March 30 Test will be Wed, April 8.

Applications of Quadratic Equations | MCR3U

3) When two consecutive integers are squared and the squares are added, their sum is 421. What are the possible numbers?

Let x represent the first number.

Let y " " second "

$y = x + 1$ — (A)

$x^2 + y^2 = 421$ — (B)

Sub (A) into (B)

$x^2 + (x+1)^2 = 421$

$x^2 + x^2 + 1^2 + 2x = 421$

$2x^2 + 2x - 420 = 0$

$\div 2 \quad \div 2 \quad \div 2 \quad \div 2$

$ac = -210$ 15×-14

$b = 1$

$x^2 + x - 210 = 0$

QF: $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \dfrac{-1 \pm \sqrt{1^2 - (4 \times 1 \times -210)}}{2}$

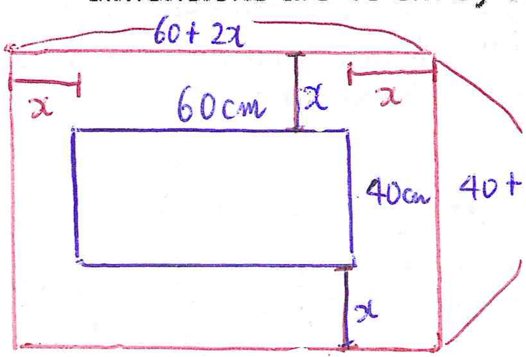
$x = \dfrac{-1 \pm \sqrt{841}}{2} = \dfrac{-1 \pm 29}{2}$

$x = 14$ or -15 so $y = 15$ or -14

$\therefore$ The possible numbers are $(14, 15)$, $(-15, -14)$

4) A matte of uniform width is to be placed around a painting so that the area of the matted surface is twice the area of the picture. If the painting's dimensions are 40 cm by 60 cm find the width of the matte.

= dull surface



Area of the matte

Area of painting

$(60 + 2x)(40 + 2x) - (60 \times 40) = 2(60 \times 40)$

Let x represent width of a matte

$2400 + 120x + 80x + 4x^2 - 2400 = 4800$

$4x^2 + 200x - 4800 = 0$

$\div 4 \quad \div 4 \quad \div 4 \quad \div 4$

$x^2 + 50x - 1200 = 0$

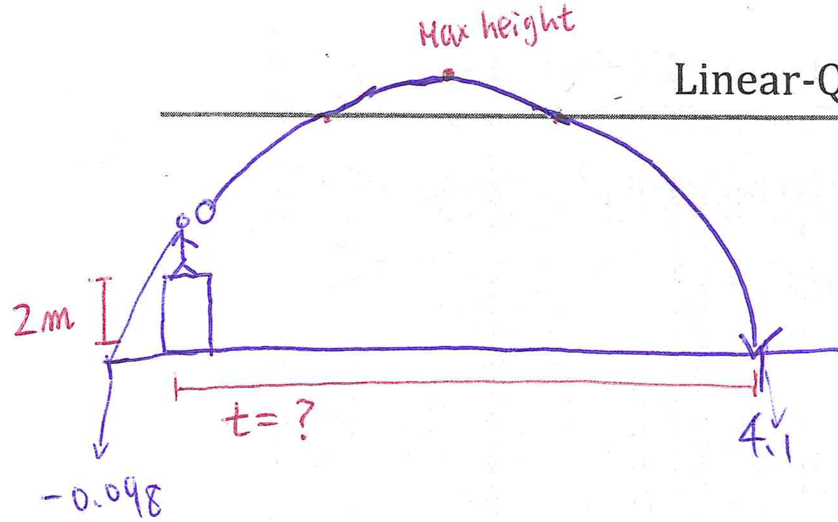
QF: $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \dfrac{-50 \pm \sqrt{2500 - (4 \times -12}}{2}$

$= \dfrac{-50 \pm \sqrt{7300}}{2} = \dfrac{-50 \pm 85.4}{2}$

$= 17.7$ or -67.7

$\therefore$ Width of the matte is 17.7 cm

Hwk. pg. 50 # 12, 13, 15, 16



Warmup

The function h(t) = -5t² + 20t + 2 gives the approximate height, h metres, of a thrown football as a function of the time, t seconds, since it was thrown.

→ initial height = 2m

a) For how long was the ball in the air? (x intercepts = ?) → set y or h = 0

$0 = -5t^2 + 20t + 2 \rightarrow ac = -5 \times 2 = -10, \; b = 20$ ∴ There is not any com

QF: $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-20 \pm \sqrt{20^2 - (4 \times -5 \times 2)}}{-5 \times 2} = \frac{-20 \pm \sqrt{400 + 40}}{-10}$

$= \frac{-20 \pm 20.98}{-10} = -0.098$ or $+4.1$ ∴ The ball was in the air for 4.1 se

we reject −0.098 because time can not be negative number.

b) For how many seconds was the height of the ball at least 17m?

when h = 17m, t = ?

$17 = -5t^2 + 20t + 2$

$0 = -5t^2 + 20t - 15$

$\div -5 \quad \div -5 \quad \div -5 \quad \div -5$

$0 = t^2 - 4t + 3$ $\quad ac = 3$

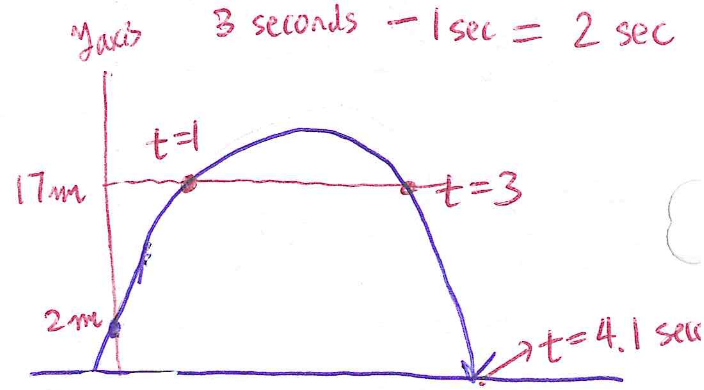
$b = -4$

$0 = (t-1)(t-3)$ $\quad -1 \times -3 = 3$

∴ $t = 1, 3$ $\quad -1 + -3 = -4$

∴ The ball was in the air (at least 17m) for 2 seconds

3 seconds − 1 sec = 2 sec



March 30 P31 MCR3U

5 Sales = 60 items / month

Unit Profit = \$800 / item

Total Profit = Quantity (sold) × Unit Profit

y =

Let x represent increase in selling price by \$20

Let y "

Revenue = price × Quantity

$$\underset{\text{Revenue}}{f(x)} = \underbrace{(800 + 20x)}_{\text{price}}\underbrace{(60 - 1x)}_{\text{Quantity}}$$

1800 × 10

$$0 = (800 + 20x)(60 - x)$$

$x = 0$ when $\begin{cases} 60 - x = 0 & \text{or} \rightarrow x = 60 \\ 800 + 20x = 0 & \rightarrow x = -40 \end{cases}$

reject

To find vertex = $\dfrac{60 \quad 40}{2} = 10$

When $x = 10 \rightarrow$ sub into eqn $f(10) = (800 + 200)(50)$

Max Rev = 50,000

∴ Vertex (10, 50,000)

∴ The cost price (which maximizes the revenue) is $800 + 20(10) = 1000$ \$.