

## Unit R116 – Process control systems

### Using programming tools

#### *Instructions and answers for teachers*

*These instructions should accompany the OCR resource ‘Using programming tools’ activity which supports OCR Cambridge Nationals in Engineering.*

**OCR** Engineering Level 1/2 Cambridge NATIONALS

**Unit R116 – Process control systems**

**Using programming tools**

**Task 1**

Flow charts are an extremely useful technique for planning out the sequence of operations for an activity. They are often used in computer programming to plan out the sequence of events and operations that the computer program must perform. They often form the basis for how the program is written.

Flow charts consist of blocks to represent actions such as processes and decisions, and also terminations.

An activity that requires some form of planning and sequencing is making a cup of tea. Look at the operations below and sequence them to produce a flow chart for making a cup of tea. There is no right or wrong answer!

```

graph TD
    Start([Start]) --> PourTea[Pour tea into cup]
    PourTea --> PutTeabag[Put teabag in teapot]
    PutTeabag --> Milk{Milk?}
    Milk --> AddWater[Add water]
    Milk --> AddSugar[Add sugar]
    AddWater --> BoilWater[Boil water]
    AddSugar --> BoilWater
    BoilWater --> PourMilk[Pour milk into cup]
    PourMilk --> Stop([Stop])
    Stop --> Sugar{Sugar?}
    Sugar --> WaitBrewed[Wait until brewed]
    WaitBrewed --> DrinkTea[Drink tea]
  
```

**OCR Cambridge National  
in  
Engineering  
Level 1/2**

**Unit R116 - Process control systems  
Using programming tools Lesson Element**

**Engineering** Level 1/2 **OCR**

#### **The Activity:**

This resource comprises of 2 tasks.



*This activity offers an opportunity for English skills development.*

#### **Associated materials:**

'Using programming tools' activity sheet  
'Using programming tools' PowerPoint presentation

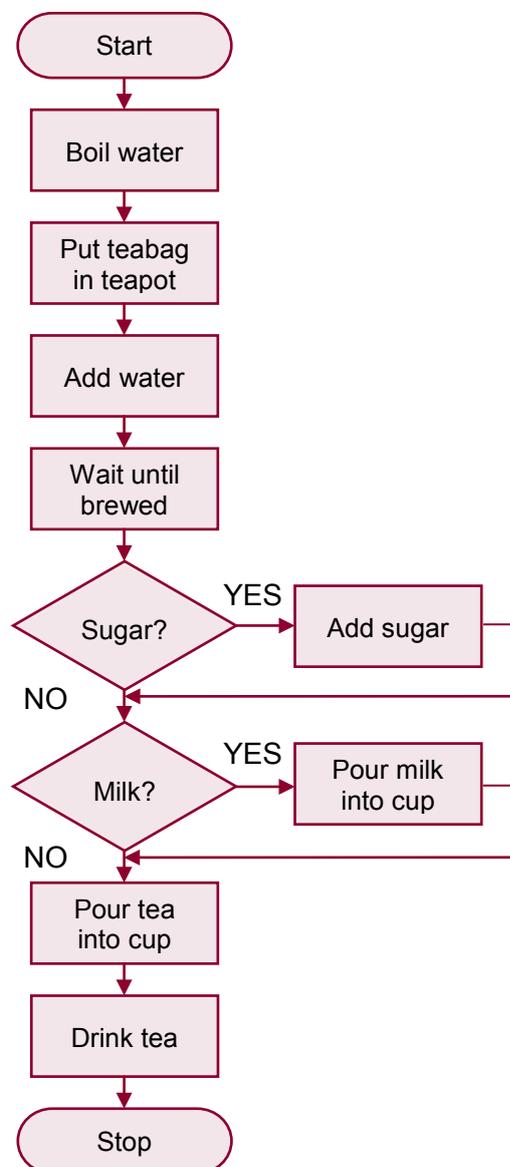
#### **Suggested timings:**

**Tasks 1 and 2:** 1 hour

### Task 1

For this activity learners are tasked to produce a flow chart for making a cup of tea. Learners might require a teacher introduction to flow charts including the types and meaning of different flow chart operations and symbols (eg processes and decisions, and also terminators). The diagram below is one solution to the problem, but there is no correct or incorrect solution as the sequence in the flow chart may be altered. The decision blocks (diamonds) relate to prescribed operations however.

Learners might produce flow charts by hand or using information technology. The flow chart shown here was produced using Microsoft PowerPoint.



## Task 2

For Task 2 learners should select an electrical or electronic control system and produce flow charts showing operating sequence. Examples might include a washing machine or DVD player.

Teachers might introduce learners to a wider range of operations and symbols that could be used on a flow chart, such as delays, manual operations and data.

Learners might use suitable software to develop and present their flow charts.

The activity might be used as the basis for learners producing flow charts to aid with programming their own control system solution, and also with explain and presenting system operation.

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