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QUESTION 1

Drag and drop the correct answer into the space(s) provided.

A product costs AED 36 to be made. The cost of making the product is decreasing at a rate of AED 1 per year. The total number of products made will be 50,000, and the number of items made is increasing at a rate of 40 per year. At what rate is the total cost changing? Is the cost increasing or decreasing?

Total cost,

$T(x)$

$=$

number of items produced

$\times$

cost to make each item. Where x is the number of years.

$=$

$(50,000 + 40x)(36 - x)$ ✓

$T'(x) =$

40 ✓

$(36 - x)$

$+$

(-1) ✓

$(50,000 + 40x)$

$T'(0) =$

$-48,560$ ✓

The rate of change is AED $-48,560$ per year ✓. So, the cost is decreasing ✓.

AED $48,560$ per year

$(50,000-40x)(36+x)$

increasing

$48,560$

1

36

QUESTION 2

Drag and drop the correct answer into the space(s) provided.

A product costs AED 6 to be made. The cost of making the product is increasing at a rate of AED 2 per year. The total number of products made will be 760, but the number of items made is decreasing at a rate of 20 per year. At what rate is the total cost changing? Is the cost increasing or decreasing?

Total cost,

$T(x)$

$=$

number of items produced

$\times$

cost to make each item. Where x is the number of years.

$=$

$(760-20x)(6+2x)$ ✓

$T'(x) =$

-20 ✓

$(6 + 2x)$

$+$

2 ✓

$(760 - 20x)$

$T'(0) =$

1400 ✓

The rate of change is AED 1,400 per year ✓. So, the cost is increasing ✓.

decreasing | AED -1400 per year | -1400 | -2 | 20

$(760 + 20x)(6 - 2x)$

QUESTION 3

Drag and drop the correct answer into the space(s) provided.

The depth in meters of a man-made lake is given by the function

$$d(x) = \frac{2x^3 - 25x^2 + 98x - 130}{2x^2 - 17x + 30}$$

, where

x

is the number of years since it was completed. Compute

$d'(x)$

and compare and interpret

$d'(7)$

and

$d'(10)$

.

Both rates of change are positive ✓ for 7 and 10 years after completion, so the depth was increasing ✓ at those times. Since

$d'(7)$

$>$ ✓

$d'(10)$

, the depth was increasing at a greater rate ✓ 7 years after completion than 10 years.

increasing at a lesser rate | decreasing at a lesser rate | negative

$<$ | decreasing | decreasing at a greater rate

QUESTION 4

Drag and drop the correct answer into the space(s) provided.

The depth in centimeters of a harbor is given by the function

$$d(x) = \frac{x^3 - 13x^2 + 46x + 2}{x^2 - 5x + 6}$$

, where

x

is the number of years since it was restored. Compute

$d'(x)$

and compare and interpret

$d'(4)$

and

$d'(8)$

.

After 4 years of restoration, the rate of change is [negative ✓], so the depth is [decreasing ✓]. After 8 years of restoration, the rate of change is [positive ✓], so the depth is [increasing ✓]. So after the restoration, the depth of the harbor [increases and decreases ✓].

does not change | constant

QUESTION 5

Drag and drop the correct answer into the space(s) provided.

The depth in centimeters of a garden pond is given by the function

$$d(x) = \frac{2x^3 - 33x^2 + 136x + 10}{2x^2 - 21x + 10}$$

, where

x

is the number of years since it was completed. Compute

$d'(x)$

and compare and interpret

$d'(12)$

and

$d'(15)$

.

Both rates of change are [positive ✓] for 12 and 15 years after completion, so the depth was [increasing ✓] at those times. Since

$d'(12)$

[< ✓]

$d'(15)$

, the depth was [increasing at a lesser rate ✓] 12 years after completion than 15 years after completion.

decreasing at a lesser rate | decreasing at a greater rate | increasing at a greater rate | > | decreasing | negative

QUESTION 6

Fill in the blank(s) with the correct answer.

The position in centimeters of an object from a given point is given by the function

$$p(x) = \frac{-4x^4 + 6x^3}{x^2 + 5}$$

, where

x

is the number of seconds since the object has been in motion. Compute

$p'(2)$

and

$p'(5)$

. *Round to the nearest whole number.*

Since

$p'(2) \approx$

-5 ✓ and

$p'(5) \approx$

-32 ✓, the object is moving faster at

5 ✓ seconds than at 2 ✓

seconds toward its initial position.

QUESTION 7

Fill in the blank(s) with the correct answer.

The position in centimeters of an object from a given point is given by the function

$$p(x) = \frac{-x^4 + 5x^3}{x^2 - 2}$$

, where

x

is the number of seconds since the object has been in motion. Compute

$p'(2)$

and

$p'(4)$

. *Round to the nearest whole number.*

Since

$p'(2) \approx$

-10 ✓ and

$p'(4) \approx$

-4 ✓ , the object is moving faster at

2 ✓ seconds than at 4 ✓

seconds toward its initial position.

QUESTION 8

Fill in the blank(s) with the correct answer.

The position in centimeters of an object from a given point is given by the function

$$p(x) = \frac{-2x^4 + 8x^3}{4x^2 + 6}$$

, where

x

is the number of seconds since the object has been in motion. Compute

$p'(1)$

and

$p'(3)$

. *Round to the nearest hundredth.*

Since

$p'(1) \approx$

1.12 ✓ and

$p'(3) \approx$

-0.73 ✓, the object is moving faster at

1 ✓ second(s) than at 3 ✓

second(s). At 1 ✓ second(s), the object is moving away from

its initial position, and at 3 ✓ second(s), it is moving toward

its initial position.

QUESTION 9

Fill in the blank(s) with the correct answer.

A product costs AED 60 to be made. The cost of making the product is decreasing at a rate of AED 2 per year. The total number of products made will be 200,000, and the number of items made is increasing at a rate of 900 per year. At what rate is the total cost changing?

Total cost,

$T(x)$

=

number of items produced

×

cost to make each item. Where x is the number of years.

The rate of change is AED -346,000 ✓ per year.

QUESTION 10

Fill in the blank(s) with the correct answer.

A product costs AED 24 to be made. The cost of making the product is increasing at a rate of AED 6 per year. The total number of products made will be 90,000, and the number of items made is increasing at a rate of 100 per year. At what rate is the total cost changing?

Total cost,

$T(x)$

=

number of items produced

×

cost to make each item. Where x is the number of years.

The rate of change is AED 542,400 ✓ per year.

QUESTION 11

Choose the correct answer from the drop-down menu.

A product costs AED 45 to make. The cost of making the product is decreasing at a rate of AED 1 per year. The total number of products made will be 36,000, and the number of items made is

increasing at a rate of 50 per year. At what rate is the total cost changing? Is the cost increasing or decreasing?

Total cost,

$T(x)$

$=$

number of items produced

$\times$

cost to make each item

$T'(x) =$

$50(45 - x)$ ✓

$+$

$(-1)(36,000 + 50x)$ ✓

$T'(0) =$

$-33,750$ ✓

The rate of change is decreasing at AED $-33,750$ ✓ per year.

QUESTION 12

Choose the correct answer from the drop-down menu.

The price in AED of a popular shirt is given by the function

$$p(x) = \frac{-x^3 + 40x^2 - 1600x + 64,000}{1000 - 25x}$$

, where

x

is the number of years it has been on the market. Compute

$p'(8)$

and

$p'(12)$

.

$p'(8)$

and

$p'(12)$

indicate an increase in the price but at different ✓ rate(s).

QUESTION 13

Choose the correct answer from the drop-down menu.

The price in AED of a popular piece of jewelry is given by the function

$$p(x) = \frac{-24x^2 - 200x + 50,000}{500 - 12x}$$

, where

x

is the number of years it has been on the market. Compute

$p'(5)$

and

$p'(10)$

.

$p'(5)$

and

$p'(10)$

indicate [an increase in the price at the same ✓] rate(s).

QUESTION 14

Choose the correct answer from the drop-down menu.

The price in AED of a popular electronic gadget is given by the function

$$p(x) = \frac{-2.5x^3 - 300x^2 - 10,000x + 1,200,000}{6000 - 50x}$$

, where

x

is the number of years it has been on the market. Compute

$p'(9)$

and

$p'(15)$

.

$p'(9)$

and

$p'(15)$

indicate [a decrease in the price but at different ✓] rate(s).

QUESTION 15

Choose the correct answer from the drop-down menu.

A product costs AED 12 to be made. The cost of making the product is increasing at a rate of AED 4 per year. The total number of products made will be 25,000, and the number of items made is increasing at a rate of 100 per year. At what rate is the total cost changing? Is the cost increasing or decreasing?

Total cost,

$T(x)$

$=$

number of items produced

$\times$

cost to make each item. Where x is the number of years.

$T'(x) =$

$100\,(12 + 4x)$ ✓

$+$

$4(25,000 + 100\,x)$ ✓

$T'(0) =$

$101,200$ ✓

The rate of change is increasing at AED $101,200$ ✓ per year.