Two lines can be said to be **parallel** or **perpendicular**.

Two lines are parallel if _____

Two lines are perpendicular if _____

For each of the following:
a) Plot the given points and draw lines connecting the points as
     stated. Make sure you extend the lines to the edges of the graph.
b) Calculate the slope of each of the lines
c) Classify the lines as *parallel, perpendicular (meet at 90°)*, or
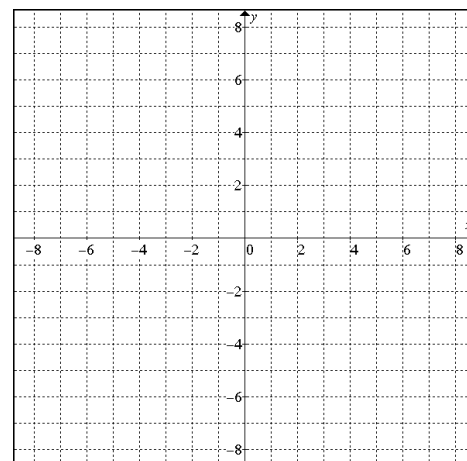   *neither*.

1. Points: $A(3,2), B(6,4), C(-8,-2), D(-2,2)$.
     Lines: AB and CD.

> $m_{AB} =$ $m_{CD} =$
>
> The lines are _____
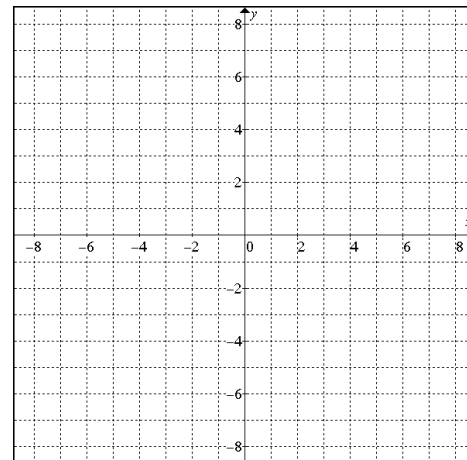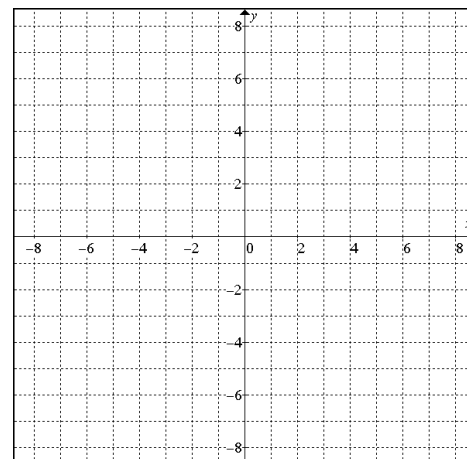
2. Points: $A(3,2), D(-2,2), F(4,-1), I(1,-2)$.
     Lines: AI and DF.

> $m_{AI} =$ $m_{DF} =$
>
> The lines are _____

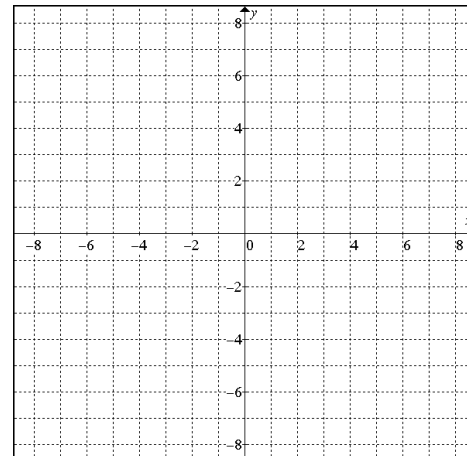3. Points: $A(3,2), B(6,4), E(8,1), G(-4,6)$.
     Lines: AE and BG.

> $m_{AE} =$ $m_{BG} =$
>
> The lines are _____
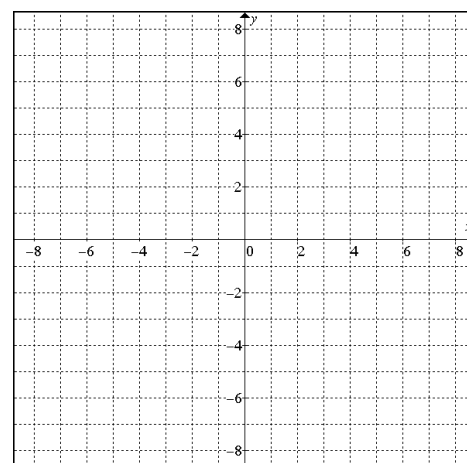
4. Points: $A(3,2), D(-2,2), G(5,-1), H(6,-3)$.
    Lines: AH and DG.

    > $m_{AH} =$ $m_{DG} =$
    >
    > The lines are _____
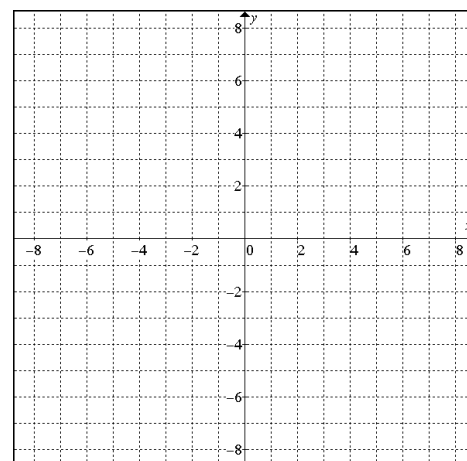
5. Points: $A(3,2)$, $E(8,1), J(6,4), K(4,7)$.
    Lines: AJ and EK.

    > $m_{AJ} =$ $m_{EK} =$
    >
    > The lines are _____

6. Points: $B(-2,-2), C(0,6), D(5,7), E(2,-5)$.
    Lines: BC and DE.

    > $m_{BC} =$ $m_{DE} =$
    >
    > The lines are _____

By comparing the slopes of the pairs of lines that were parallel, develop a rule for the slopes of parallel lines.

If lines are parallel, then _____

By comparing the slopes of the pairs of lines that were perpendicular, develop a rule for the slopes of perpendicular lines.

If lines are perpendicular, then _____

7. Determine if the following lines are parallel, perpendicular, or neither by placing the symbols $\parallel$, $\perp$, or N beside each pair of equations.

a) $y = 5x, y = 5x + 3$ _____

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

c) $y = \frac{2}{3}x - 2, y = \frac{3}{2}x - 2$ _____

d) $y = \frac{4}{3}x - 5, y = \frac{4}{3}x + \frac{1}{5}$ _____
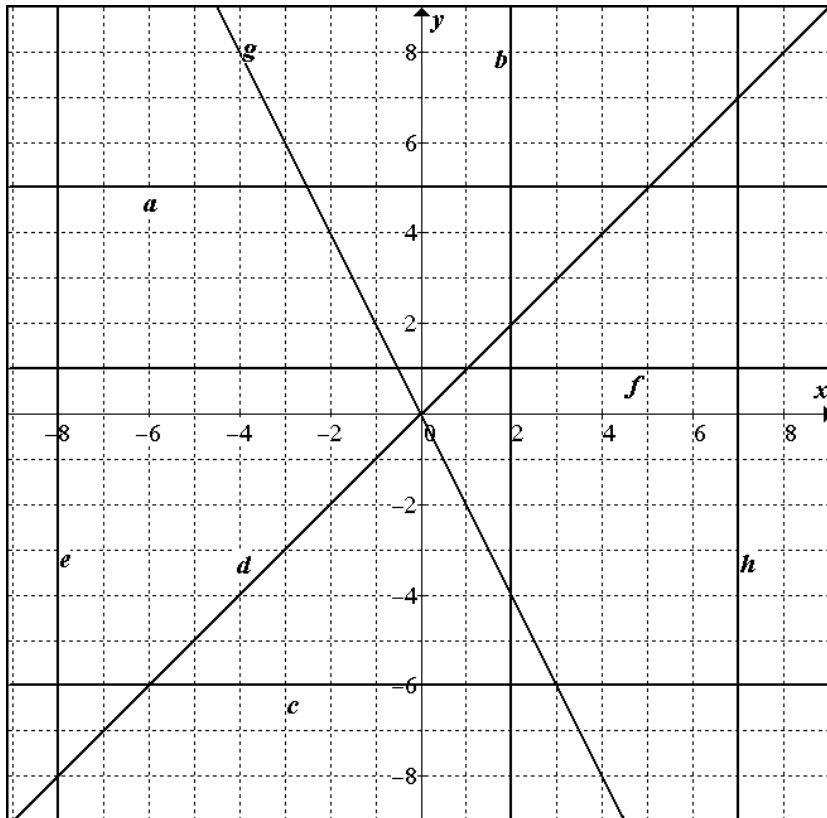
e) $y = -\frac{2}{5}x + \frac{5}{2}, y = -\frac{5}{2}x - \frac{2}{5}$ _____

f) $y = -\frac{4}{7}x - \frac{4}{7}, y = \frac{7}{4}x - \frac{4}{7}$ _____

g) $y = x + 2, y = 2x - \frac{1}{2}$ _____

h) $y = \frac{5}{4}x, y = x + \frac{5}{4}$ _____

i) $y = -\frac{6}{5}x + 4, y = \frac{5}{6}x + 4$ _____

j) $y = \frac{5}{2}x, y = -\frac{2}{5}x + \frac{5}{2}$ _____

k) $y = 3x - \frac{1}{3}, y = 3x + 3$ _____

l) $y = -x, y = x - 1$ _____

8. State the equation of the labelled lines in the graph.

a) _____

b) _____

c) _____

d) _____

e) _____

f) _____

g) _____

h) _____

9. Determine if the following lines are horizontal, vertical, or neither.

   a) $y = 1$ _____   b) $x = 1$ _____   c) $y = -4$ _____

   d) $y = \frac{5}{3}$ _____   e) $x = -\frac{3}{2}$ _____   f) $y = \frac{2}{3}x + 2$ _____

   g) $x = -8$ _____   h) $y = x$ _____   i) $y = 3x$ _____

10. Determine if the following lines are parallel, perpendicular, or neither.

   a) $y = 5, y = 2$ _____   b) $y = 3, y = -\frac{1}{3}$ _____   c) $y = 5, x = 1$ _____

   d) $x = 3, y = 3$ _____   e) $y = 5, x = 9$ _____   f) $x = \frac{3}{2}, x = -\frac{2}{3}$ _____

   g) $x = \frac{1}{2}, x = -\frac{1}{2}$ _____   h) $y = \frac{4}{3}, x = -\frac{3}{4}$ _____   i) $y = \frac{5}{3}, y = -\frac{3}{5}$ _____

   j) $y = \frac{7}{3}, x = \frac{7}{3}$ _____   k) $x = \frac{3}{4}, y = -\frac{3}{4}$ _____   l) $x = 5, y = 7$ _____

11. Determine if the following lines are parallel, perpendicular, or neither.

   a) $y = 2x , y = 3x$ _____   b) $y = \frac{1}{3}x , y = -3x$ _____   c) $x = \frac{3}{10} , x = -\frac{10}{3}$ _____

   d) $y = x , y = -x$ _____   e) $y = 2 , y = 3$ _____   f) $x = 2 , y = 2$ _____

   g) $y = 2x , y = 2$ _____   h) $y = \frac{1}{2} , x = \frac{1}{2}$ _____   i) $y = \frac{2}{3}x , y = -\frac{3}{2}$ _____

   j) $y = -\frac{2}{3}x , y = \frac{3}{2}x$ _____   k) $y = x , y = 2x$ _____   l) $y = 2x , y = -2x$ _____

Selected Answers:

1. $m_{AB} = \frac{2}{3}, m_{CD} = \frac{2}{3}$ 2. $m_{AI} = 2, m_{DF} = -\frac{1}{2}$ 3. $m_{AE} = -\frac{1}{5}, m_{BG} = -\frac{1}{5}$

4. $m_{AH} = -\frac{5}{3}, m_{DG} = -\frac{3}{7}$ 5. $m_{AJ} = \frac{2}{3}, m_{EK} = -\frac{3}{2}$ 6. $m_{BC} = 4, m_{DE} = 4$

7. a) ‖   b) ⊥   c) N   d) ‖   e) N   f) ⊥
    g) N   h) N   i) ⊥   j) ⊥   k) ‖   l) ⊥

8. a) $y = 5$ b) $x = 2$ c) $y = -6$ d) $y = x$
    e) $x = -8$ f) $y = 1$ g) $y = -2x$ h) $x = 7$

9. a) H   b) V   c) H   d) H   e) V   f) N   g) V   h) N   i) N

10. a) ‖   b) ‖   c) ⊥   d) ⊥   e) ⊥   f) ‖
    g) ‖   h) ⊥   i) ‖   j) ⊥   k) ⊥   l) ⊥

11. a) N   b) ⊥   c) ‖   d) ⊥   e) ‖   f) ⊥
    g) N   h) ⊥   i) N   j) ⊥   k) N   l) N