NAME: Key DATE: _____

2.4-2.6 Word Problem Review

1. The storage space in a moving truck is shaped like a rectangular prism. It has a total volume of 16 cubic meters. The height and width are both 2 meters less than the depth. What are the dimensions of the storage space?

4m x 2m x 2m

$V = l \cdot w \cdot h$

$16 = (x)(x-2)(x-2)$

$16 = x(x^2-4x+4)$

$16 = x^3-4x^2+4x$

$x^3-4x^2+4x-16=0$

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

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

~~$\pm 2i$~~ (4)

2. A shipping box is shaped like a rectangular prism. It has a total volume of 96 cubic inches. The height is two inches less than the width and the length is eight inches longer than the width. What are the dimensions of the box?

12 in
x
4 in
x
2 in

$V = l \cdot w \cdot h$

$96 = (x+8)(x)(x-2)$

$96 = (x^2+6x-16)(x)$

$96 = x^3+6x^2-16x$

$x^3+6x^2-16x-96=0$

$x^2(x+6)-16(x+6)=0$

$(x^2-16)(x+6)=0$

$(x+4)(x-4)(x+6)=0$

-4 (4) -6

3. A wooden board is shaped like a rectangular prism. It has a total volume of 324 cubic inches. The width is 3 inches less than the height and the length is 12 inches longer than the height. What are the dimensions of the board?

$V = l \cdot w \cdot h$

$324 = (x+12)(x-3)(x)$

$324 = (x^2+9x-36)(x)$

$324 = x^3+9x^2-36x$

18 in x 3 in x 6 in

$x^3+9x^2-36x-324=0$

$x^2(x+9)-36(x+9)=0$

$(x^2-36)(x+9)=0$

$(x+6)(x-6)(x+9)=0$

-6 (6) -9

4. The profit P (in millions of dollars) for a manufacturer of MP3 players can be modeled by $P = -4x^3 + 12x^2 + 16x$ where x is the number of MP3 players produced (in millions). Currently, the company produces 3 million MP3 players and makes a profit of $48,000,000. What lesser number of MP3 players could the company produce and still make the same profit?

$48 = -4x^3 + 12x^2 + 16x$

$4x^3 - 12x^2 - 16x + 48 = 0$

$4x^2(x-3) - 16(x-3) = 0$

$(4x^2 - 16)(x-3) = 0$

$(2x+4)(2x-4)(x-3) = 0$

$-2 \quad 2 \quad 3$

2 million MP3 players

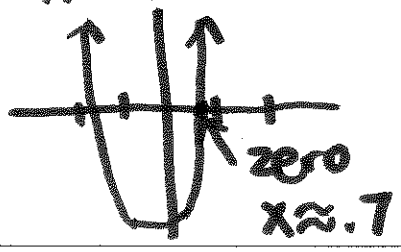
5. The profit P (in millions of dollars) for a shoe manufacturer can be modeled by $P = -21x^3 + 46x$ where x is the number of shoes produced (in millions). The company now produces 1 million shoes and makes a profit of $25,000,000, but would like to cut back production. What lesser amount of shoes could the company produce and still make the same profit?

$25 = -21x^3 + 46x$

$21x^3 - 46x + 25 = 0$

$(x-1)(21x^2 + 21x - 25) = 0$

1	21	0	-46	25
	↓	21	21	-25
	21	21	-25	0



700,000 shoes

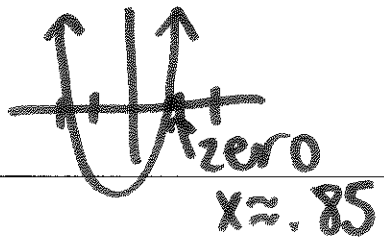
6. A company's profit C (in thousands of dollars) can be modeled by $C = -5x^3 + 6x^2 + 15x$, where x is the number of items produced (in thousands). The profit is $14,000 for producing 2,000 items. What other number of items would produce about the same profit?

$14 = -5x^3 + 6x^2 + 15x$

$5x^3 - 6x^2 - 15x + 14 = 0$

$(x-2)(5x^2 + 4x - 7) = 0$

2	5	-6	-15	14
	↓	10	8	-14
	5	4	-7	0



850 items