

A student happiness rating varies jointly with the number of brownies and number of friends and inversely with the square of the number of administrators in the room.

A student has a happiness rating of 22.5 when he/she has 12 friends and 3 brownies in a room with 2 administrators.

How many administrators are in the room if a student's happiness rating is 18 and the student has 9 brownies and 20 friends in the room?

Step 1 – Set up the variation using k . Remember to see if it is direct, inverse, or joint.

h = happiness rating

f = # of friends

b = # of brownies

a = # of administrators

$$h = \frac{kbf}{a^2}$$

Step 2 – Find k .

$$22.5 = \frac{k(3)(12)}{(2)^2}$$

$$22.5 = \frac{k(36)}{4}$$

$$22.5 = k(9)$$

$$2.5 = k$$

Step 3 – Write the variation with a number in for k !

$$h = \frac{2.5bf}{a^2}$$

Step 4 – We can solve for whatever we want!

$$18 = \frac{2.5(9)(20)}{a^2}$$

$$18 = \frac{450}{a^2}$$

$$18a^2 = 450$$

$$a^2 = 25$$

$$a = 5$$

5 administrators