Before we begin, are there any questions from last day's work?

3.4.2 #1-12

Today's Learning Goal(s):

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

a) solve polynomial equations by selecting and applying strategies
   i.e. factoring, using the quadratic formula

b) solve problems algebraically that involve polynomial functions & equatior
   arising from real-world applications

3.5.1   Solving Polynomial Equations   Date: Mar-27/17

Ex. Solve

1. $x^3 - 3x^2 = 16x - 48$ 2. $2x^3 - 18x = 0$ 3. $x^6 - 25x^4 = 0$

$x^3 - 3x^2 - 16x + 48 = 0$

$x^2(x-3) - 16(x-3) = 0$

$(x-3)(x^2-16) = 0$

$(x-3)(x-4)(x+4) = 0$

$\therefore x = 3, 4, -4$

$x^4(x^2 - 25) = 0$

$x^4(x-5)(x+5) = 0$

$\therefore x = 0, 5, -5$

4. $x^3 = -2x^2 - 4x - 8$

5. $x^3 - 18 = -2x^2 + 9x$

$x^3 + 2x^2 - 9x - 18 = 0$

$x^2(x+2) - 9(x+2) = 0$

$(x+2)(x^2-9) = 0$

$(x+2)(x-3)(x+3) = 0$

$\therefore x = -2, 3, -3$

6. $7x^4 - 4x^3 = 0$

$x^3(7x-4) = 0$

$x^3 = 0 \quad \text{or} \quad 7x-4 = 0$

$x = 0 \qquad x = \dfrac{4}{7}$

7. $-4x^2 + 36 = -x^3 + 9x$

$x^3 - 4x^2 - 9x + 36 = 0$

$x^2(x-4) - 9(x-4) = 0$

$(x-4)(x^2-9) = 0$

$(x-4)(x-3)(x+3) = 0$

$\therefore x = 4, 3, -3$

8. $x^3 + 2x^2 = 2(x^2 + 32)$

$x^3 + 2x^2 = 2x^2 + 64$

$x^3 + 2x^2 - 2x^2 - 64 = 0$

$x^3 - 64 = 0$

$x^3 = 64$

$x = \sqrt[3]{64}$

$= 4$

9. $x(x^2 - x - 2) = 17 - x(x + 2)$

$x^3 - x^2 - 2x = 17 - x^2 - 2x$

$x^3 - x^2 - 2x + x^2 + 2x - 17 = 0$

$x^3 = 17$

$x = \sqrt[3]{17}$

$\doteq 2.571$

$\doteq 2.57$

3.5.2   Applications of Polynomial Equations   Date: *Mar. 27/17*

1. A box with dimensions $(x + 3)$, $(x - 2)$, and $(5 - x)$ in metres has a volume of 14 m³.
    Determine the dimensions of the box.

$$V = \ell w h$$

$$14 = (x+3)(x-2)(5-x)$$

$$0 = (x+3)(5x-x^2-10+2x) - 14$$

$$0 = (x+3)(-x^2+7x-10) - 14$$

$$= -x^3+7x^2-10x -3x^2+21x -30 -14$$

$$= -x^3+4x^2+11x-44$$

$$= -x^2(x-4)+11(x-4)$$

$$= (x-4)(-x^2+11)$$

$$0 = (x-4)(11-x^2)$$

$$x=4 \text{ or } 11-x^2=0$$
$$11=x^2$$
$$x=\pm\sqrt{11}$$
$$\doteq \pm 3.316$$
$$\doteq \pm 3.32$$

if $x = 4$
$x+3$ $x-2$ $5-x$
$= 7$ $= 2$ $= 1$

if $x = -3.32$
$x+3$
$= -3.32+3$
$= -0.32$ inadmissible

if $x = 3.32$ $x-2$ $5-x$
$x+3$ $\doteq 1.32$ $= 5-3.32$
$\doteq 6.32$ $\doteq 1.68$

2. The area of a rectangle is given by $A = 2x^2 + 9x + 4$.   On next screen.
    If the perimeter of the rectangle is 46 cm, determine the area of the rectangle.

Answers:
1.   There are two possibilities for the size of the box: 2m by 7m by 1m AND 1.32m by 6.32 m by 1.68m
2.   130 cm²

2. The area of a rectangle is given by $A = 2x^2 + 9x + 4$.
    If the perimeter of the rectangle is 46 cm, determine the area of the rectangle.

$$A = 2x^2 + 9x + 4$$

$$= (2x+1)(x+4)$$

$$(\ell) \ (w)$$

$$P = 2w + 2\ell$$

$$46 = 2w + 2\ell$$

$$46 = 2(x+4) + 2(2x+1)$$

$$46 = 2x + 8 + 4x + 2$$

$$46 = 6x + 10$$

$$46 - 10 = 6x$$

$$36 = 6x$$

$$x = 6$$

$$A = 2(6)^2 + 9(6) + 4$$

$$= 2(36) + 54 + 4$$

$$= 72 + 58$$

$$= 130 \ cm^2$$

$\therefore$ the area of the rectangle is 130 cm².