

**WAVE MOTION – PROBLEM SET
ANSWERS**

1. length of antenna bar = 1.85 m
2. new position of the finger = 0.58 m
3. speed of sound in the aluminum bar = 5050.88 m/s
4. a. tension in the string = 36.262400 dynes
 b. frequency = 660 Hz
5. 12^{th} overtone is equal to 25^{th} harmonic; length of the stopped pipe = 0.2075 m
6. Since temperature of air is not given, assume velocity of sound in air to be 332 m/s
 - (a) for open pipe
Fundamental frequency, $f_1 = 332.00$ Hz
First overtone frequency, $f_2 = 664.00$ Hz
Second overtone frequency, $f_3 = 996.00$ Hz
Third overtone frequency, $f_4 = 1328.00$ Hz
 $n = 54$
 - (b) for closed pipe
Fundamental frequency, $f_1 = 166.00$ Hz
First overtone frequency, $f_2 = 498.00$ Hz
Second overtone frequency, $f_3 = 830.00$ Hz
Third overtone frequency, $f_4 = 1290.00$ Hz
 $n = 127$
7. length of pipe = 0.296 m
length of tube = 0.687 m
8. frequency of source = 488.82 Hz
9. speed of departure = 183.88 m/s