1 Linear equations

1. (i) The equation of the straight line has the form $y = mx + c$, where $m = \frac{rise}{run}$, taking the points $(-2, 4)$ and $(4, 1)$ we have

$$m = \frac{4-1}{-2-4} = \frac{3}{-6} = -\frac{1}{2},$$

then $y = -\frac{1}{2}x + c$. Since $(4, 1)$ is a point on the line, when $x = 4$ we have $y = 1$, substituting in the equation $y = -\frac{1}{2}x + c$ we obtain $1 = -\frac{1}{2} \times 4 + c$, which implies that $c = 3$.

Hence, the required equation is $y = -\frac{1}{2}x + 3$.

(ii) Since the gradient is $m = 2$ and the point $(-2, -3)$ belong to the line, we have that $y = 2x+c$ must be satisfied for $x = -2$ and $y = -3$, substituting $-3 = 2 \times (-2) + c$, then $c = -3 + 4 = 1$.

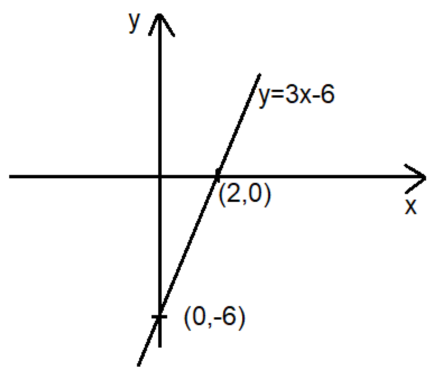
Hence, the required equation is $y = 2x + 1$.

2. Given the equation $y = 3x - 6$, first we obtain the interceptions with the axis.

When $x = 0$ we have $y = 3 \times 0 - 6 \implies y = -6$ (y-intercept).

When $y = 0$ we have $0 = 3x - 6 \implies 3x = 6 \implies x = 2$ (x-intercept).

Hence the sketch



3. (i) Follow the ideas of the question 1(i).

$$m = \frac{4-1}{-2-(-1)} = \frac{3}{-2+1} = -3$$

Now using that the point $(-1, 1)$ belongs to the line, we have $y = -3x + c$ must be satisfied for $x = -1$ and $y = 1$. Then $1 = -3 \times (-1) + c \implies 1 = 3 + c \implies c = -2$.

Hence, the required equation is $y = -3x - 2$.

(ii) Follow the ideas of the question 1(ii). The equations is $y = 5x + c$, substituting $(-2, 4)$, i.e., $x = -2$ and $y = 4$, we have $4 = 5 \times (-2) + c \implies c = 4 + 10 = 14$.

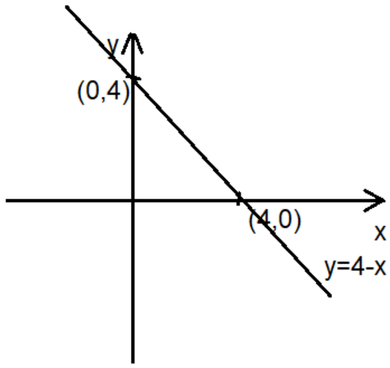
Hence, the required equation is $y = 5x + 14$.

4. Given the equation $y = 4 - x$.

When $x = 0$ we have $y = 4 - 0 \implies y = 4$ (y-intercept).

When $y = 0$ we have $0 = 4 - x \implies x = 4$ (x-intercept).

Hence the sketch


y
(0,4)
(4,0)
x
y=4-x