Are there any questions from last day's assigned work you would like to see on the board?

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 & equation
   arising from real-world applications

QUIZ 1ST

3.5.1 Solving Polynomial Equations   Date: _Oct. 16/19_

Ex. Solve

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

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

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

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

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

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

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

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

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

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

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

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

$x = -2, -3, 3$

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

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

$\downarrow \qquad \downarrow$

$x = 0 \qquad 7x - 4 = 0$

$\qquad\qquad 7x = 4$

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

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

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

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

$x^3 - 64 = 0$

$x^3 = 64$

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

$x = 4$

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

3.5.2 Applications of Polynomial Equations   Date: _Oct.16/19_

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.

$$Volume = lwh$$

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

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

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

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

$$0 = -x^3 + 4x^2 + 11x - 30 - 14$$

$$0 = -x^3 + 4x^2 + 11x - 44$$

$$0 = -1(x^3 - 4x^2 - 11x + 44)$$

$$= -1[x^2(x-4) - 11(x-4)]$$

$$= -1(x-4)(x^2 - 11)$$

$$x - 4 = 0 \qquad \searrow x^2 - 11 = 0$$
$$x = 4 \qquad\qquad x^2 = 11$$
$$\qquad\qquad x = +\sqrt{11} \text{ or } x = -\sqrt{11}$$
$$\qquad\qquad \doteq 3.316 \qquad \doteq -3.31$$
$$\qquad\qquad \doteq 3.32 \qquad\quad \text{inadmissible}$$

if x = 4

$l = x+3,\ w = x-2 \qquad h = 5 - x$
$\quad = 4+3 \qquad = 4-2 \qquad = 5-4$
$\quad = 7 \qquad\quad = 2 \qquad\quad = 1$

if x ≐ 3.32

$l = x+3,\ w = x-2 \qquad h = 5-x$
$\quad \doteq 3.32+3 \quad \doteq 3.32-2 \quad \doteq 5-3.32$
$\quad \doteq 6.32 \qquad \doteq 1.32 \qquad \doteq 1.68$

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.

$A = 2x^2 + 9x + 4$ $P = 46 \text{ cm}$

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

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

$\ell = 2x+1 \quad w = x + 4$ $46 = 2\ell + 2w$

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

if $x = 6$ $46 = 4x + 2 + 2x + 8$

$A = 2(6)^2 + 9(6) + 4$ $46 = 6x + 10$

$ = 2(36) + 54 + 4$ $46 - 10 = 6x$

$ = 72 + 58$ $36 = 6x$

$ = 130 \text{ cm}^2$ $x = \frac{36}{6}$

$\therefore$ the area is 130 cm^2 $x = 6$

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

$ = (2(6)+1)(6)+4)$

$ = (13)(10)$