the two points
d) the slope of the line parallel to the line defined by the two points
e) the slope of the line perpendicular to the line defined by the two points

1. $(-4,5)$ and $(-7,-9)$

$a)\ m=\frac{14}{3},\ b)\ M\left(-\frac{11}{2},-\frac{4}{2}\right),\ c)\ d=\sqrt{205},\ d)\ m_2=\frac{14}{3},\ e)\ m_2=-\frac{3}{14}$

2. $(-9,-3)$ and $(11,-6)$

$a)\ m=-\frac{3}{20},\ b)\ M\left(\frac{2}{2},-\frac{9}{2}\right),\ c)\ d=\sqrt{409},\ d)\ m_2=-\frac{3}{20},\ e)\ m_2=\frac{20}{3}$

3. $(-14,11)$ and $(-17,-7)$

$a)\ m=\frac{18}{3},\ b)\ M\left(-\frac{31}{2},\frac{4}{2}\right),\ c)\ d=\sqrt{333},\ d)\ m_2=\frac{18}{3},\ e)\ m_2=-\frac{3}{18}$

C. From each given equation determine:

a) the slope of the line
b) the slope of the line parallel to the given line
c) the slope of the line perpendicular to the given line
d) the y-intercept of the equation
e) the x-intercept of the equation

1. $9x-3y=-11$

$a)\ m=\frac{9}{3},\ b)\ m_2=\frac{9}{3},\ c)\ m_2=-\frac{3}{9},\ d)\ \mathrm{b}=\frac{11}{3},\ e)\ x=-\frac{11}{9}$

2. $7y+4x=17$

$a)\ m=-\frac{4}{7},\ b)\ m_2=-\frac{4}{7},\ c)\ m_2=\frac{7}{4},\ d)\ \mathrm{b}=\frac{17}{7},\ e)\ x=\frac{17}{4}$

3. $4y=-13$

$a)\ m=0,\ b)\ m_2=0,\ c)\ m_2=\varnothing,\ d)\ \mathrm{b}=-\frac{13}{4},\ e)\ x=\varnothing$

4. $-3x=4$

$a)\ m=\varnothing,\ b)\ m_2=\varnothing,\ c)\ m_2=0,\ d)\ \mathrm{b}=\varnothing,\ e)\ x=-\frac{4}{3}$

D. Determine the equation of the line given the following information:

a) slope and y-intercept

1. $m=-2, b=-5$ $\quad y=-2x-5$

2. $m=-3/4, b=1/4$ $\quad y=\frac{-3}{4}x+\frac{1}{4}\Rightarrow 4y=-3x+1$

3. $m=5,(0,-2)$ $\quad y=5x-2$

4. $m=-3/5, b=2/3$ $y=-\frac{3}{5}x+\frac{2}{3} \Rightarrow 15y=-9x+10$

b) slope and a point

1. $m=-3,(5,-2)$ $y=-3x+13$
2. $m=5,(-3,-7)$ $y=5x+8$
3. $m=3/4,(-5,-1)$ $4y=3x+11$

c) two points

1. $(-6,7)$ and $(5,-2)$ $m=-\frac{9}{11},\ 11y=-9x+23$
2. $(-8,-2)$ and $(4,-7)$ $m=-\frac{5}{12},\ 12y=-5x-64$

d) point and an equation

1. through $(4,-2)$ and parallel to $6x-5y=11$ $m=\frac{6}{5},\ 5y=6x-34$
2. through $(-7,-4)$ and parallel to $3x+7y=-2$ $m=-\frac{3}{7},\ 7y=-3x-49$
3. through $(6,-3)$ and perpendicular to $-4x+3y=6$
   $m_1=\frac{4}{3},\ m_2=-\frac{3}{4},\ 4y=-3x+6$
4. through $(-2,3)$ and perpendicular to $5x+8y=-1$
   $m_1=-\frac{5}{8},\ m_2=\frac{8}{5},\ 5y=8x+31$

e) point and two points not on the given line

1. through $(-1,-3)$ and parallel to the line defined by the points $(-6,4)$ and $(-8,-1)$
   $m=\frac{5}{2},\ 2y=5x-1$
2. through $(5,-5)$ and parallel to the line defined by the points $(-3,-2)$ and $(-7,-9)$
   $m=\frac{7}{4},\ 4y=7x-55$
3. through $(5,-6)$ and perpendicular to the line defined by the points $(-1,7)$ and $(3,-1)$
   $m_1=-2,\ m_2=\frac{1}{2},\ 2y=x-17$

5. 4. through $(-9,2)$ and perpendicular to the line defined by the points $(5,-7)$ and $(-4,-5)$
   $m_1=-\frac{2}{9},\ m_2=\frac{9}{2},\ 2y=9x+85$

f) perpendicular bisector

1. of the line segment defined by the points $(-7,3)$ and $(3,-5)$
   $m_1=-\frac{4}{5},\ m_2=\frac{5}{4},\ M(-2,-1),\ 4y=5x+6$

2. of the line segment defined by the points $(6,-4)$ and $(11,-7)$

$m_1=-\frac{3}{5},\ \ m_2=\frac{5}{3},\ \ M\left(\frac{17}{2},-\frac{11}{2}\right),\ \ 6y=10x-118$

g) special lines

1. through the point $(-3,9)$ and parallel to the y-axis $x=-3$
2. through the point $(8,-7)$ and parallel to the x-axis $y=-7$
3. through the point $(-5,-11)$ and perpendicular to the y-axis $y=-11$
4. through the point $(3,9)$ and perpendicular to the x-axis $x=3$