# Problem of the Week <br> Problem B and Solution 

## Flangles

## Problem



Semaphore signal flags are used to communicate in places such as on aircraft carriers. Each letter is represented by a specific position of the two flags. Each flag is placed vertically, horizontally, or exactly halfway between the vertical and the horizontal.
a) Add each letter to the table below by looking at the type of angle between the two flags in the signal for that letter. Letters A and L are already placed. The 'space' is not a letter. It is used to put a space between words. Assume the angles are between $0^{\circ}$ and $180^{\circ}$, but can also include $0^{\circ}$ and $180^{\circ}$.

| Angle Type | Letters |
| :---: | :--- |
| Acute | A, |
| Right |  |
| Obtuse |  |
| Straight | L, |

Here is how we know that the angle for letter A is acute and for letter L is straight:

Letter A




Letter L

b) When communicating with semaphore signal flags, there are only four different angle measurements between the two flags. What are these angles? Assume the angles are between $0^{\circ}$ and $180^{\circ}$, but can also include $0^{\circ}$ and $180^{\circ}$.
c) Try to communicate a simple message to a friend using your arms as semaphores.

## Solution

a) The appropriate groups of letters are:

| Angle Type | Letters |
| :---: | :--- |
| Acute | A, G, H, O, T, W, Z |
| Right | B, F, I, J, N, P, U, X |
| Obtuse | C, E, K, M, Q, S, V, Y |
| Straight | D, L, R |

b) Since each acute angle is halfway between horizontal and the vertical, each one must measure $\frac{1}{2}$ of $90^{\circ}$ which is $45^{\circ}$.
Also, each obtuse angle must measure $90^{\circ}+45^{\circ}=135^{\circ}$.
Therefore, the four angles in use are $45^{\circ}, 90^{\circ}, 135^{\circ}$, and $180^{\circ}$.

