UNIT 13 :
Maximum/Minimum Value of a Quadratic Function

Level 1

1 The minimum value of $y = (x-2)^2 + 1$ occurs at $x =$

A -2 B -1 C 0 D 1 E 2

2 The maximum value of $y = 3 - \dfrac{(x-1)^2}{2}$ is

A 3 B $\dfrac{5}{2}$ C 2 D 1 E $\dfrac{1}{2}$

3 The function $f(x) = (ax-1)^2 + b$ has a minimum value of -1 at $x = 2$. Find the values of a and b.

A $a = -2,\ b = -1$

B $a = -1,\ b = -2$

C $a = -1,\ b = \dfrac{1}{2}$

D $a = \dfrac{1}{2},\ b = -1$

E $a = \dfrac{1}{2},\ b = -2$

[4] If $y = -2x^2 + x - 3$, the maximum value of y is

A $\dfrac{23}{8}$ B $-\dfrac{47}{16}$ C $-\dfrac{49}{16}$ D $-\dfrac{23}{8}$ E $-\dfrac{25}{8}$

[5] The function $f(x) = (x-1)(x-2)$ attains its minimum value at $x =$

A 2 B $\dfrac{3}{2}$ C 1 D 0 E $-\dfrac{1}{2}$

[6] The minimum value of $y = x^2 + ax + b$ occurs at $x = -2$. $a =$

A -4

B -1

C 1

D 4

E Cannot be determined.

Level 2

[7] Given the function $f(x) = ax^2 + bx$. If $f(-1) = -3$ and the maximum value of $f(x)$ is 1, find the values of a and b.

A $a = -9,\ b = -6$

B $a = -1,\ b = -6$

C $a = -1,\ b = 2$

D $a = -1,\ b = -6$ or $a = -9,\ b = 2$

E $a = -1,\ b = 2$ or $a = -9,\ b = -6$

[8] The maximum/minimum value of the function $f(x) = \dfrac{1}{x^2 - 2x + 2}$ is

A -1 (maximum)

B -1 (minimum)

C 1 (maximum)

D 1 (minimum)

E 2 (minimum)

[9] When $y = (x^2 - 1)(x^2 -$ [illegible] eaches its minimum value, the value(s) of x is/are

A 0

B $\sqrt{\dfrac{5}{2}}$

C $\pm\sqrt{\dfrac{5}{2}}$

D $\pm\dfrac{5}{2}$

E 0 or $\pm\sqrt{\dfrac{5}{2}}$

[10] Find the maximum/minimum value of $y = 2 - \dfrac{4}{x^2 - 4x + 8}$.

A -2 (minimum)

B 1 (minimum)

C 2 (maximum)

D 1 (maximum)

E -2 (minimum)

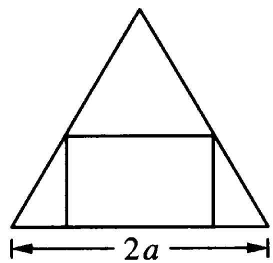
[11] The minimum value of $y = x^2 + ax + b$ is $a^2 \cdot b =$

A $-\dfrac{a^4}{4}$ B $-\dfrac{a}{2}$ C a^2 D $\dfrac{3a^2}{4}$ E $\dfrac{5a^2}{4}$

[12] The difference between two numbers is 6. Find their m[illegible]num product.

A -9 B -6 C -3 D 0 E 3

[13] A rectangle is inscribed in an equilateral triangle of side $2a$, as shown in the figure. Find the maximum area of the rectangle.



A $\frac{a}{2}$

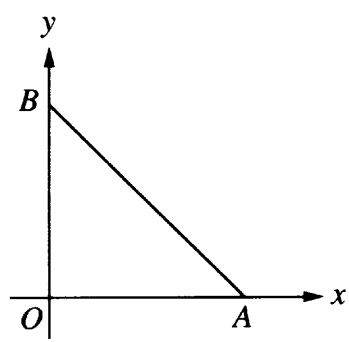
B $\frac{a^2}{4}$

C $\frac{\sqrt{3}a^2}{2}$

D $\frac{\sqrt{3}a^2}{4}$

E $\frac{\sqrt{3}a^2}{8}$

[14] In the figure, A and B are two variable points on the x-axis and y-axis respectively. Let $AB = 10$. Find the maximum area of ΔOAB.



A 15

B 25

C 50

D 100

E 625

[15] The minimum value of $y = (a-x)^2 + (b-x)^2$ occurs at $x =$

A a B b C $\frac{a+b}{2}$ D $a+b$ E $\frac{a-b}{2}$