

Why is Jasmine's answer different? Is Jasmine's answer correct or are Kevin and Francisco's answers correct? Explain your reasoning.

Apply the methods that Jasmine, Kevin, and Francisco used to solve the following problems. Identify any extraneous solutions and justify why they are extraneous.

$$1. (0.5x + 1.5) = (\sqrt{2x + 3})^2$$

$$(.5x + 1.5)(.5x + 1.5) = 2x + 3$$

$$.25x^2 + .75x + .75x + 2.25 = 2x + 3$$

$$.25x^2 + 1.5x + 2.25 = 2x + 3$$

$$.25x^2 - .5x - .75 = 0$$

$$.5 \pm \frac{\sqrt{(-.5)^2 - 4(.25)(-.75)}}{.5}$$

$$\frac{.5 \pm \sqrt{1}}{.5} = \frac{.5 \pm 1}{.5} = \frac{1.5}{.5} = 3 \quad \frac{-.5}{.5} = -1$$

$$2. \sqrt{x+7} = x+5$$

$$x+7 = x^2 + 10x + 25$$

$$-x-7 = x^2 + 9x + 18$$

$$(x+3)(x+6)$$

$$x = -3 \quad x = -6$$

Developed by CHCCS and WCPSS

$$x = 3, -1$$

3. $\sqrt{3x+1} = x+1$

$$\begin{array}{r} 3x+1 = x^2+2x+1 \\ -3x-1 \quad -3x-1 \\ \hline 0 = x^2 - x \\ 0 = x(x-1) \\ x=0 \quad x=1 \\ \checkmark \quad \checkmark \end{array}$$

4. $3x-2 = \sqrt{2x-5}$

$$\begin{array}{r} 9x^2 - 12x + 4 = 2x - 5 \\ -2x + 5 \quad -2x + 5 \\ \hline 9x^2 - 14x + 9 = 0 \\ \frac{14 \pm \sqrt{(-14)^2 - 4(9)(9)}}{18} \\ \frac{14 \pm \sqrt{-128}}{18} \end{array}$$

2 | 128

~~0~~

6.9 Seasonal Systems

A Develop Understanding Task

Family Kingdom Amusement Park is planning to hire more support staff to work during the summer months. They have budgeted \$12,000 per week to go towards the pay for these seasonal workers.



Image Source: <https://pixabay.com/en/carnival-summer-concession-stand-2456911/>

1. If Family Kingdom Amusement Park hired 60 people, how much would each person make per week? Justify your answer.

$$\frac{12,000}{60} = \$200$$

a: 29

2. Create an equation, table, and graph that models the relationship between the number of people that Family Amusement Park can hire and the weekly pay per person.

$$y = \frac{12,000}{x}$$

table & graph on Desmos

From previous years the owners at Family Kingdom Amusement Park have realized that the more money they advertise for pay per week, the more applicants they will receive. Two years ago the owners advertised this seasonal part-time work as having a weekly salary of \$205 and they received 40 job applications. Last year they advertised a weekly salary of \$220 and they received 50 job applications.

independent: x : advertised salary
 dependent: y : # of applicants

of apps / advertised salary

3. Create an equation, table and graph to model the relationship between the weekly salary advertised and the number of job applications the owners will receive.

$(x_1, y_1) = (220, 50)$ x : advertised salary
 $(x_2, y_2) = (205, 40)$ y : # app

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{40 - 50}{205 - 220} = \frac{-10}{-15} = \frac{2}{3}$$

$y = mx + b$
 $50 = (\frac{2}{3})(220) + b$
 $50 = \frac{440}{3} + b$ $b = -\frac{290}{3}$

$y = \frac{2}{3}x - \frac{290}{3}$

4. How much should the owners at Family Kingdom Amusement Park advertise as the weekly pay if they want for the number of job applications to be the same as the number of people they can hire? If the owners choose to advertise at this amount of pay per week, how many applications will they receive? Justify your answer.

$y = \frac{12000}{x}$: Weekly Salary $\frac{2(225) - 290}{3}$
 $y = \frac{2}{3}x - \frac{290}{3}$: # of app. 53.3

$$\frac{3}{3} \cdot \frac{12000}{x} = \frac{2x \cdot x - 290}{3} \cdot \frac{x}{x}$$

$$36000 = 2x^2 - 290x$$

$$0 = 2x^2 - 290x - 36000$$

$$\frac{290 \pm \sqrt{(-290)^2 - 4(2)(-36000)}}{4}$$

$$\frac{290 \pm 610}{4}$$

225
~~80~~

5. The owners at Family Kingdom Amusement Park want to have more applicants than people that they can actually hire, so that they can choose the best workers from the pool of applicants. Write an inequality that can be solved to find the weekly salary that the owners should advertise to make sure that they receive more applications than people that they can hire. Then, use tables and graphs to solve the inequality so that the owners know how much they can advertise to ensure that they receive more applicants than people they can actually hire.

$$\frac{2}{3}x - \frac{290}{3} > \frac{12000}{x}$$

↖ # app
Salary

6. Make a recommendation to the owners about how much they should advertise as the weekly salary. Explain why your recommendation is the owner's best option. Make sure that you let them know how many job applications they should expect, how many people they can hire, and the total cost per week for salaries of all seasonal workers.

$$[225, 12,000]$$

7. You just solved a system of equations that involved a linear equation and an inverse variation equation, both graphically and using tables. How would you solve the following system?

$$\begin{array}{l}
 y = \sqrt{x} \\
 x - y = 6 \\
 \quad y = 6
 \end{array}
 \begin{array}{l}
 \rightarrow (2, a) \\
 \rightarrow (-5, 6)
 \end{array}$$

$$\begin{aligned}
 (x-6)^2 &= (\sqrt{x})^2 \\
 x^2 - 12x + 36 &= x \\
 \quad \quad \quad -x & \\
 \hline
 x^2 - 13x + 36 &= 0
 \end{aligned}$$

$$\begin{array}{l}
 x - 6 = y \\
 4 - 6 = -2 \\
 y = \sqrt{x} \\
 4 = \sqrt{4} \\
 4 \neq 2
 \end{array}$$

when put in 4, 2 diff outputs

$$\begin{aligned}
 (x-9)(x-4) &= 0 \\
 \text{X=9} & \quad \text{X=4} \\
 \text{X=9} & \text{ is circled and checked} \\
 \text{X=4} & \text{ is crossed out}
 \end{aligned}$$

$$\begin{array}{l}
 y = x - 6 \\
 y = 9 - 6 \\
 y = 3 \\
 \checkmark
 \end{array}
 \quad
 \begin{array}{l}
 y = \sqrt{x} \\
 y = \sqrt{9} \\
 y = 3 \\
 \checkmark
 \end{array}$$