Question Exploration Guide

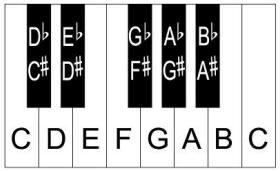
1 What is the Critical Question?

Pianos and pipe organs contain keyboards, a portion of which is shown below.

a) What is the ratio of black keys to white keys in the picture above?

b) If the pattern shown continues, how many black keys appear on a portable keyboard with 35 white keys?

c) If the pattern shown continues, how many black keys appear on a pipe organ with a total of 240 keys?



2 What are the Key Terms and explanations?

Keyboard	A set of keys on a piano – shown in the picture
Ratio	The relationship between 2 or more numbers
Pattern	Things that are arranged following a rule, a repeated design
Key	A level that strikes a string creating a certain note, 1 piece of the keyboard

3 What are the Supporting Questions and answers?

What is the problem asking?	Ratio of black to white keys used to figure out # of black keys on portable keyboard, pipe organ
What information does the problem give me?	5 black keys for every 8 white keys, portable keyboard has 35 white keys, pipe organ has 240 white keys
How do I figure out the ratio of white to black keys?	Set up a fraction with 1 number in numerator, one in denominator
How do I apply that ratio to a larger set of keys?	Set up equivalent fractions with 5/8 on one side of the equal sign and x/# of white keys on the other side, cross multiply to solve (note: make sure black keys appear in the same place in the fraction

4 What is the main Idea answer?

By counting the # of black keys and the # of white keys on the picture I can create a ratio of white to black keys. Since the pattern repeats, I can calculate the # of black keys on a different keyboard given the # of white keys by setting up equivalent fractions and cross multiplying to solve.

5 How can we use the main idea?

Solve letter a by setting up a ratio: 5/8

Solve letter b with equivalent fractions: 5/8 = x/35, 8x = 5 x 35

Solve letter c with equivalent fractions: 5/8 = x/240, 8x = 5 x 240

6 Is there an Overall Idea? Is there a real-world use?

A pattern is a pattern because the ratio of the different pieces of the design stay the same.