A farmer wishes to enclose a rectangular garden with 100 metres of fencing.

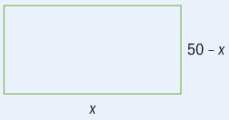
a If the garden is x metres wide, find the length and the area of the garden in terms of x.

b Find the width of a garden with an area of 525 m^2.

c Find the maximum area the garden can have.

Answers

a



length $= 50 - x$

area $= x(50 - x)$

Area = width × length

Set the area equal to 525.

b $x(50 - x) = 525$

$50x - x^2 = 525$

$x^2 - 50x + 525 = 0$

$(x - 15)(x - 35) = 0$

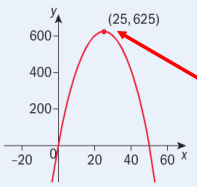
Write as a quadratic equation in standard form, and solve for x.

You could also solve this equation by completing the square, or by using the quadratic formula, or by using your GDC.

$x = 15$ m *or* 35 m

If the width is 15, the length is 35.
If the width is 35, the length is 15.

c



The maximum area is 625 m^2.

The easiest way to find the maximum area is to graph the function $y = x(50 - x)$, where y is the area and x is the width. You can do this on your GDC. See Chapter 17 Section 1.6.

The vertex (25, 625) is the highest point on the graph, and tells you the maximum area occurs when the width of the garden is 25 metres.

Sep 29-12:13 PM

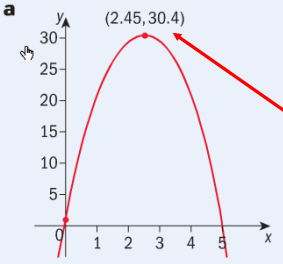
The height of a ball t seconds after it is thrown is modeled by the function $h = 24t - 4.9t^2 + 1$, where h is the height of the ball in metres.

a Find the maximum height reached by the ball.

b For what length of time will the ball be higher than 20 metres?

Answers

a



The maximum height is 30.4 metres.

Graph the function $y = 24x - 4.9x^2 + 1$, where y is the height of the ball and x is the time in seconds.

The vertex is approximately (2.45, 30.4). This tells you the maximum height occurs when the ball has been in the air for 2.45 seconds.

You can find the vertex using your GDC.

b $20 = 24t - 4.9t^2 + 1$

$4.9t^2 - 24t + 19 = 0$

Let h = 20.

Write as a quadratic equation in standard form, and solve for t.

You can solve this using your GDC. See Chapter 17, Section 1.7.

$t \approx 0.9930$ seconds and 3.905 seconds

$3.905 - 0.9930 = 2.912$

The ball will be higher than 20 metres for about 2.91 seconds.

The ball is at a height of 20 metres twice, once on the way up, and once on the way down.

Sep 29-12:13 PM

3 A piece of wire 40 cm long is cut into two pieces. The two pieces are formed into two squares.

a If the side length of one of the squares is x cm, what is the side length of the other square?

b Show that the combined area of the two squares is given by $A = 2x^2 - 20x + 100$.

c What is the minimum combined area of the two squares?

$4x$ | $40-4x$

x | $10-x$

$A_1 = (x)(x)$ $A_2 = (10-x)(10-x)$

$A_1 = x^2$ $A_2 = 100 - 20x + x^2$

$A_1 + A_2$

$= x^2 + x^2 - 20x + 100$

Combined Area $= 2x^2 - 20x + 100$ ✓

$y = 2x^2 - 20x + 100$

$y = 2(x^2 - 10x + 25) + 100 - 50$

$y = 2(x-5)^2 + 50$

vertex $(5, 50)$

$\frac{0}{2} = \frac{2x^2 - 20x + 100}{2}$

$0 = x^2 - 10x + 50$

Sep 29-12:13 PM

6 The sum of the squares of three consecutive positive odd integers is 251. Find the integers.

x odd, $x+1$ even, $x+2$ odd, $x+3$ even, $x+4$ odd . . .

$(x)^2 + (x+2)^2 + (x+4)^2 = 251$

$x^2 + x^2 + 4x + 4 + x^2 + 8x + 16 = 251$

$3x^2 + 12x + 20 = 251$

$-251 \quad -251$

$\frac{3x^2 + 12x - 231 = 0}{3} \quad \frac{}{3}$

$x^2 + 4x - 77 = 0$

$(x-7)(x+11) = 0$

$x = 7 \quad x = -11$

7, 9, 11

Sep 29-12:13 PM

REMINDERS:

- HW Quiz Due Tomorrow
- Try the Review Packet
- UNIT 1 Test is on Thursday!!!
- Where can you find EVERYTHING?
  - mrswyan.weebly.com

Sep 29-12:13 PM