

The amount of each vitamin Rogers rabbits need to meet their daily vitamin requirements and the number of grams of each vitamin in the foods Xena, Yum and Zany can be represented by the following equations where x represents Xena, y represents Yum and z represents Zany.

$$2x + 4y + 5z = 1000$$

$$3x + 7y + 10z = 1600$$

$$5x + 9y + 14z = 2400$$

solved simultaneously

$$x = 300 \quad \text{Xena}$$

$$y = 100 \quad \text{Yum}$$

$$z = 0 \quad \text{Zany}$$

These calculations lead to the conclusion that in order for his rabbits to meet their exact daily requirements Roger should feed them 300 grams of Xena, 100 grams of Yum and 0 grams of Zany each day. Therefore the rabbits daily vitamin requirements can be met by consuming the previously mentioned amounts of Xena and Yum alone. Zany is not needed. ①

If Zany increases the amount of vitamin A in their food from 5 micrograms to 6 micrograms this would change the number of grams of each food Roger should feed his rabbits in order for them to meet their exact daily vitamin requirements.

$$2x + 4y + 6z = 1000 \quad (1)$$

$$3x + 7y + 10z = 1600 \quad (2)$$

$$5x + 9y + 14z = 2400 \quad (3)$$

$$(1) \times 1.5 \quad 3x + 6y + 9z = 1500 \quad (4)$$

$$3x + 7y + 10z = 1600 \quad (2)$$

$$(2) - (4) \quad y + z = 100$$

$$(1) \times 2.5 \quad 5x + 10y + 15z = 2500 \quad (5)$$

$$5x + 9y + 14z = 2400 \quad (3)$$

$$(3) - (5) \quad -y - z = -100$$

$$\text{so} \quad y + z = 100$$

$$-y - z = -100 \quad (\text{add})$$

$$0 = 0$$

This means that there are many solutions to the number of grams of each of the foods Roger should have fed his rabbits in order to meet their daily requirements. There is no one real solution. ②

One example of a possible solution of the number of grams of each food Roger should now feed his rabbits is $x = 250$ grams Xena

$$y = 50 \text{ grams Yum}$$

$$z = 50 \text{ grams Zany}$$