**Homework Page 478 #10-14**

Sunday, March 13, 2016
5:23 PM

**For Exercises 10–13, use the following information.**

Instead of identifying notes by their frequencies, musicians have given them names. The table below displays the frequencies for the notes in the middle octave of a well-tuned piano.

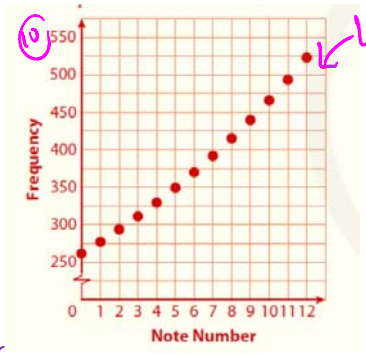
| Name of the Note | Note Number | Frequency |
|---|---|---|
| $C_4$ | 0 | 261.63 |
| $C_4^\#$ | 1 | 277.18 |
| $D_4$ | 2 | 293.66 |
| $D_4^\#$ | 3 | 311.13 |
| $E_4$ | 4 | 329.63 |
| $F_4$ | 5 | 349.23 |
| $F_4^\#$ | 6 | 369.99 |
| $G_4$ | 7 | 392.00 |
| $G_4^\#$ | 8 | 415.30 |
| $A_4$ | 9 | 440.00 |
| $A_4^\#$ | 10 | 466.16 |
| $B_4$ | 11 | 493.88 |
| $C_5$ | 12 | 523.25 |

277.18 ÷ 261.63 = 1.0594

293.66 ÷ 277.18 = 1.0595

all successive ratios are approx. 1.0595

(10)




Looks exponential!

**10.** Make a scatter plot of frequency vs note number.

**11.** Do these data represent a function? Yes! Passes Vertical Line Test.

**12.** Find an equation that models the relationship between frequency and note number.

(12) $y = a \cdot b^x$

$b = 1.0595$ (from successive ratios)

$a = 261.63$ (from note zero)

$y = 261.63(1.0595)^x$

**13.** What note do you think was played by the tuning fork in Exercises 1–3?

(13) The frequency was approx. 329 hertz, so $E_4$.

**14.** The figure below shows graphs of sound pressure waves collected from two sources.

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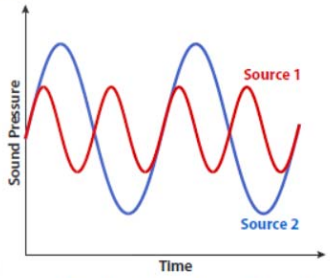


**a.** Which source is louder? How do you know?

**b.** Which source has the higher pitch? How do you know?

a) Source 2 is louder because it has a bigger amplitude relative to Source 1. (the graph goes higher & lower than Source 1). ∿ vs. ∿

b) Source 1 has the higher pitch because it has the higher frequency (it has more cycles per second than Source 2).

∿ vs. ∿