MPM2D May 29

#3. Revenue = Unit Price x Quantity sold

Price	Quantity
3.9	120
3.8	140
3.7	160

Let x represent 10 cents decrease

$Rev = \$3.90 \times 120$

$Rev = (3.9 - 0.1x)(120 + 20x)$

$700 = (3.9 - 0.1x)(120 + 20x)$

$700 = 468 + 78x - 12x - 2x^2$

* sub Rev = 700

$0 = -2x^2 + 66x + 468 - 700$

$0 = -2x^2 + 66x - 232$

$QF = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \dfrac{-66 \pm \sqrt{66^2 - 4 \cdot (-2)(-232)}}{2 \cdot -2}$

$= \dfrac{-66 \pm \sqrt{4356 - 1856}}{-4} = \dfrac{-66 \pm 50}{-4}$

$\dfrac{-66+50}{-4} = \dfrac{-16}{-4} = 4$

$\dfrac{-66-50}{-4} = \dfrac{-116}{-4} = 29$

$\therefore x$ is 4 or 29

↓

40 cents decrease

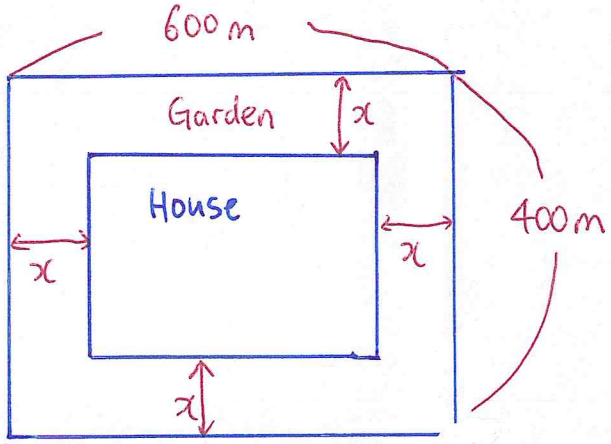
$2.90 decrease

$\therefore$ The price is $3.50 or $1.00.

$3.90 - (4 \times 0.10)$ $\qquad$ $3.90 - (29 \times 0.1)$

May 29 MPM2D Park

8 (Review Sheet)



* Land = $600 \times 400 = 240{,}000\ m^2$

* House = $0.9 \times 240{,}000$

$= 216000\ m^2$

* Garden = $240{,}000 - 216000$

$= 24000$

* Area of House

$216000 = (400 - 2x) \times (600 - 2x)$

$216000 = 240{,}000 - 800x - 1200x + 4x^2$

$0 = 4x^2 - 2000x + 240{,}000 - 216000$

$0 = 4x^2 - 2000x + 24000$

$$QF = \frac{2000 \pm \sqrt{(-2000)^2 - 4(4)(24000)}}{2 \cdot 4}$$

$$= \frac{2000 \pm \sqrt{4000000 - 384000}}{8}$$

$$= \frac{2000 \pm \sqrt{3616000}}{8}$$

$$= \frac{2000 \pm 1901.58}{8} = \begin{cases} 12.3 \text{ or} \\ 487.7 \end{cases}$$

$\therefore$ Width of the garden has to be 12.3 m

487.7 (reject this answer because length and width become nega-

for May 29

HW: ① Try # 4, 5, 6 and of "Quadratic Word Problem" Handout! (especially #6)

② Review all lesson notes of this unit!

#6. $P(x) = -0.1x^2 + 1.2x + 4.4$

Let x = # of years since 2000 i.e) $x=1 \rightarrow 2001$

// P = population in thousands

a) 2005 $\rightarrow$ $x = 5$

$P = -0.1(5)^2 + 1.2(5) + 4.4$

$P = -2.5 + 6 + 4.4 = 7.9$

$\therefore 7.9 \times 1000 = 7900$

b) 1999 $\rightarrow$ $x = -1$

$P = -0.1(-1)^2 + 1.2(-1) + 4.4$

$= -0.1 - 1.2 + 4.4 = 3.1$

$\therefore 3.1 \times 1000 = 3100$

c) Maximum P = ? when P was max, x = ?

Find the vertex!

$P = -0.1(x^2 - 12x) + 4.4$

$P = -0.1\left(x^2 - 12x + \left(\frac{-12}{2}\right)^2 - \left(\frac{-12}{2}\right)^2\right) + 4.4$

$P = -0.1[(x-6)^2 - 36] + 4.4$

$P = -0.1(x-6)^2 + 4.4 + (-0.1 \times -36)$

6 <continue>

$p = -0.1(x-6)^2 + 8$ $\therefore$ Vertex $= (6, 8)$

$\therefore$ Max population $= 8 \times 1000 = 8000$

Year $= 2000 + 6 = 2006$

d) Don't worry about it.

MPM2D
Ms. Kueh

Quadratics Unit 6 Review

Knowledge/Communication:

1) Finding information from vertex form:
   a. Find the a value
   b. Vertex
   c. Direction of opening
   d. Axis of symmetry
   e. Number of zeros
   f. Sketch the graph

2) Find the equation given the:
   a. Vertex and "a" value
   b. Vertex and a point

3) Completing the square
4) Find the equation given transformations
5) Describe transformations given an equation

6) Solve quadratic equations
   - Using Factoring
   - Quadratic Formula
   - Vertex form – Reverse BEDMAS

   Find the number of Solutions to a quadratic equation (*discriminant*)

Application:

1) Transform graphs of quadratics
   Use appropriate terminology:
   a. Vertical stretch by a factor of a
   b. Vertical compression by a factor of _____
   c. Reflection in x-axis
   d. Shift left/right _____ units
   e. Shift up/down _____ units
2) Height/Time Questions
3) Dimension/Area Questions
4) Number Questions
5) Money/Revenue Questions
6) Right Triangles with unknown sides
7) Modelling Parabolas (Bridges)
8) Uniform Width Questions (Gardens with a uniform walkway)

For applications you must know when to complete the square, and when to use quadratic formula!

***Only complete the square when you are looking for the Vertex.

The question must ask you for a max or min.***

May 28 Unit test on Monday June 1st

MPM2D

Ms. Kueh

Quadratic Word Problems...All Mixed Together!

Remember, you have to read max or min (or some other derivative) in order to 'complete the square'. Otherwise you solve a quadratic equation by factoring or using the quadratic formula.

1. The cost, in dollars, of operating a machine per day is given by the formula $C(t) = 2t^2 - 84t + 1025$, where t is the time in hours, the machine operates. What is the minimum cost of running the machine? For how many hours must the machine run to reach this minimum cost?

2. A basketball is tossed from the top of a 3m wall. The height of the basketball is defined by the relation $y = -t^2 + 2t + 3$, where t represent the time in seconds, in metres, and y represents the height, in metres, above the ground.
   a) How many seconds have passed when it lands on the ground?
   b) What is the highest height the ball reaches?
   c) For how many metres horizontally is the ball higher than 3.5 m?

= Unit

3. At the Mini Market at 4L bag of milk costs \$3.90 and the store sells an average of 120 bags. For each \$0.10 decrease in price, sales increase by 20 bags per day.
   a) Determine the price they should sell the milk at to make a revenue of \$700.
   b) Determine the price they should sell the milk at to make a maximum revenue?

4. The sum of two numbers is 30 and their product is 209. Determine the two numbers.

5. The sum of two numbers is 30. Determine the two numbers if their product is a maximum.

6. The population of a town is modelled by $P(x) = -0.1x^2 + 1.2x + 4.4$, where x is the number of years since the year 2000, and P is the population in thousands.
   a) In the year 2005, what is the population?
   b) In the year 1999, what is the population?
   c) When was the population of the town the greatest? What was the greatest population?
   d) The town has really become a terrible place to live. Predict when all the residents will leave the town.

7. The product of two consecutive even integers is 224. Find the integers.