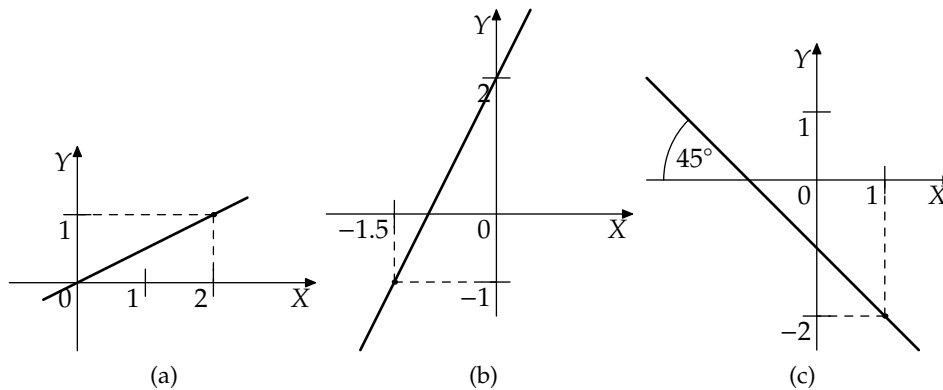


## Equation of a line

1. Sketch the graphs of the following functions:

- (a)  $y = 2x + 3$ ;
- (b)  $y = -x + 1$ ;
- (c)  $y = 0.5x - 0.5$ ;
- (d)  $y = 5x - 8$ ;
- (e)  $y = -\frac{1}{3}x + \frac{2}{3}$ ;
- (f)  $y = -3$ ;
- (g)  $y = 200x - 300$ ;
- (h)  $y = 0.001x + 50$ .

2. Find the equations of the following lines:



Represent them in the form  $ax + by + c = 0$ , where  $a, b, c \in \mathbb{Z}$ .

3. Write down the equation of the straight line passing through the points  $A$  and  $B$  in both the gradient-intercept form and in the form  $ax + by + c = 0$  with  $a, b, c$  integer.

- (a)  $A = (0, 2)$ ,  $B = (3, 0)$ ;
- (b)  $A = (-1, 3)$ ,  $B = (2, 1)$ ;
- (c)  $A = (5, -4)$ ,  $B = (-1, -4)$ ;
- (d)  $A = (-\frac{1}{2}, \frac{3}{4})$ ,  $B = (\frac{3}{4}, \frac{3}{2})$ ;
- (e)  $A = (-2.5, 0.5)$ ,  $B = (1.5, 1)$ ;
- (f)  $A = (3, -2)$ ,  $B = (3, 1)$ .

4. Find the equation of the line passing through the point  $C$  and having the gradient equal to  $m$ . Write it down in the gradient-intercept form and in the form  $ax + by + c = 0$  with  $a, b, c \in \mathbb{Z}$ .

- (a)  $C = (1, 2)$ ,  $m = 1$ ;
- (b)  $C = (1, 2)$ ,  $m = -1$ ;
- (c)  $C = (-1, 3)$ ,  $m = 2$ ;
- (d)  $C = (0, 0)$ ,  $m = 0$ ;
- (e)  $C = (3, -1)$ ,  $m = -\frac{1}{2}$ ;
- (f)  $C = (3.81, 2.32)$ ,  $m = 0$ .

5. Find the equation of a straight line with  $Y$ -intercept  $n$  and passing through the point  $D$ . Represent them in the form  $ax + by + c = 0$  for  $a, b, c \in \mathbb{Z}$  and in the gradient-intercept form.
- $n = 3, D = (1, 2)$ ;
  - $n = 0, D = (5, 3)$ ;
  - $n = -\frac{1}{2}, D = (2, -1)$ ;
  - $n = 3, D = (-1, 3)$ ;
  - $n = 2, D = (0, 5)$ ;
  - $n = -2.5, D = (1, 1.5)$ .
6. Find the equation of a line with  $X$ -intercept  $a$  and  $Y$ -intercept  $b$  and write it down in gradient-intercept form and in the form  $Ax + By + C = 0$  with  $A, B, C$  integer.
- $a = 2, b = 4$ ;
  - $a = -1, b = 2$ ;
  - $a = 0, b = 1.5$ ;
  - $a = 3, b = \frac{1}{2}$ ;
  - $a = 1, b = 0$ ;
  - $a = b = 0$ .
7. State with a reason of the two lines given are perpendicular or parallel.
- $k: y = 2x - 3, l: y = 3x - 2$ ;
  - $k: y = -x + 1, l: y = x - 2$ ;
  - $m: y = 3x - 3, p: y = 3x + \frac{1}{3}$ ;
  - $p: y = 3x - 3, q: y = \frac{1}{3}x + 2$ ;
  - $a: 2x - y + 4 = 0, b: -4x + 2y + 8 = 0$ ;
  - $s: 2x + 3y + 4 = 0, t: 6x - 4y - 2 = 0$ .
8. Given a point  $P$  and a line  $k$ , find the equations of the lines:  $l$ , perpendicular to  $k$  and passing through  $P$ , and  $m$ , parallel to  $k$  and passing through  $P$ .
- $k: y = x + 2, P = (3, 1)$ ;
  - $k: y = -2x + 3, P = (0, 0)$ ;
  - $k: y = \frac{1}{3}x - \frac{2}{3}, P = (11, 3)$ ;
  - $k: 2x - y + 1 = 0, P = (1, 3)$ ;
  - $k: -x + 2 = 0, P = (3, 1)$ ;
  - $k: y = 3, P = (1, 0)$ .
9. Write down the following line equations in the form  $ax + by + c = 0$ , where  $a, b, c \in \mathbb{Z}$ , or state with a reason that it is impossible.
- $y = 2x - 1.5$ ;
  - $y = \frac{1}{8}x + \frac{1}{4}$ ;
  - $y = -4x + 2.5$ ;
  - $y = 5x - 25$ ;
  - $y = 3$ ;
  - $y = 3.3x + 2.1$ ;
  - $y = 3x + \sqrt{2}$ .

10. Write down the following line equations in the gradient-intercept form.
- (a)  $3x - 5y + 2 = 0$ ;
  - (b)  $x\sqrt{2} + y\sqrt{3} + \sqrt{5} = 0$ ;
  - (c)  $-\frac{1}{2}x + \frac{2}{3}y + \frac{3}{7} = 0$ ;
  - (d)  $x + y = 0$ .
11. Two lines,  $p$  and  $q$ , have equations:  $p: y = (m - 2)x + m$ ,  $q: y = -mx + 2m^2$ , where  $m \in \mathbb{R}$  is a constant. For what values of  $m$  are they parallel or perpendicular?
12. Prove that a line with  $X$ -intercept  $a$  and  $Y$ -intercept  $b$ , where  $a, b \neq 0$ , has an equation of the form

$$\frac{x}{a} + \frac{y}{b} = 1.$$

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