Before we begin, are there any questions from last day's work? **3.5.1 and #2**

Today's Learning Goal(s):

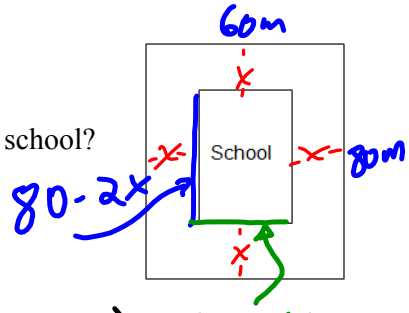
By the end of the class, I will be able to:

a) solve problems algebraically that involve polynomial functions & equations arising from real-world applications

3.6.1 Applications of Polynomial Equations

Date: Mar. 28/17

1. A school is to be built on a rectangular lot measuring 80 m by 60 m.
   A lawn of uniform width is to surround the school.
   The area of the lawn is equal to the area of the school.
   How wide will the strip of lawn be **AND** what are the dimensions of the school?



Solution

Let x represent the width of the **lawn**, in m.
Let $80-2x$ represent the length of the school, in m.
Let $60-2x$ represent the width of the school, in m.

$A_{lawn} = A_{school}$

$2400\ m^2$ $(2400 m^2)$

$A_{LOT} = 80 \times 60$

$= 4800 m^2$

$A_{school} = (60-2x)(80-2x)$

$2400 = 4800 - 120x - 160x + 4x^2$

$0 = 4x^2 - 280x + 4800 - 2400$

$= 4x^2 - 280x + 2400$

$= 4(x^2 - 70x + 600)$

$= 4(x-60)(x-10)$

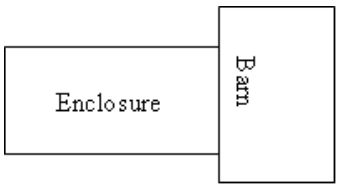
$\therefore x = 60$ inadmissible or $x = 10$ m

$l = 80-2x$
$= 80-2(10)$
$= 60$ m

$w = 60-2x$
$= 60-2(10)$
$= 40$ m

$\therefore$ the lawn is 10 m wide, and the school's dimensions are 60m by 40m.

2. A farmer needs to enclose a rectangular area using 50 m of fencing.
   One of the sides of the enclosure is against the barn.
   If the area of the enclosure is $300m^2$, determine the dimensions of the enclosure.



3. The function, $h = t^4 - 2t^3 - t + 2$, models the path of a seagull trying to catch fish,
   where h represents the seagull's height above the water in metres and t represents the time in seconds.
   a) At what height is the seagull when it first sees the fish?
   b) When does the seagull hit the water?
   c) At what time does the seagull leave the water with the fish in its beak?

4. Melissa is running a ski trip during the exam break.
   The bus holds 40 students and if she charges $250 per student the bus will be filled.
   For every $25 increase in the price she charges students, two fewer students will go on the trip.
   a) Write an equation to model the Melissa's revenue.
   b) Determine the maximum revenue.
   c) How many students need to go on the trip for Melissa to earn $8800?

Answers:

1) The lawn will have a width of 10 m and the dimensions of the school will be 60 m by 40 m.
2) There are two possibilities: L=10 m by w=30 m AND L=15 m by w=20 m
3a) $h = 2$ m, b) $t = 1$ s, c) $t = 2$ s
4a) $R = -0.08p^2 + 60p$, where R is the revenue, and p is the price she charges, both in dollars
b) $11 250 (when price is $375)
c) 16 students earn her $8800 (when price is $550)

Answers:

1) The lawn will have a width of 10 m and the dimensions of the school will be 60 m by 40 m.
2) There are two possibilities: L=10 m by w=30 m AND L=15 m by w=20 m
3a) h = 2 m, b) t = 1 s, c) t = 2 s
4a) $R = -0.08p^2 + 60p$, where R is the revenue, and p is the price she charges, both in dollars
b) $11 250 (when price is $375)
c) 16 students earn her $8800 (when price is $550)