48. $y = x(x-3)^2$ decreases for the values of x given by

(a) $1 < x < 3$ (b) $x < 0$ (c) $x > 0$ (d) $0 < x < \dfrac{3}{2}$

Sol. (a) We have, $y = x(x-3)^2$

$$\therefore \qquad \frac{dy}{dx} = x \cdot 2(x-3) + (x-3)^2 \cdot 1$$

$$= 2x^2 - 6x + x^2 + 9 - 6x = 3x^2 - 12x + 9 = 3(x-3)(x-1)$$

$y = f(x)$ decreases when $\dfrac{dy}{dx} < 0$

The sign scheme of $\dfrac{dy}{dx}$ is as shown in the following figure.

From the singe scheme $\dfrac{dy}{dx} < 0$ for $x \in (1, 3)$