

(1) In die sketsgrafiek is:

$$f(x) = -x^2 + 2x + 8 \quad \text{en} \quad g(x) = x - 4$$

(a) Bepaal die lengte van:

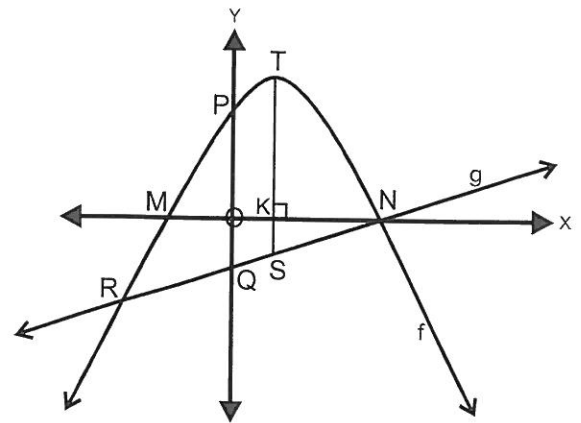
- (i) MN
- (ii) PQ
- (iii) OK en TS

(b) Bereken die koördinate van R.

(c) Skryf die koördinate van die draaipunt van $f(x - 2)$ neer.

(d) $h(x)$ is die refleksie van $f(x)$ in die y -as. Skryf die vergelyking van h neer.

(e) Bereken die gemiddelde gradiënt van $f(x)$ tussen $x = 3$ en $x = 5$.



(a)(i) M en N is die x -afsnitte van f . ($\therefore y = 0$)

$$\therefore 0 = -x^2 + 2x + 8$$

$$0 = x^2 - 2x - 8$$

$$0 = (x - 4)(x + 2)$$

$$x = 4 \quad \text{of} \quad x = -2$$

$$N(4; 0) \quad M(-2; 0)$$

$$\therefore ON = 4 \quad \text{en} \quad OM = 2$$

$$\therefore MN = 4 + 2 = 6$$

(ii) P en Q is die y -afsnitte van f en g .

$$\therefore P(0; 8) \quad \text{en} \quad Q(0; -4)$$

$$\therefore OP = 8 \quad \text{en} \quad OQ = 4$$

$$\therefore PQ = 8 + 4$$

$$= 12$$

(iii) T is die draaipunt van T .

$\therefore$ Vir simmetrie-as : $y = -x^2 + 2x + 8$

$$x = \frac{-b}{2a}$$

$$= \frac{-2}{2(-1)}$$

$$x = \frac{-2}{-2} = 1$$

$$\text{of } x = \frac{x_1 + x_2}{2}$$

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

$$x = \frac{2}{2} = 1$$

$$\therefore OK = 1$$

$$\text{en } y = -(1)^2 + 2(1) + 8 = -1 + 2 + 8 = 9$$

$$\therefore TK = 9$$

$$\text{Vir KS : } x = 1 \text{ in } g(x) = y = x - 4$$

$$\therefore y = 1 - 4 = -3$$

$$\therefore KS = 3$$

$$\therefore TS = 9 + 3 = 12$$

(b) R en N is die sny punte van f en g :

$$\therefore -x^2 + 2x + 8 = x - 4$$

$$0 = x - 4 + x^2 - 2x - 8$$

$$0 = x^2 - x - 12$$

$$0 = (x - 4)(x + 3)$$

$$\swarrow x = 4 \quad \text{of} \quad x = -3$$

$$N(4; 0)$$

$$\therefore y = x - 4$$

$$y = -3 - 4$$

$$y = -7$$

$$\therefore R(-3; -7)$$

(c) $f(x-2)$ skuif 2 eenhede na regs

$\therefore$ as f se DP $(1;9)$ is sal

$f(x-2)$ se DP $(1+2;9)$ wees.

$\therefore$ DP $(3;9)$

(d) Refleksie in y -as: $f(x) \rightarrow f(-x)$

$$\therefore h(x) = f(-x) = -(-x)^2 + 2(-x) + 8$$

$$\therefore h(x) = -x^2 - 2x + 8$$

$$(e) f(x) = -x^2 + 2x + 8$$

$$\therefore f(3) = -(3)^2 + 2(3) + 8$$

$$f(3) = -9 + 6 + 8 = 5 \quad \therefore (x_1, y_1)$$

$$f(5) = -(5)^2 + 2(5) + 8$$

$$f(5) = -25 + 10 + 8 = -7 \quad \therefore (x_2, y_2)$$

$$\therefore GG = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-7 - 5}{5 - 3}$$

$$= \frac{-12}{2}$$

$$GG = -6$$

(2) In die sketsgrafiek is $p(x) = -2^{-x} + 1$

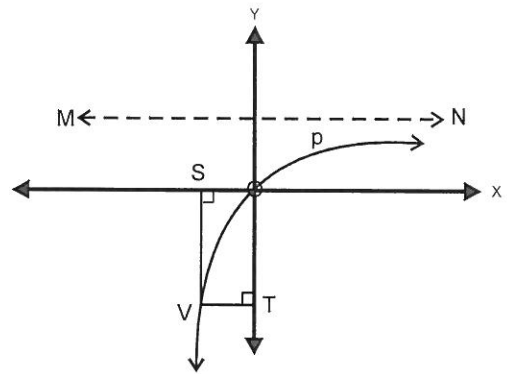
(a) Skryf die vergelyking neer van MN.

(b) Bereken die lengte van SV as $VT = 1$.

(c) Bepaal die vergelyking van $q(x)$ as $q(x)$ die spieëlbeeld is van p in die y -as.

(d) Bepaal die vergelyking van $h(x)$ as $h(x)$ die grafiek van p is wat 2 eenhede op skuif.

(e) Skryf die waardeversameling van p neer.



(a) $MN: y = 1$

(b) $VT = 1 \rightarrow x = -1$

$$\begin{aligned} \therefore y &= p(-1) = -2^{-(-1)} + 1 \\ &= -2^1 + 1 \\ &= -2 + 1 \end{aligned}$$

$$p(-1) = -1$$

$$\therefore SV = 1$$

(c) Refleksie in y -as $\rightarrow q(x) = p(-x)$

$$\therefore q(x) = -2^{-(-x)} + 1$$

$$\therefore q(x) = -2^x + 1$$

(d) $h(x) = p(x) + 2$

$$= -2^{-x} + 1 + 2$$

$$\therefore h(x) = -2^{-x} + 3$$

(e) $w_p: y < 1$