Student 1: Low Excellence

NZQA Intended for teacher use only

x = no of grams of Xena

y = no of grams of Yum

z = no of grams of Zany

The amount of vitamins of each type of food can be represented by the equations

$2x + 4y + 5z = 1000$ (Vit A)

$3x + 7y + 10z = 1600$ (Vit C)

$5x + 9y + 14z = 2400$ (Vit E)

Solving these equations gives x = 300, y = 100, z = 0 (1)

So to meet the daily requirement Roger should feed them 300 grams of Xena, 100 grams of Yum and no Zany.

If the amount of Vitamin A in Zany changes to 6 micrograms then

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

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

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

Solving these gives multiple solutions. These equations are consistent.

Solving (1) × 3 – (2) × 2 gives $-2y - 2z = -200$ $y + z = 100$

(1) × 5 – (3) × 2 gives $2y + 2z = 200$ $y + z = 100$ (2)

(1) × 7 – (2) × 4 gives $2x + 2z = 600$ $x + z = 300$

So solution is 300 – z, 100 – z, z

If z > 100 the amount of Yum would be negative so $0 \leq z \leq 100$

So if z = 20 grams, x = 280 grams and y = 80 grams (3)

ie one solution is 280 grams of Xena, 80 grams of Yum and 20 grams of Zany

if z = 50, x = 250, y = 50 so another solution is 250 grams of Xena, 50 grams of Yum and 50 grams of Zany

If the amount of Vitamin A in Zany is k micrograms

then $2x + 4y + kz = 1000$

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

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

Using the calculator I got 0 micrograms of Zany for lots of values I tried for k except when k = 6 micrograms when there is no unique solution. (4)

Maybe this is because (3) = 4 × (1) – (2)