



# PHP Piscine

Day 08

Staff 42 [piscine@42.fr](mailto:piscine@42.fr)

*Summary:*

*This document is the day08's subject for the PHP Piscine.*

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# Chapter 1

## Foreword

Discover [Warhammer 40000](#).

# Chapter 2

## General Instructions

- Only this page will serve as reference; do not trust rumors.
- Watch out! This document could potentially change up to an hour before submission.
- Only the work submitted on the repository will be accounted for during peer-2-peer correction.
- As when you did C Piscine, your exercises will be corrected by your peers AND/OR by Moulinette.
- Moulinette is very meticulous and strict in its evaluation of your work. It is entirely automated and there is no way to negotiate with it. So if you want to avoid bad surprises, be as thorough as possible.
- Using a forbidden function is considered cheating. Cheaters get **-42**, and this grade is non-negotiable.
- These exercises are carefully laid out by order of difficulty - from easiest to hardest. We **will not** take into account a successfully completed harder exercise if an easier one is not perfectly functional.
- You cannot leave any additional file in your repository than those specified in the subject.
- Got a question? Ask your peer on the right. Otherwise, try your peer on the left.
- Your reference guide is called **Google / the Internet / <http://www.php.net> / ....**
- Think of discussing on the Forum. The solution to your problem is probably there already. Otherwise you will start the conversation.
- Examine the examples thoroughly. They could very well call for details that are not explicitly mentioned in the subject ...
- By Odin, by Thor ! Use your brain !!!

# Chapter 3

## Awesome Starships Battles In The Dark Grim Future Of The Grim Dark 41st Millenium

Turn-in directory : ex00/

Files to turn in: \*

Allowed functions: Everything. Yes everything. Yes, even Javascript if you know how to use it. Yes, even your framework that knows how to brew coffee.

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### 3.1 No, you are not dreaming

With today's videos, you have just about gone round the whole object syntax of **PHP**. But in reality, you have had to write only about 15 classes that are dueling without any real purpose since the exercises were dictating to you the classes to create and what to put in them. Today, you will have to decide for yourself what classes to create and how to make them interact.

Today, we are not trying to asses whether you are able to write a class, an interface or a line. Nope, today we want to determine if you are able to implement what you have learned. Which is why, instead of having the usual daily assignments, you will have only one exercise for which you will be free to develop and implement your program however you see fit.

Why allow everything? Because **OOP** isn't a technology. It's a way of coding and you must be able to make it your own and code no matter what the technology is. If you are drowning in one or more extremely complex frameworks for today, or in the labyrinth of JavaScript, it is your problem. We want a program that works with a relevant **OOP** use. The rest isn't our problem today.

## 3.2 Instructions

- This is a **PHP** project, which means that even though we say that you're allowed to use everything, it doesn't mean you can use **Python** or **Ruby**, for example. Otherwise, you will be graded 0.
- Your program needs to work on **Chrome** with the version installed on the iMacs.
- A minimal effort is required on the aesthetic front. Use **CSS** and some images.
- The different URLs of your application are up to you.
- No matter which technology you choose, it is your responsibility that everything your application requires is available on your repository for your defence, as well as on your computer. Be mindful of the size of your project and do not push or install **30 GB** of framework.
- Each **d06**, **d07** and **d08** videos introduce a concept. Each of these concepts **MUST** be presented at least once in your submitted project, with the exception of reflection API that you may choose to use or not. On top of that, the use of each of these concept **MUST** be relevant. Your evaluator can refuse to give you any points for a concept that you used badly or that is useless. The JavaScript object syntax should not be taken into account in that regard.
- One unique Class per file only.
- One file that contains the definition of a class cannot contain any other, except for **require** or **require\_once** if necessary.
- A file containing a class must **ALWAYS** be named **ClassName.class.php**.
- A class must **ALWAYS** be accompanied by a documentation file which name **MUST** be **ClassName.doc.txt**.
- A Class documentation must **ALWAYS** be useful and match the implementation.
- A class must **ALWAYS** have a static method called **doc** that returns the documentation of a class into a string.

- An attribute or public method that wasn't needed will result in you being graded 0 for the day. Be clever with the visibility and prove that you know how to use it.
- If your Class inherits from a parent class, then this inheritance must be justified and useful. Otherwise, you will be graded 0.
- This is more an advice than a recommendation: big and incomplete is bad. Small and complete is better.

### 3.3 The subject

You will have to write a turn-based space combat game using the **Warhammer 40000** universe [SciFi Universe invented by **Games Workshop**]. The rules are simple but not trivial to have minimal fun. For those who know, the rules will be freely inspired by the game **Dreadfleet** from the same company. Actually all rights reserved to **Games Workshop** etc.

**Awesome Battleships Battles** is a 2 players game that allow them to control a fleet of awesome spaceships that fight each other for a reason that you'll get to invent. The goal is to eliminate the adversary fleet first.

#### 3.3.1 The dice

- The game uses ordinary 6 faces dice that we will refer to as **D6** from now on, to shorten it.
- *"To throw one dice"* is shortened with **1D6**. For example, *"throwing three dice"* will be written **3D6**. Etc.
- Obtaining **3, 4, 5** or **6** on **1D6** is shortened with **3+**. Etc.

#### 3.3.2 The game zone

- The game zone is a grid of 150 by 100 cells.
- Both enemy fleets start from opposite corners and all the spaceships are stationary.
- There must be a few obstacles [asteroids or space stations for example], it is up to you which obstacles you wish to include. The goal is to block the movements of the spaceships and to break the lines of fire to encourage maneuvers. The board cannot be filled with obstacles. 5 or 6 obstacles of about 10 cells each will do. You can of course adapt these values to your liking.
- The position and the size of the obstacles do not have to be random if you do not wish to spend more time on it.
- A ship that leaves the playing area or hits an obstacle for one reason or another is eliminated.



### 3.3.3 The turns

- Each turn, players play with one of their ships one after the other until all ships have been played.
- When one plays with a ship, one "activates it".
- One can only activate a ship once per turn.
- Activation is irreversible.
- An active ship must complete three mandatory phases and always in this order:
  - The orders phase [or instructions phase]
  - The movement phase
  - The shoot phase
- Once all the spaceships of both players have been activated, a new turn starts.

### 3.3.4 Spaceships

- A spaceship is defined by different features:

**Name** : The name of the spaceship. It should be badass, like, for example, "Wrath Of The Righteous", "Rightful Vengeance" or "Smite Of Terra" for the imperial ones, "Megacrusha" for Orks, or even "Bane Of All Hope" for Chaos.

**Size** : The width and length, in cells, for a spaceship. A Spaceship of 3x10 cells is a very big admiral ship. A spaceship of 1x2 cells is a small light one, a "scout". An average one will be 1x4 cells.

**Sprite or equivalent** : The representation of the ship on the grid.

**Hull points** : The life points of the spaceship. If those fall to 0, the ship is destroyed. 5 points is a good average for a mid-sized ship.

**Engine power :** The engine power provides the spaceship a number of points that it will be possible to assign to each ship activation to certain systems on the ship to adapt it to a situation. This are the "power points", abbreviated as **PP**. These points can be spent to make it move faster, to boost its shields or power its weapons. This allocation is made during the orders phase, which will be detailed later. 10 **PPs** represent an average for a base ship and will be the average value. The bigger ships could go up to 15 **PP**.

**Speed :** The maximum number of cells that the ship can move each turn. This characteristic can be increased using **PP**. A scout, which is faster, can move up to 20 cells. A big admiral ship can only move up to 10.

**Handling:** The manoeuvrability, or the number of cells that a spaceship that has moved in the previous round must travel straight during the current round if it wants to stay still during the next round [an effect of inertia]. This is also the minimum number of cells a spacecraft must travel straight before it can make a right or left turn AND between turns. A stationary spaceship may make one "free" turn before starting to move again at the beginning of its movement phase. A light scout would have a handling of 2 or 3. A big ship would have a handling of 5, for example.

**Shield:** The number of damage points that a ship can endure before losing its hull points. It's worth 0 upon ship activation and it can receive some **PP** points.

**Weapons:** The list of weapons that each ship owns, generally one or two, sometimes more for a really big ship. Each weapon needs **PP** to work. Each **PP** attributed to a weapon will allow it to raise its shooting efficiency factor for that round. A section is dedicated to the weapons and their specificities further in the subject.

Some weapons will be able to have some special bonuses that will modify their specificities or action range.

### 3.3.5 The phases

Activating a ship leads to 3 phases which must always take place in this order:

#### The orders phase

At the beginning of this phase, all the **PP** spent on the previous round are reset to zero. It means that the weapons systems, shields and speed will be back to their initial values.

The player spends the spaceship's **PP** on any of the ship's systems, depending on the situation. They can spend all, some or none of their points.

- **1PP** spent on speed allows to move one **1D6** extra cells.
- **1PP** spent on shields give 1 shield point.
- **1PP** spent on weapons gives one more **1D6** to shoot with it.

The players can also spend their **PP** to repair their ships. In order to repair a ship, it must be stationary. Each **PP** spent in repairs allows to roll **1D6**. Obtaining a 6, will restore the hull points to the maximum starting value.

## The movement phase

During this phase, a spaceship can move.

- We define a turn as "rotating the ship 90 degrees to the right or to the left".
- The spaceship rotates around the most central cell that composes it.
- A stationary ship can do a "free" turn before starting to move again.
- A ship can only move a number of cells corresponding to its speed characteristic. [with the additional **PP** spent on speed for the round].
- A ship must always move to an equal or superior amount of cells, matching its "handling" characteristic.
- If, during the previous round, a ship has moved exactly the amount of cells corresponding to its "handling" characteristic, the ship can stay stationary during the current round.
- A ship can remain stationary indefinitely.
- A stationary ship can move a number of cells inferior to its "handling" characteristic. It's the only case where it is allowed to move less cells than its speed characteristic. If it does, the spaceship won't be considered stationary on the next round.
- A ship can make a turn each time it has moved a bigger or equal number of cells than its "handling" characteristic.
- A ship that hits another one will immediately stop and can no longer move or shoot for that round. It will be considered stationary at the beginning of the next round. Furthermore, if it moved a number of cells strictly greater than its "handling", each ship will receive a number of damage points equal to the number of hull points that the other ship had prior to impact. Those damage points can be absorbed by shield points. In that case, we are talking about "buccaneering". It's a risky maneuver, quite desperate really, but that can lead to some spectacular situations.
- A spaceship that hits an obstacle or that goes out of playable area is eliminated and considered destroyed.

## Shooting phase

This is the phase where the serious stuff happens. Imagine ships several kilometres long shooting at each other with weapons the size of buildings. Special effects guaranteed.

Every weapons have a specific profile defined as such:

**Charge:** Initially 0 upon activation of the Spaceship. Each **PP** spent on that weapon for that round adds 1 charge point. Each charge point gives 1D6 for the shooting with that weapon. Some weapons have a number of charge points by default, always available, that allows to shoot even if no **PP** was used for that weapon on that round.

**Short Range:** Number of cells the weapon can reach at short range.

**Middle Range:** Number of cells the weapon can reach middle range.

**Long Range:** Number of cells the weapon can reach at long range. Also it's the maximum range for the weapon to be used..

**Effect Zone:** Description of the cells on which the weapon can shoot..

To shoot, a ship must have a clear view of its target. Any ship or obstacle can block that target view. To check the target view, we need to be able to trace a line between the shooter and its target without any obstacle. If the shooter has acquired a clear target, the ship will throw a number of dice equal to the number of charge points the weapons has. Of course the target must be within its effect zone and its weapon range. The dice obtaining at least a certain value are considered "a success". The basic values to obtain in order to win are as follows:

**Short range:** 4+

**Middle range:** 5+

**Long range:** 6

Each success shot will cause a damage point on one or many targets. The damage points are first deducted from the target's shield, then from its hull points.

Each weapon can only shoot once per turn. Of course, a ship can decide not to shoot. Furthermore, some weapons can force the ships to be stationary to be able to shoot. Those weapons are usually powerful long range guns. Some weapons may also change the value to be obtained on 1D6 to cause a successful hit.

A shoot that reaches its target from the front or the back provokes an "enfilade shoot". An enfilade shoot will pass through a ship length-wise bringing on catastrophic damages. To represent that case, a ship that shoots an "enfilade shoot" reduces by 1 the value required on a 1D6 to obtain a successful hit.

### 3.3.6 Weapons examples

- **SIDE LASER BATTERIES**

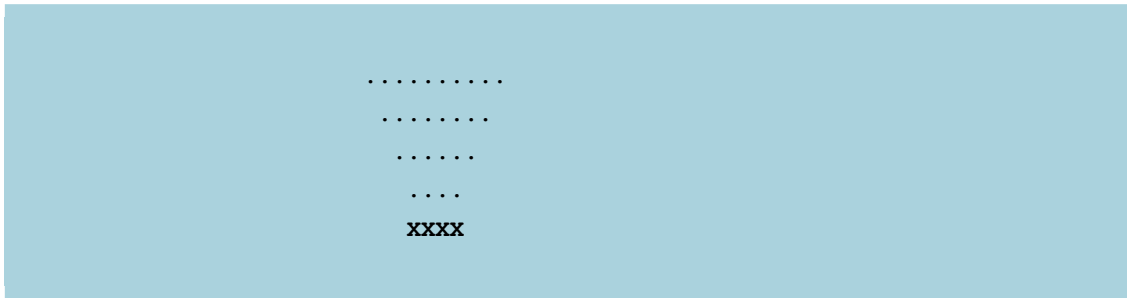
**Charge:** 0

**Short Range:** 1 to 10 cells

**Middle Range:** 11 to 20 cells

**Long Range:** 21 to 30 cells

**Effect Zone:** The ship's width for the first cell, plus 1 width cell more at the front and back of the ship per cell away from the ship. The ship can choose to shoot either from the left or from the right at each use. The drawing will be more clear. The 'x' represent the ship and the '.' the effect zone.



```
.....  
.....  
.....  
....  
....  
xxxx
```

- **NAUTICAL SPEAR**

**Charges :** 0

**Short Range:** 1 to 30 cells

**Middle Range:** 31 to 60 cells

**Long Range:** 61 to 90 cells

**Effect Zone:** A straight line or column 1 cell wide that start from the front of the ship.

- **HEAVY NAUTICAL SPEAR**

**Charges:** 3

**Short Range:** 1 to 30 cells

**Middle Range:** 31 to 60 cells

**Long Range:** 61 to 90 cells

**Effect Zone:** A straight line or column of 1 cell wide that start from the front of the ship.

**Special:** The shooter must be stationary to be able to shoot. Furthermore, as long as the shoot destroys its target, the dice can be thrown again to attempt to destroy a target located behind the original one, as long as the maximum range of the weapon isn't reached.

- **CLOSE RANGE SUPER-HEAVY-AUTOMATIC WEAPON**

**Charges:** 5

**Short Range:** 1 to 3 cells

**Middle Range:** 4 to 7 cells

**Long Range:** 8 to 10 cells

**Effect Zone:** Any cell within range.

- **MACRO CANON**

**Charges:** 0

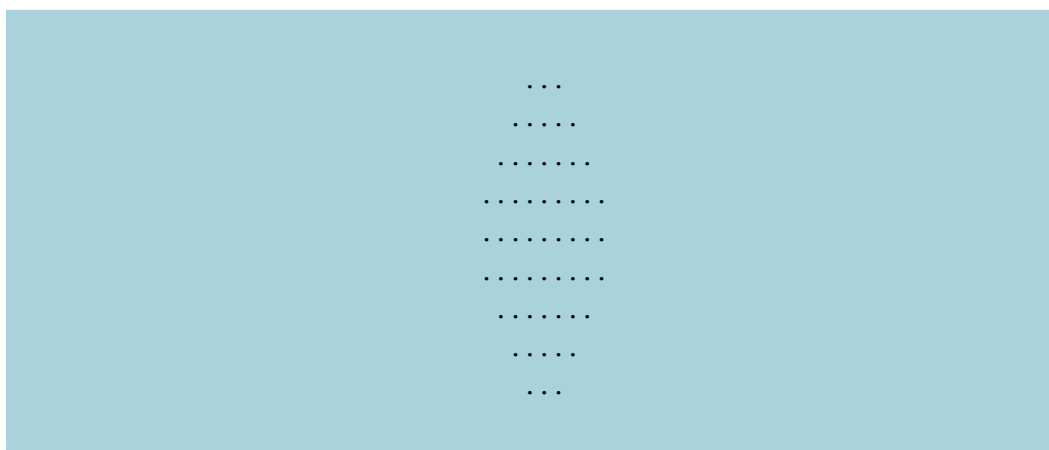
**Short Range:** 1 to 10 cells

**Middle Range:** 11 to 20 cells

**Long Range:** 21 to 30 cells

**Effect Zone:** A straight line or column of 1 cell wide that start from the front of the ship.

**Special :** The explosion of the projectile reaches multiple cells. The center of the explosion is located on the closest target's hit cell from the shooter. The explosion covers "a circle" of 9 cells:

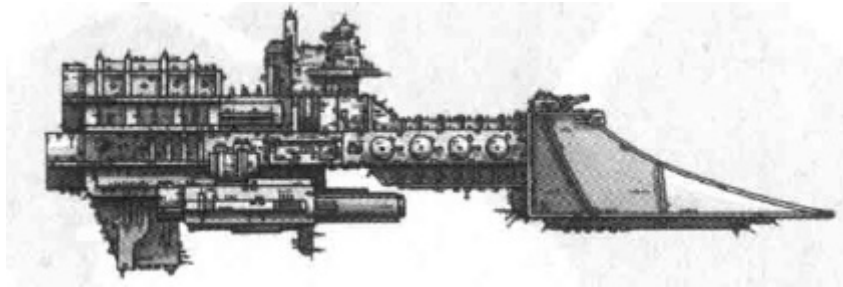


Each target covered, even partially by the "circle" receives a number of damage points matching the dice throw. Useful to vaporize the fleet of fast little scouts.



### 3.3.7 Ships examples

- IMPERIAL FRIGATE



**Name:** "Honorable Duty"

**Size:** 1x4 cells

**Hull points:** 5

**PP:** 10

**Speed:** 15

**Handling:** 4

**Shield:** 0

**Weapons:** Side laser batteries

- IMPERIAL DESTROYER



**Name:** "Sword Of Absolution"

**Size:** 1x3 cells

**Hull points:** 4

**PP:** 10

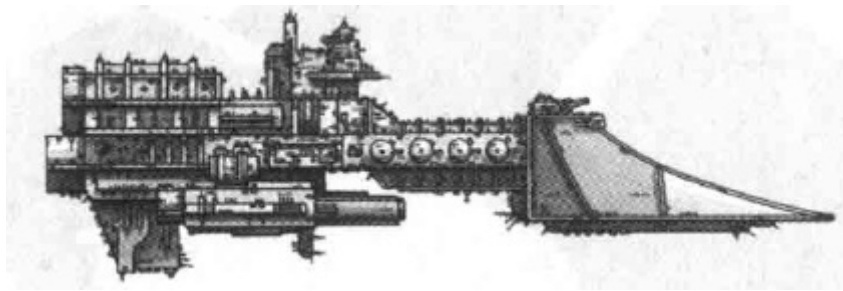
**Speed:** 18

**Handling:** 3

**Shield :** 0

**Weapons:** Side laser batteries

- IMPERIAL FRIGATE



**Name:** "Hand Of The Emperor"

**Size:** 1x4 cells

**Hull points:** 5

**PP:** 10

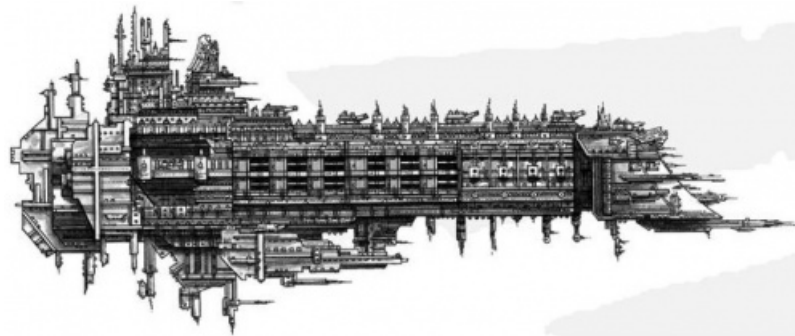
**Speed:** 15

**Handling:** 4

**Shield:** 0

**Weapons:** Nautical Lance

- IMPERIAL IRONCLAD



**Name:** "Imperator Deus"

**Size:** 2x7 cells

**Hull points:** 8

**PP:** 12

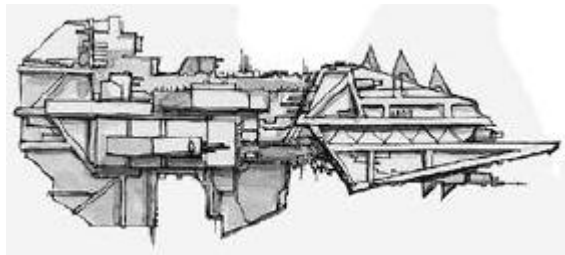
**Speed:** 10

**Handling:** 5

**Shield:** 2

**Weapons:** Two Nautical Lances

- **ONSLAUGHT ATTACK SHIP**



**Name:** "Orktobre Roug'"

**Size:** 1x2 cells

**Hull points:** 4

**PP:** 10

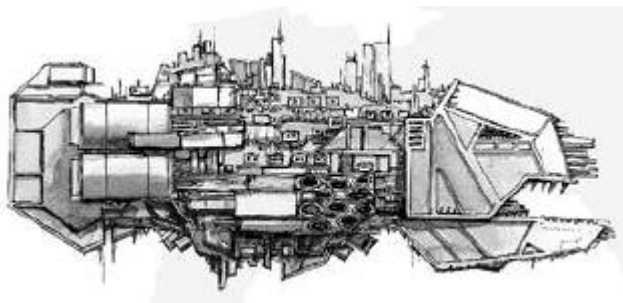
**Speed:** 19

**Handling:** 3

**Shield:** 0

**Weapons:** Side laser batteries

- **TERROR SHIP**



**Name:** "Ork'N'Roll !"

**Size:** 1x5 cells

**Hull points:** 6

**PP:** 10

**Speed:** 12

**Handling:** 4

**Shield:** 0

**Weapons:** Close range super heavy automatic weapon - Makro Kanon

### 3.4 Additional comments

- Discuss with your peers and get their opinion on the best way to use this or that notion of OOP in PHP for this exercise. The components of this game are a perfect exercise for that.
- Prefer a limited - but playable version - of the game rather than being tempted to do it all and end up with nothing. Your objective is to practice OOP, not to code an extraordinary game [Even if we'd be happy if you did that].
- To have two identical ships that can move on an empty grid and be shot at with an identical weapon is the strict minimum.
- An average game should contain 2 fleets of equal strength composed of 5 to 10 ships each.
- Don't hesitate to post on Slack your weapon and/or vessels ideas. The Warhammer 40000 world has a lot of awesome factions and has even more awesome and numerous weapons. This way you will raise easily that way the level of your game.
- You can modify some parameters of the game as long as they do not modify the nature of the rules and Warhammer 40000's universe.
- The provided illustrations come from <http://wh40k.lexicanum.com/>. All rights reserved to all concerned etc.
- For the Emperor.Q