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Labforward Tasks

Task 1

Q1. I have actually 2 ideas for this question:

1. **Idea 1: Timer Adjustment:**

   a. Measure the time it takes for the stirrer to reach the desired RPM which is 22 seconds in this example

   b. Subtract the time taken to reach the RPM from the total stirring time (60 seconds). Or we can add this time to the total stirring time to ensure that we have a full minute for the process

   c. This is the adjusted code

```
fields:
  TimeToReachRPM:
    title: Time to Reach RPM
    type: quantity
    unit: s
    defaultValue:
      number: 22
      unit: s

  AdjustedStirringTime:
    title: Adjusted Stirring Time
    type: timer
    hidden: true

steps:
  stirring:
    info:
      title: Stirring
```

```
substeps:
  - primary: Put the flask on {{Stirrer}} and confir
    confirm: true
    buttons:
      - label: Confirm
        key: confirm
    behaviors:
      - when:
          on_manual:
            key: confirm
        do: complete_substep

  - primary: Stirring at {{RPM}}
    behaviors:
      - when: on_substep_start
        do:
          - set_field:
              field: AdjustedStirringTime
              value: (StirringTimer - TimeToReachRPM
          - start_timer:
              duration: AdjustedStirringTime
          - send_command:
              device: Stirrer
              command: set_rotation_setpoint
              data: SCALAR(RPM)
          - send_command:
              device: Stirrer
              command: set_stirrer_status
              data: 1
      - when:
          - on_timer_stop
          - on_timer_complete
        do:
          - send_command:
              device: Stirrer
              command: set_stirrer_status
              data: 0
```

```
                    - complete_substep
              timer: StirringTimer
```

2. **Idea 2: Repeating the Experiment and Averaging Results:**

   a. Perform the experiment multiple times (3-5 repetitions) to gather data on the stirring process, including the time taken to reach RPM and the overall stirring time.

   b. Use the data from "a" to calculate the average time taken to reach RPM and the average stirring time. We can choose to automate this process or not

   c. This is the adjusted code:

```
steps:
  repeat_experiment:
    info:
      title: Repeat Experiment
    substeps:
      - primary: Repeat the experiment 3 times and reco
        buttons:
          - label: Confirm
            key: confirm
        behaviors:
          - when:
              on_manual:
                key: confirm
            do: complete_substep

  calculate_average:
    info:
      title: Calculate Average
    substeps:
      - primary: Calculate the average time taken to re
        buttons:
          - label: Confirm
            key: confirm
        behaviors:
          - when:
```

```
                on_manual:
                    key: confirm
                do: complete_substep
```

```
flow:
   - weighing
   - stirring
   - repeat_experiment
   - calculate_average
   - summary
```

Q2. We just add the target weight to the HTML code and we can do this in every step if needed to check if we are on the right track

```
- primary: Put {{TargetWeight}} of Ice Tea into the flask a
  expandDescription: true
  description: |
    %col
      ### Target Weight: {{TargetWeight}}
    <br/>
    %col
      ### Stable Weight: {{StableWeight}}
      <br/>
      ### Delta Weight: {{Delta}}
    <br/>
    <br/>
    %col
      {{button|print}}
  buttons:
    - label: Print
      key: print
      placement: manual
    - label: Continue
      key: continue
  devices:
    - Balance:
        image: https://i.ibb.co/3zhbtdH/Unbenannt.jpg
```

```
behaviors:
  - when:
      on_manual:
        key: print
    do:
      send_command:
        device: Balance
        command: get_weight
  - when:
      on_data_point:
        device: Balance
        channel: weight
    do:
      - set_field:
          field: StableWeight
          value: data_point.qty
      - set_field:
          field: Delta
          value: (TargetWeight - data_point.qty)
  - when:
      on_manual:
        key: continue
    do:
      - complete_substep
```

Q3. In the screencast example, the value of `data_point.qty` represents the weight measured by the balance when the user presses the `Print` button during the weighing step. This value is dynamically fetched from the balance and is used to update the `StableWeight` field. In this case, the displayed `StableWeight` is `9.69 g`, and the `Delta`, which is the difference between the `TargetWeight (10.00 g)` and the `Stable Weight`, is calculated as `0.31 g`. The formula for Delta is `Delta = TargetWeight - StableWeight`, so substituting the values, we get `10.00 - 9.69 = 0.31`. Therefore the `StableWeight` is `9.69 g`, and the value of `data_point.qty` in this example is `9.69 g`. This value is displayed to the user along with the calculated Delta, keep in mind that this value might be different when we try it again as the sensitivity of the balance might be different therefore affects the readings.

Q4. According to the code, both are the same. It does not matter because whether the user stops the process manually or the timer finishes, `on_timer_stop` and `on_timer_complete` both actions turns off the stirrer to `0` . Then `complete_substep` which means the substep is completed. The resulting behaviour remains the same in the end for both cases.