A

AS
COMPUTER SCIENCE

Paper 1

7516/1

INSERT

FIGURE 1 for use in answering Question 1

INFORMATION and FIGURE 2 for use in answering Question 2

FIGURE 3 for use in answering Question 3

FIGURE 4 for use in answering Question 11.4

[Turn over]

FIGURE 1

```
SUBROUTINE A(S, X, Y)
  P ← -1
  WHILE P = -1 AND X <= Y
    Z ← (X + Y) DIV 2
    IF List[Z] = S THEN
      P ← Z
    ELSE
      IF List[Z] < S THEN
        X ← Z + 1
      ELSE
        Y ← Z - 1
      ENDIF
    ENDIF
  ENDWHILE
  RETURN P
ENDSUBROUTINE
```

The `DIV` operator calculates the whole number part resulting from an integer division, for example,

`10 DIV 3 = 3`

BLANK PAGE

[Turn over]

The following information is for use in answering Question 2.

A parking meter has an Add hours button (+), an Accept button, a coin slot, a payment card reader, a Cancel button and a number keypad.

The system operates in a specific sequence:

- **the system is initially in Idle Mode**
- **when the user presses the + button the system goes into Select Hours Mode with the parking time set to 1 hour and the payment owed set to £1.00**
  - **each time the user presses the + button again, the number of hours' parking time increases by 1 and the payment owed increases by £0.50**
  - **when the user presses the Accept button the system goes into Payment Due Mode and the user is able to make payments using cash or a payment card**
  - **the user can cancel the operation by pressing the Cancel button**
- **using cash:**
  - **each time the user inserts a coin (except the final coin), the value of it is deducted from the payment owed**
  - **when the final coin that completes the payment is inserted, the system goes into Paid Mode**

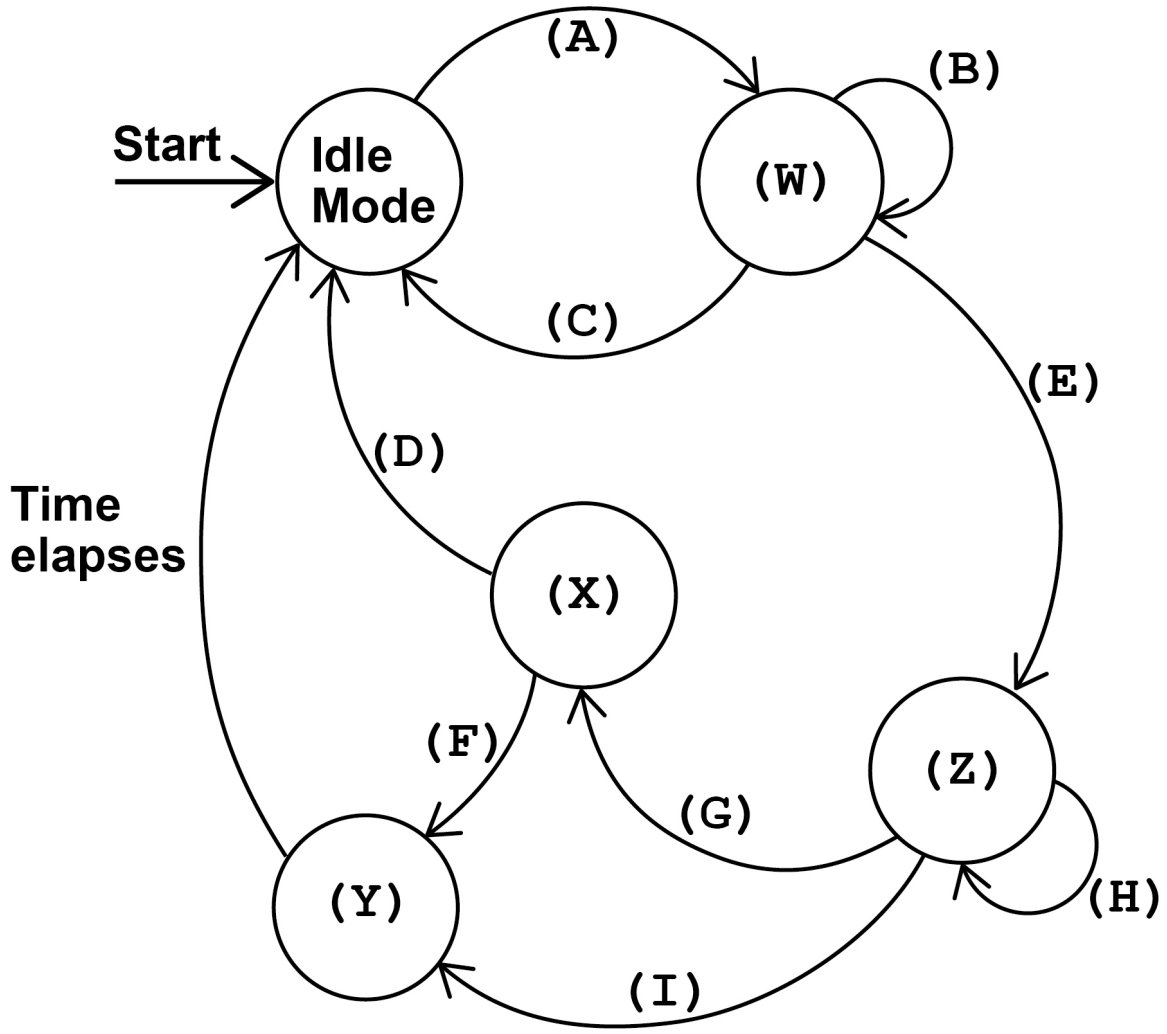
- using a payment card:
  - when the user inserts a payment card into the card reader, the meter goes into a mode that allows the user to enter their PIN
  - the user then enters their PIN on the keypad
  - if the PIN is correct, the system goes into Paid Mode; otherwise the system goes into Idle Mode
- the system remains in Paid Mode until the time paid for has elapsed.

FIGURE 2, on page 7, shows a partially completed state transition diagram that represents the operation of the parking meter. Four of the states are labelled (W) to (Z) and events are labelled (A) to (I).

[Turn over]

BLANK PAGE

FIGURE 2

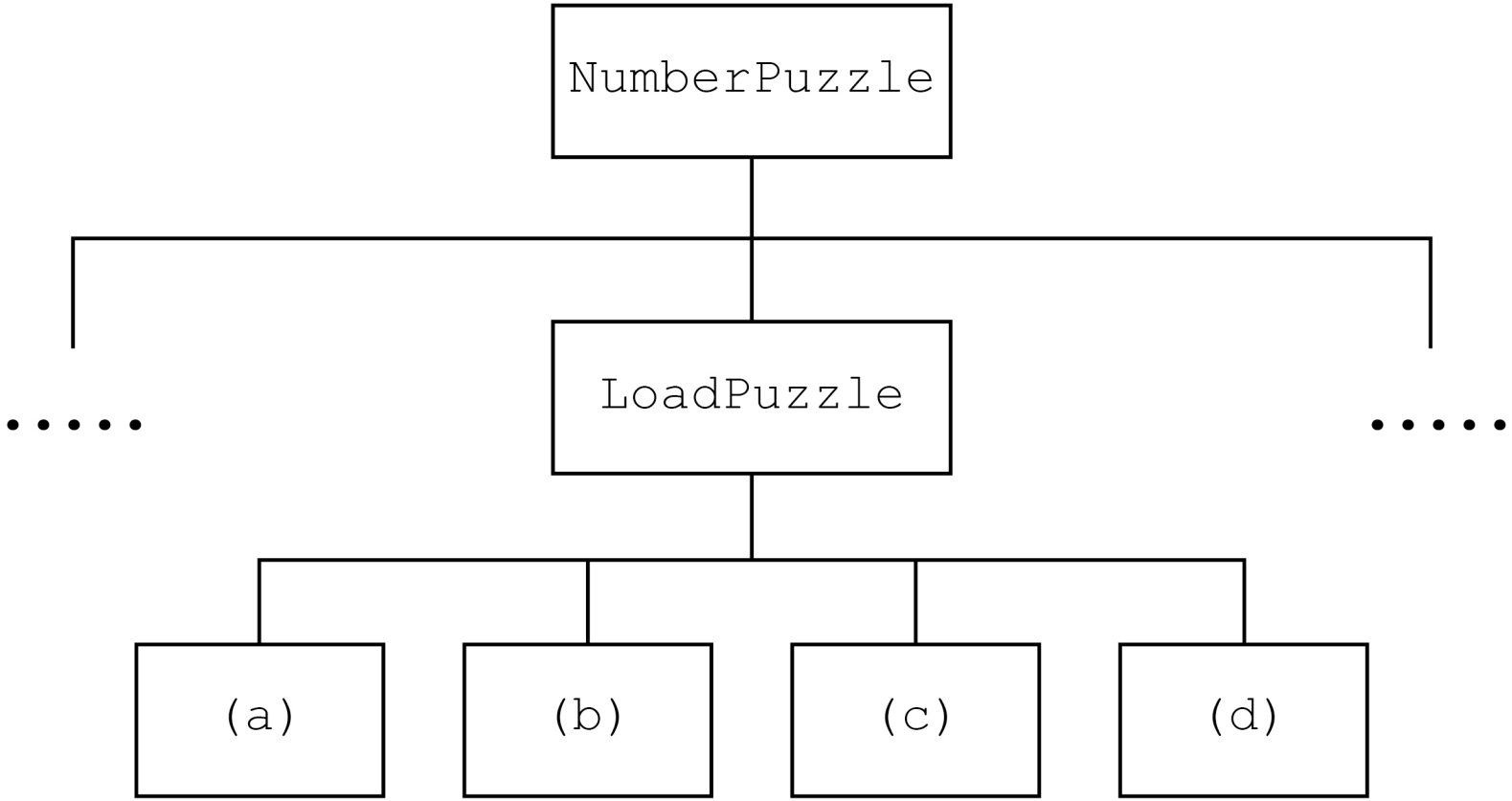


[Turn over]

FIGURE 3

```
C ← 0
D ← 0
S ← 0
T ← 0
WHILE C < 3 AND D < 3
  T ← T + 1
  N1 ← generate random integer between 1 and 6 inclusive
  N2 ← generate random integer between 1 and 6 inclusive
  OUTPUT N1, N2
  S ← S + N1 + N2
  IF N1 = 6 OR N2 = 6 THEN
    C ← C + 1
  ENDIF
  IF N1 = N2 THEN
    D ← D + 1
  ENDIF
ENDWHILE
A ← S DIV (T * 2)
OUTPUT C, D, A
```

FIGURE 4



END OF SOURCES

BLANK PAGE