A sled on ice moves in the ways described in questions 1-5 below. *Friction is so small that it can be ignored.* A person wearing spiked shoes standing on the ice can apply a force to the sled and push it along the ice. Choose the one force (A through G) which would *keep the sled moving* as described in each statement below.

You may use a choice more than once or not at all but choose only one answer for each blank. If you think that none is correct, answer choice J.

<table>
<thead>
<tr>
<th>Direction of Force</th>
<th>A. The force is toward the <strong>right</strong> and is <strong>increasing</strong> in strength (magnitude).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B. The force is toward the <strong>right</strong> and is of <strong>constant</strong> strength (magnitude).</td>
</tr>
<tr>
<td></td>
<td>C. The force is toward the <strong>right</strong> and is <strong>decreasing</strong> in strength (magnitude).</td>
</tr>
<tr>
<td></td>
<td>D. No applied force is needed</td>
</tr>
<tr>
<td></td>
<td>E. The force is toward the <strong>left</strong> and is <strong>decreasing</strong> in strength (magnitude).</td>
</tr>
<tr>
<td></td>
<td>F. The force is toward the <strong>left</strong> and is of <strong>constant</strong> strength (magnitude).</td>
</tr>
<tr>
<td></td>
<td>G. The force is toward the <strong>left</strong> and is <strong>increasing</strong> in strength (magnitude).</td>
</tr>
</tbody>
</table>

___1. Which force would keep the sled moving toward the right and speeding up at a steady rate (constant acceleration)?

___2. Which force would keep the sled moving toward the right at a steady (constant) velocity?

___3. The sled is moving toward the right. Which force would slow it down at a steady rate (constant acceleration)?

___4. Which force would keep the sled moving toward the left and speeding up at a steady rate (constant acceleration)?

___5. The sled was started from rest and pushed until it reached a steady (constant) velocity toward the right. Which force would keep the sled moving at this velocity?
6. A person pulls a block across a rough friction surface at **constant speed** by applying a force \( F \). The arrows in the diagrams correctly indicate the directions, but not necessarily the magnitudes of the various forces on the block. Which of the following relations among the force magnitudes \( W, k, N, F \) **must be true**?

A) \( F = k \) and \( N = W \)  
B) \( F = k \) and \( N > W \)  
C) \( F > k \) and \( N < W \)  
D) \( F > k \) and \( N = W \)  
(E) None of the above choices

7. Assume the system above is moving to the right at **constant velocity** because of an applied hand force. What is the correct force diagram for mass 2? 

8. Which force diagram would be correct for mass 2 if the system is moving at a **constant acceleration**?
Questions 9-10 refer to the figure below which is being pushed to the left by a hand applied to box (1). Both box (1) and box (2) move to the left because of the applied hand force.

9. There are action – reaction pairs between (circle all answers that are correct!)

A) Box 1 and 2
B) Box 1 and the table
C) Box 1 and the earth
D) Box 2 and the table
E) Box 2 and the earth

10. The action - reaction pairs that you indicated in question 9 are

A) Vertical only
B) Horizontal only
C) Some are vertical, some are horizontal.
D) You need to know if it is accelerating.