Lines

Problem Set 4

1. Read of the gradient and y-intercept of the following lines, and draw a quick sketch without plotting points.

   (a) $y = 2x + 5$
   (b) $y = 2x - 5$
   (c) $y = 4x + 1$
   (d) $y = 1 - 4x$
   (e) $y = x - 3$
   (f) $y = -x - 3$

2. Find the slope of the line passing through the two points

   (a) (5,3)and (8,12)
   (b) (3,-4) and (-5,6)
   (c) (1,5) and (4,5)
   (d) (2,3) and (2,7)

3. Find the equation of each of the lines described in the previous question.

4. Use the point-slope equation of a line to do the following questions.

   (a) Find the equation of the straight line passing through (2,-1) with slope 3.
   (b) Find the equation of the straight line passing through (6,-2) and (9,4).

5. Sketch the graph of the equation $2x - 3y - 12 = 0$.

6. Find the x and y intercepts of the following lines and then sketch them.

   (a) $3x - 5y + 30 = 0$
   (b) $4x + 5y = 10$

7. Find the equation of the line passing through the point (5,3) and parallel to the line $2x + 5y = 7$.

8. Find the equation of the line passing through the point (5,3) and perpendicular to the line $2x+5y = 7$.

9. Find the equation of the following lines given:

   (a) The line is horizontal and passes through $(\frac{2}{3}, \frac{3}{4})$
   (b) The line has slope -0.3 and passes through (1,1).
   (c) The line has x-intercept 7 and slope -4.
   (d) The line is parallel to $y = 3 - 2x$ and passes through the origin.
   (e) The line is perpendicular to $3x - 5y = 7$ and passes through $(\frac{-5}{2}, \frac{8}{3})$.

10. Find the points of intersection for the following pairs of lines.

    (a) $y = 2x - 1$ and $y = 3x + 3$
    (b) $x + 2y = 3$ and $2x - y = 6$
    (c) $x + 2y = 3$ and $2x + 4y = 1$
    (d) $x + 2y = 3$ and $2x + 4y = 6$

11. For each pair of points, find the distance between them and the midpoint of the line joining them.

    (a) (1,3) and (7,10)

    (b) (-1,2) and (3,6)

    (c) (-2,3) and (-4,-3)

12. Find the value of the missing coordinate(s) y so that the point (4,y) is 10 units from the point (-2,-1).

13. At 7pm the temperature is 24 degrees Celsius. At 10pm the temperature has dropped to 16 degrees Celsius. Find the average rate of change in the temperature.

14. Scientists believe that the average surface temperature of the world has been rising steadily. The average surface temperature can be modelled by $T = 0.02t + 15$ where T is the temperature in Celsius and t is years since 1950.

    (a) What do the slope and T-intercept represent?

    (b) Use the equation to predict the average global temperature in 2050.

15. A manufacturing company to produces toasters. The production cost is $3000 plus $6 per toaster.

    (a) Find a formula for the total cost in terms of the number of toasters.

    (b) Sketch the graph of this equation.

    (c) Explain the significance of the slope and y-intercept.

    (d) How many toasters would need to be produced so that the total cost is $6000.

Ans: 9a)$y = \frac{3}{4}$, b)$y = -\frac{3}{10}x + \frac{13}{10}$, c)$y = -4x + 28$, d)$y = -2x$, e)$y = -\frac{5}{3}x - \frac{3}{2}$