**Object Oriented Development**

Module 3: Conditionals

**This document includes the answers to the exercises**

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## **Please note:**

Be careful about looking at the solutions too quickly; make sure you’ve given yourself time to wrestle with the concepts you just learned before looking at a solution. Also, there are several ways to solve many of the exercises, and the solutions only show one possible way to complete each exercise.

# Section 1 – Simple if statements

## Alien colours 1

Imagine an alien was just shot down in a game. Create a variable called alienColour and assign it a value of 'green', 'yellow', or 'red'.

Write an if statement to test whether the alien’s color is green.

If it is, display a message that the player just earned 5 points.

Try changing the value of the alienColour variable and check that it only displays the message when the value is green. In all other cases it should display nothing.

## Alien colours 2

Create two more if statements to deal with red and yellow:

* Red - display a message that the player just earned 10 points.
* Yellow - display a message that the player just earned 15 points.

Try changing the value of the alienColour variable and check that the code in the relevant if statement runs.

## Alien colours 3

Merge your 3 if statements from the previous exercise into a single if – else if – else statement.

You should display an extra message of “invalid colour” if the variable alienColour is not set to red, green or yellow.

Try changing the value of the alienColour variable and check that the code in the relevant part of the if statement runs.

## Stages of life

Write an if-else if-else statement that determines a person’s stage of life.

Set a value for the variable age, and then:

* If the person is less than 2 years old, display a message that the person is a baby.
* If the person is at least 2 years old but less than 4, display a message that the person is a toddler.
* If the person is at least 4 years old but less than 13, display a message that the person is a child.
* If the person is at least 13 years old but less than 20, display a message that the person is a teenager.
* If the person is at least 20 years old but less than 65, display a message that the person is a working age adult.
* If the person is age 65 or older, display a message that the person is an pensioner.

## Tax rates

Create an int called salary which will store a person’s salary. Write an if – else if – else statement which displays a message showing the person’s tax rate.

* Salaries over £150,000 will display 45%
* Salaries over £50000 up to and including £150,000 will display 40%
* Salaries over £12,500 up to and including £50,000 will display 20%
* Salaries up to and including £12,500 will display 0%

# Section 2 – More complex conditions

## 2.1 Valid account numbers

A valid account number will have 8 digits ranging from 10000000 to <=. Create an int called accountNumber and put a number in it.

Now write an if statement which checks if the account number is valid or not. It should display either “valid account number” or “invalid account number”.

Test your if statements by feeding it valid and invalid account numbers.

## 2.2 Airline codes 1

A flight code follows the following format:

LH1234 (Lufthansa)

BA5678 (British Airways)

FR5432 (Ryanair)

The first 2 characters are the airline code.

Make a String called flightCode and give it one of the 3 values above.

Write an if statement which checks if the airline code (i.e. the first 2 characters of the flight code) is equal to BA. If it does then display “British Airways” otherwise display “Not British Airways”

## 2.3 Airline codes 2

Alter the condition of your if statement to include the codes for Lufthansa and Ryanair. If the flightCode has one of the airline codes: LH, BA, or FR then display the message “valid airline” otherwise display the message “unrecognised or invalid airline”.

Do not use else if.

## 2.4 Airline codes 3

Rewrite your if statement from the previous question so that it displays message “unrecognised or invalid airline” if the flight code doesn’t have any of the airline codes: LH, BA, or FR

If the code matches any of the 3 codes then the if statement should do nothing.

Do not use an else or an else if.

## 2.5 Valid ID

Create 2 boolean variables called validPassport and validDrivingLicence. Set them to either true or false.

Write an if statement which displays “id verified” if either the passport or the driving licence is valid. If neither are valid then display “unable to verify id”.

Try changing the values of validPassport and validDrivingLicence to check that your if statement works properly.

## 2.6 Older driver

Drivers over 70 need to pass an eye test to keep driving. To test if someone can drive after 70 create the following booleans:

* hasLicence
* isDead
* hasPassedEyeTest

Write an if statement that displays the message “can still drive” if the driver has a licence, is not dead and has passed an eye test. In all other situations display “not licenced to drive”

Answers

# Section 1 – Simple if statements

## 1.1 Alien colours 1

Imagine an alien was just shot down in a game. Create a variable called alienColour and assign it a value of 'green', 'yellow', or 'red'.

Write an if statement to test whether the alien’s color is green.

If it is, display a message that the player just earned 5 points.

Try changing the value of the alienColour variable and check that it only displays the message when the value is green. In all other cases it should display nothing.

String alienColour = "green";

**if** (alienColour.equals("green")){

System.***out***.println("you've just earned 5 points!");

}

## Alien colours 2

Create two more if statements to deal with red and yellow:

* Red - display a message that the player just earned 10 points.
* Yellow - display a message that the player just earned 15 points.

Try changing the value of the alien\_colour variable and check that the code in the relevant if statement runs.

String alienColour = "green";

**if** (alienColour.equals("green")){

System.***out***.println("you've just earned 5 points!");

}

**if** (alienColour.equals("red")){

System.***out***.println("you've just earned 10 points!");

}

**if** (alienColour.equals("yellow")){

System.***out***.println("you've just earned 15 points!");

}

## Alien colours 3

Merge your 3 if statements from the previous exercise into a single if – else if – else statement.

You should display an extra message of “invalid colour” if the variable alien\_colour is not set to red, green or yellow.

Try changing the value of the alienColour variable and check that the code in the relevant part of the if statement runs.

**if** (alienColour.equals("green")){

System.***out***.println("you've just earned 5 points!");

} **else** **if** (alienColour.equals("red")){

System.***out***.println("you've just earned 10 points!");

} **else** **if** (alienColour.equals("yellow")){

System.***out***.println("you've just earned 15 points!");

} **else** {

System.***out***.println("invalid colour");

}

## Stages of life

Write an if-else if-else statement that determines a person’s stage of life.

Set a value for the variable age, and then:

* If the person is less than 2 years old, display a message that the person is a baby.
* If the person is at least 2 years old but less than 4, display a message that the person is a toddler.
* If the person is at least 4 years old but less than 13, display a message that the person is a child.
* If the person is at least 13 years old but less than 20, display a message that the person is a teenager.
* If the person is at least 20 years old but less than 65, display a message that the person is a working age adult.
* If the person is age 65 or older, display a message that the person is an pensioner.

**int** age = 23;

**if** (age < 2){

System.***out***.println("You're a baby");

} **else** **if** (age < 4){

System.***out***.println("You're a toddler");

} **else** **if** (age < 13){

System.***out***.println("You're a child");

} **else** **if** (age < 20){

System.***out***.println("You're a teenager");

} **else** **if** (age < 65){

System.***out***.println("You're a working age adult");

} **else** {

System.***out***.println("You're a pensioner");

}

## 1.5 Tax rates

Create an int called salary which will store a person’s salary. Write an if – else if statement which displays a message showing the person’s tax rate.

* Salaries over £150,000 will display 45%
* Salaries over £50000 up to and including £150,000 will display 40%
* Salaries over £12,500 up to and including £50,000 will display 20%
* Salaries up to and including £12,500 will display 0%

**int** salary = 11000;

**if** (salary > 150000){

System.***out***.println("45%");

} **else** **if** (salary > 50000){

System.***out***.println("40%");

} **else** **if** (salary > 12500){

System.***out***.println("20%");

} **else** {

System.***out***.println("0%");

}

# Section 2 – More complex conditions

## 2.1 Valid account numbers

A valid account number will have 8 digits ranging from 10000000 to 99999999. Create an int called accountNumber and put a number in it.

Now write an if statement which checks if the account number is valid or not. It should display either “valid account number” or “invalid account number”.

Test your if statements by feeding it valid and invalid account numbers.

**int** accountNumber = 12345678;

**if** (accountNumber >= 10000000 && accountNumber <= 99999999){

System.***out***.println("valid account number");

} **else** {

System.***out***.println("invalid account number");

}

## 2.2 Airline codes 1

A flight code follows the following format:

LH1234 (Lufthansa)

BA5678 (British Airways)

FR5432 (Ryanair)

The first 2 characters are the airline code.

Make a String called flightCode and give it one of the 3 values above.

Write an if statement which checks if the airline code (i.e. the first 2 characters of the flight code) is equal to BA. If it does then display “British Airways” otherwise display “Not British Airways”

String flightCode = "BA5678";

String airlineCode = flightCode.substring(0, 2);

**if** (airlineCode.equals("BA")){

System.***out***.println("British Airways");

} **else** {

System.***out***.println("not British Airways");

}

## 2.3 Airline codes 2

Alter the condition of your if statement to include the codes for Lufthansa and Ryanair. If the flightCode has one of the airline codes: LH, BA, or FR then display the message “valid airline” otherwise display the message “unrecognised or invalid airline”.

Do not use else if.

String flightCode = "BA5678";

String airlineCode = flightCode.substring(0, 2);

**if** ( airlineCode.equals("LH") ||

airlineCode.equals("BA") ||

airlineCode.equals("FR"))

{

System.***out***.println("Valid airline");

} **else** {

System.***out***.println("Unrecognised or invalid airline");

}

## 2.4 Airline codes 3

Rewrite your if statement from the previous question so that it displays message “unrecognised or invalid airline” if the flight code doesn’t have any of the airline codes: LH, BA, or FR

If the code matches any of the 3 codes then the if statement should do nothing.

Do not use an else or an else if.

String flightCode = "BA5678";

String airlineCode = flightCode.substring(0, 2);

**if** ( ! airlineCode.equals("LH") &&

! airlineCode.equals("BA") &&

! airlineCode.equals("FR"))

{

System.***out***.println("Unrecognised or invalid airline");

}

## 2.5 Valid ID

Create 2 boolean variables called validPassport and validDrivingLicence. Set them to either true or false.

Write an if statement which displays “id verified” if either the passport or the driving licence is valid. If neither are valid then display “unable to verify id”.

Try changing the values of validPassport and validDrivingLicence to check that your if statement works properly.

**boolean** validPassport = **false**;

**boolean** validDrivingLicence = **true**;

**if** (validPassport || validDrivingLicence){

System.***out***.println("ID verified");

} **else** {

System.***out***.println("Unable to verify ID");

}

## 2.6 Older driver

Drivers over 70 need to pass a driving licence to keep driving. To test if someone can still drive after 70 create the following booleans:

* hasLicence
* isDead
* hasPassedEyeTest

Write an if statement that displays the message “can still drive” if the driver has a licence, is not dead and has passed an eye test. In all other situations display “not licenced to drive”

**boolean** hasLicence = **true**;

**boolean** isDead = **true**;

**boolean** hasPassedEyeTest = **true**;

**if** (hasLicence && ! isDead && hasPassedEyeTest){

System.***out***.println("can still drive");

} **else** {

System.***out***.println("not licenced to drive");

}

Click on the link to give feedback on this exercise:

<https://forms.office.com/Pages/ResponsePage.aspx?id=glOkWCW86EGcIlkUGYi-mhn5SZBIBvtIk9fURIMGJDZUNFM1NktNM0xTNTZSRTJLWTVQR1JaMFFTTS4u>