**Unplugged robotics assessment**

**Debugging**

The following program has been written to move a block from start position 1-A to end position 5-B. The diagram below shows the correct start and end positions. But there are bugs (mistakes) in the code! Debug the following sequence by adding in the missing actions so that the robot arm places the block in the correct position:

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| **Step** | **Action** |
| 1 | Start |
| 2 | Turn left |
| 3 | Turn left |
| 4 | Claw open |
| 5 | Arm forward |
| 6 | Turn right |
| 7 | Turn right |
| 8 | Turn right |
| 9 | Arm backward |
| 10 | Open claw |

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| --- | --- |
| act2_before.PNG | act3_before.PNG |
| Start position. The block is at position 1-A. | End position. The block is at position 5-B. |

**Domain knowledge**

1. Name one rule that sequences follow. Describe why this rule is important for sequences.
2. Consider the rule you listed in question 1. Provide a real-world example of a sequence that would fail without the use of that rule. Explain where in your sequence you are applying the rule you listed and how it is an accurate application of the rule. (Hint: Write down the steps to show where the failure would take place if the rule weren’t followed.)
3. Looking at the sequence below, are steps 3 and 4 flexible? That is, will swapping these steps in the sequence change the robot’s end goal? Justify your answer.
4. Looking at the sequence below, are steps 2, 3, and 4 flexible? That is, can step 2 be step 3 or 4, can step 3 be step 2 or 4, and can step 4 be step 2 or 3? Justify your answer.
5. Looking at the sequence below, are steps 5 and 6 flexible? Justify your answer.

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| --- | --- |
| **Step** | **Action** |
| 1 | Start |
| 2 | Claw open |
| 3 | Turn left |
| 4 | Arm forward |
| 5 | Arm down |
| 6 | Claw close |
| 7 | Arm up |
| 8 | Turn right |
| 9 | Arm down |
| 10 | Claw open |

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| robotbase_2A.png | robotbase_3A.png |
| Start position. The block is at position 2-A. | End position. The block is at position 3-A. |

**Sequence implementation**

Write a program to move a block from position 3-B to position 5-A. (Hint: Draw a mat and use your arm to test your final answer. If the code is wrong, debug it.)

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| **Step** | **Action** |
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| --- | --- |
| robotbase_noblock.png | robotbase_noblock.png |
| Start position. The block is at position 3-B. | End position. The block is at position 5-A. |