A Level H2 Math

Equations and Inequalities Test 4

Q1

Without using a graphic calculator, solve the inequality $\frac{4x^2+7x+1}{3x+1} \leq x+2$. [3]

Hence solve the inequality $\frac{4x+7\sqrt{x}+1}{3\sqrt{x}+1} \leq \sqrt{x}+2$. [2]

Q2

A local wholesaler sells Pikachi plushies in two sizes, small and large. The number of Pikachi plushies bought by three particular retailers and the total amount they paid are shown in the following table.

Retailer	Small	Large	Total Amount paid
A	30	50	\$1375
B	k	$2k$	\$2704
C	$2k$	k	\$2522

Find the price of each small and each large Pikachi plushy and determine the value of k. [4]

Q3

Without using a calculator, solve the inequality $\frac{6x-13}{x^2-4} \geqslant 1$. [4]

Answers

Equations and Inequalities Test 4

Q1

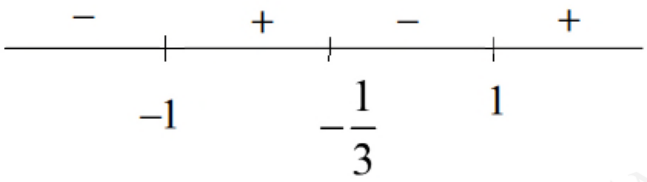
$$\frac{4x^2+7x+1}{3x+1} \le x+2$$

$$\frac{4x^2+7x+1-(x+2)(3x+1)}{3x+1} \le 0$$

$$\frac{4x^2+7x+1-(3x^2+x+6x+2)}{3x+1} \le 0$$

$$\frac{x^2-1}{3x+1} \le 0$$

$$\frac{(x-1)(x+1)}{3x+1} \le 0$$



$$\therefore \quad x \le -1 \quad \text{or} \quad -\frac{1}{3} < x \le 1$$

$$\frac{4x+7\sqrt{x}+1}{3\sqrt{x}+1} \le \sqrt{x}+2$$

Replace x with $\sqrt{x}$,

$$\therefore \sqrt{x} \le -1 \qquad \text{or} \qquad -\frac{1}{3} < \sqrt{x} \le 1$$

(rejected as $\sqrt{x} \ge 0$)

Since $\sqrt{x} \ge 0$,

$$-\frac{1}{3} < \sqrt{x} \le 1 \quad \Rightarrow \quad 0 \le \sqrt{x} \le 1$$

$$0 \le x \le 1$$

Q2

Let $\$x$ and $\$y$ be the price of each small and each large Pikachi plushy respectively.

Retailer A :

$$30x + 50y = 1375 \qquad \ldots (1)$$

Retailer B :

$$kx + 2ky = 2704$$

$$x + 2y - 2704\left(\frac{1}{k}\right) = 0 \qquad \ldots (2)$$

Retailer C :

$$2kx + ky = 2522$$

$$2x + y - 2522\left(\frac{1}{k}\right) = 0 \qquad \ldots (3)$$

From GC : $x = 15$, $y = 18.5$, $\frac{1}{k} = \frac{1}{52}$

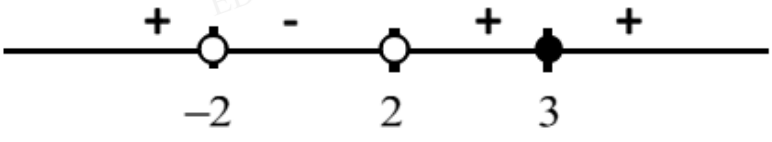
Hence, $k = 52$, each small Pikachi plushy costs \$15, and each large Pikachi plushy costs \$18.50.

Q3

$$\frac{6x-13}{x^2-4} \geqslant 1$$

$$\frac{6x-13-x^2+4}{x^2-4} \geqslant 0$$

$$\frac{(x-3)^2}{(x+2)(x-2)} \leqslant 0$$



$$\therefore -2 < x < 2 \quad \text{or} \quad x = 3$$