GCSE OCR

Computer Science
J277

2

Sequence and selection

Unit 7 Programming

PG ONLINE

Objectives

- Use selection and nested selection statements
- Use NOT, AND and OR when creating Boolean expressions
- Use random number generation

Starter

- What are the **three** basic control structures used in programming?
  - What are **three** operators used in Boolean expressions?

Starter

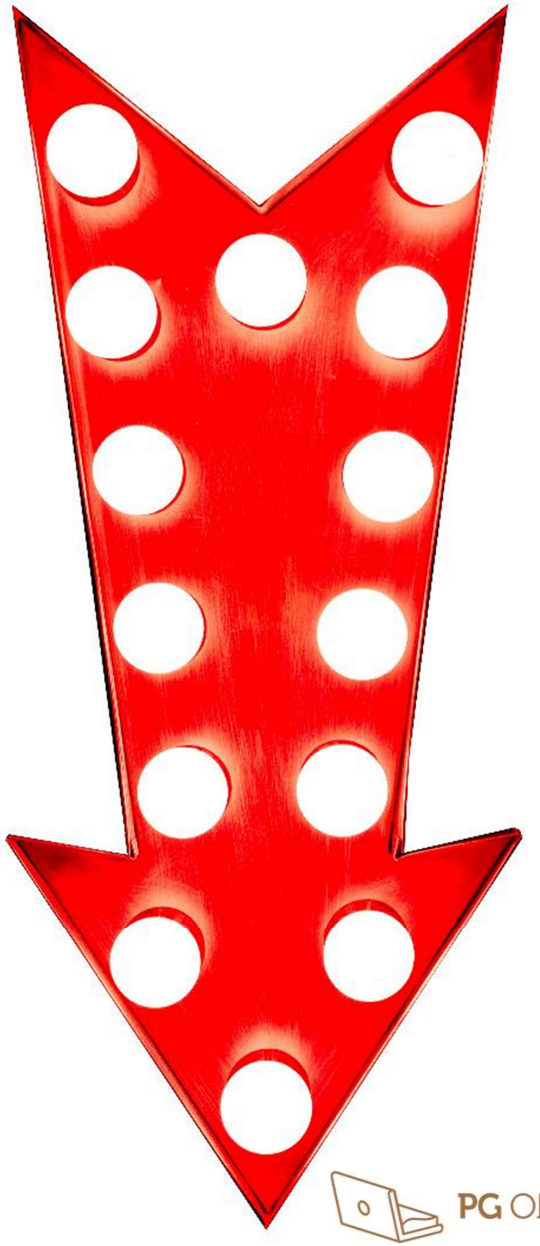
Answers

- What are the **three** basic control structures used in programming?
  - Sequence, selection and iteration
- What are **three** operators used in Boolean expressions?
  - AND, OR, NOT

Sequence

- The statements are executed one by one in the order they are written:

```
mark1 = 78
mark2 = 67
total = mark1 + mark2
average = total / 2
print(average)
```



Selection

- An IF statement is a selection statement
- The next statement to be executed depends on whether the condition being tested is True or False

```
if average >= 80 then
   print("Distinction")
else
   print("Pass")
endif
```

Comparison expressions

- The condition average >= 80 is a Boolean expression
  - The outcome will always evaluate to TRUE or FALSE
- Comparison operators include

==	equal to
!=	not equal to
>	greater than
<	less than

- What are **two** other comparison operators?
  - Why is = not used to mean equal to?

Boolean expressions

Answers

- Here is a full list of comparison operators

Comparison operators	Meaning	Pseudocode example	Result	Notes
==	Equal to	5 == 5	True	Some languages use a single =
!=	Not equal to	5 != 5	False	Visual Basic uses <>
>	Greater than	5 > 5	False	
>=	Greater than or equal to	5 >= 5	True	
<	Less than	5 < 5	False	
<=	Less than or equal to	5 <= 5	True	

- A single = is used for assignment - e.g. age = 14

If statements

- If statements allow different branches to be executed based on the result of a Boolean expression

```
if average >= 80 then
    print("Distinction")
elseif average >= 60 then
    print("Merit")
elseif average >= 40
    print("Pass")
else
    print("Fail")
endif
```

Nested if statements

- If statements may be nested:

```
if member == "child" then
    if day == "Saturday" then
       swimPrice = 2.00
    else
       swimPrice = 2.50
    endif
else
    swimPrice = 4.00
endif
```

- What is the price for an adult on Saturday?
  - What is the price for a child on Sunday?

Nested if statements

Answers

```
if member == "child" then
    if day == "Saturday" then
        swimPrice = 2.00
    else
        swimPrice = 2.50
    endif
else
    swimPrice = 4.00
endif
```

- What is the price for an adult on Saturday? 4.00
  - What is the price for a child on Sunday? 2.50

Complex Boolean expressions

- Boolean expressions can include the Boolean operators AND, OR and NOT
- For example:

```
if (mark < 0) OR (mark > 100) then …
```

Operator	Description
AND	Returns TRUE if both conditions are TRUE
OR	Returns TRUE if either of the conditions are TRUE
NOT	A TRUE expression becomes FALSE and vice versa

True or False?

- Complete the table:

Mark1	Mark2	Condition	True or False?
80	67	`(mark1 >= 80) AND (mark2 >= 80)`	
82	80	`(mark1 >= 80) OR (mark2 >= 80)`	
35		`(mark1 > 30) OR (mark1 < 50)`	
65		`(mark1 < 30) OR (mark1 > 80)`	
0	75	`NOT(mark1 > 50) AND (mark2 > 50)`	
65	85	`NOT(mark1 < 60) AND NOT (mark2 < 80)`	

True or False?

Answers

- Complete the table:

Mark1	Mark2	Condition	True or False?
80	67	`(mark1 >= 80) AND (mark2 >= 80)`	False
82	80	`(mark1 >= 80) OR (mark2 >= 80)`	True
35		`(mark1 > 30) OR (mark1 < 50)`	True
65		`(mark1 < 30) OR (mark1 > 80)`	False
0	75	`NOT(mark1 > 50) AND (mark2 > 50)`	True
65	85	`NOT(mark1 < 60) AND NOT (mark2 < 80)`	True

Worksheet 2

- Now complete **Task 1** on **Worksheet 2**

The switch/case statement

- This statement may be used when a selection is to be made from several alternatives, for example when choosing from a menu

```
switch menuChoice:
    case "1":
        print("You selected 1")
    case "2":
        print("You selected 2")
    case "3":
        print("You selected 3")
    default:
        print("This is not a valid choice")
endswitch
```

Random numbers

- Programming languages will provide a number of built-in functions that can be used
  - To use them a library may need to be imported
  - For example, in Python, `import random` will import the random library of functions
- A random number between 0 and 100 can then be generated with a statement such as

```
random(0, 100)
```

  In Python this would be `random.randint(0, 100)`

- How could you simulate the throw of a die?

Random numbers

Answers

- How could you simulate the throw of a die?
- Pseudocode:

```
die = random(0, 100)
print(die)
```

- Python:

```
import random
die = random.randint(0, 100)
print(die)
```

Worksheet 2

- Now complete **Task 2** and **Task 3** on **Worksheet 2**

Plenary

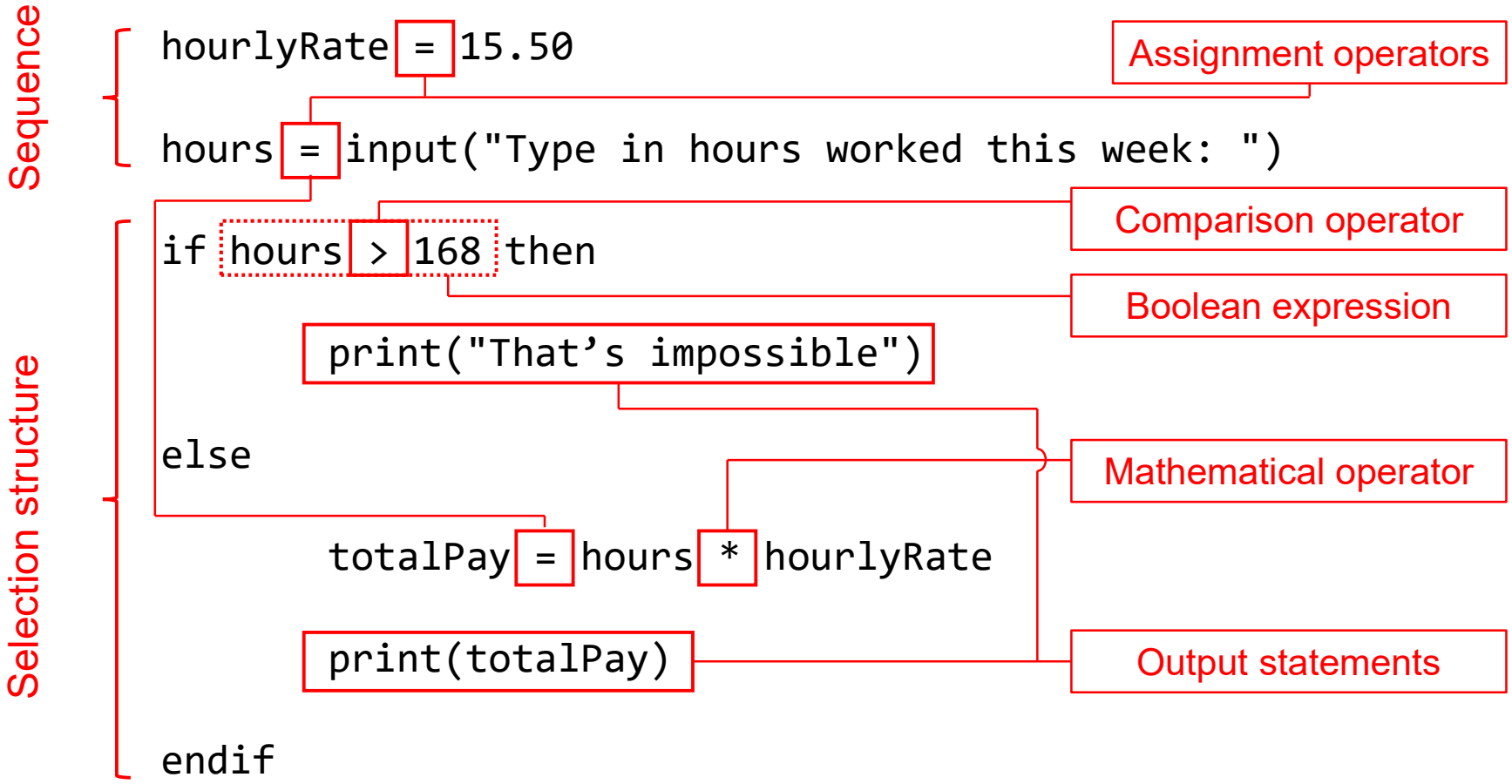
- Look at the following code:

```
hourlyRate = 15.50
hours = input("Type in hours worked this week: ")
if hours > 168 then
    print("That's impossible")
else
    totalPay = hours * hourlyRate
    print(totalPay)
endif
```

- With a partner, identify each of the following:
  - A comparison operator, a Boolean expression a selection structure, a sequence, three assignment operators, an output statement, one mathematical operator

Plenary

Answers



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