

# C++ OOP – Exam (4 September 2022)

Write C++ code for solving the tasks on the following pages.

Code should compile under the C++11 standard.

Submit your solutions here: <https://judge.softuni.org/Contests/3597/CPlusPlus-OOP-Regular-Exam-4-September-2022>

Only source code will be accepted as solution for each task.

## 3. Diablo

Time for some classics! What else if not the father of all hack n slash RPGs?

Dive in the world of Diablo where the mighty Barbarian is stuck in a deadly battle versus the swift Amazon.

Your task is to study the code and implement the missing functionalities.

### General rules

- The game consists of 2 heroes. Barbarian with index 0 and Amazon of index 1.
- Each hero has 3 attributes. Health, mana and manaRegenRate. If you don't know what mana is, think of it as "currency" needed to cast a spell

```
struct VitalData {
    int health { 0 };
    int currMana { 0 };
    int maxMana { 0 };
    int manaRegenRate { 0 };
};
```

- The heroes take turns attacking each other. First the Barbarian attacks the Amazon, then the Amazon attacks the Barbarian, etc...
- A simple turn consists of: one of the heroes' attacks, the other defends and after that the attacker regains some mana (based on his/hers manaRegenRate). NOTE: A hero mana cannot exceed its maximum value.
- The game is played until one of the heroes dies (his/hers) health indicator becomes 0 (or below zero)
- Each hero has 2 active spells and a passive spell.
- Active spell means something the hero acts (attacks) with
- Passive spell means a bonus that the hero can add to his/hers attack or defends
- The stronger active spell requires mana to be casted.
- When the hero attacks, if he/she has enough mana for his stronger spell – he/she always casts that spell and the required mana for the spell is subtracted from his/her mana pool.
- If the hero doesn't have enough mana for his stronger spell – he/she uses the weaker spell. The weaker spell requires no mana (can be casted for 0 mana).
- Each spell has the following attributes:

```
struct SpellData {
    std::string name;
    int damage { 0 };
    int manaCost { 0 };
};
```

## Heroes' passive abilities

### Barbarian

Each 3<sup>rd</sup> defends of the Barbarian results in the hero blocking half of the incoming damage.

Example: let's assume that the barbarian will always be attacked with 20 damage

On his defends number 1 and 2 he takes 20 damage

On his defends number 3 he takes 10 damage

On his defends number 4 and 5 he takes 20 damage

On his defends number 6 he takes 10 damage

### Amazon

Each 2<sup>nd</sup> attack of the has 25% increased damage.

Example: let's assume that the Amazon will always be dealing with 40 damage

On her attack number 1 she deals 40 damage

On her attack number 2 she deals 50 damage

On her attack number 3 she deals 40 damage

On her attack number 4 she deals 50 damage

## Input

The first 1<sup>st</sup> and 2<sup>nd</sup> rows of data representing the VitalData for each Hero.

Each of those rows represents the hero "health", "maxMana" and "manaRegenRate" in that order.

The 3<sup>rd</sup> and 4<sup>th</sup> rows of data represents the Barbarian spells.

The 3<sup>rd</sup> row is his weaker spell – "spellName" and "spellDamage"

The 4<sup>th</sup> row is his stronger spell – "spellName", "spellDamage" and "spellManaCost"

The 5<sup>th</sup> and 6<sup>th</sup> rows of data represents the Amazon spells.

The 5<sup>th</sup> row is her weaker spell – "spellName" and "spellDamage"

The 6<sup>th</sup> row is her stronger spell – "spellName", "spellDamage" and "spellManaCost"

## Output

You need to generate 3 prints for each turn of the game.

- In the hero "castSpell()" method you should print:

**"Hero** casting *spellName* for *manaCost* mana"

Where:

Hero – the name of the attacking hero (Barbarian or Amazon)

spellName – the name of the spell that is being casted

manaCost – what is the cost of the current spell that is being casted

- In the hero "takeDamage()" method you should print:

**"Hero** took *D* damage and is left with *H* health"

Where:

Hero – the name of the attacking hero (Barbarian or Amazon)

D – the damage the hero is receiving from his opponent

H – the health that the hero is left with after the attack

- In the hero "renewMana()" method you should print:

**"Hero** regained *M* mana for up to *T*"

Where:

Hero – the name of the attacking hero (Barbarian or Amazon)

M – regained mana by the hero

H – current mana of the hero after the regeneration

## Restrictions

Hero mana cannot be negative – 0 is the minimum

Hero mana cannot exceed the hero max mana value

The damage of each of the heroes' spells is **guaranteed** to be divisible by 4 with no remainder.

Example: 4, 44, 72, 112

Time limit: 500ms (0.50s)

Memory limit: 16 MB

## Examples

Input	Output
100 50 5 120 40 8 Bash 24 Whirlwind 44 30 PowerStrike 28 LightningArrow 60 20	==== Staring turn 1 ==== Barbarian casting Whirlwind for 30 mana Amazon took 44 damage and is left with 76 health Barbarian regained 5 mana for up to 25  ==== Staring turn 2 ==== Amazon casting LightningArrow for 20 mana

	<p>Barbarian took 60 damage and is left with 40 health  Amazon regained 8 mana for up to 28</p> <p>===== Staring turn 3 =====  Barbarian casting Bash for 0 mana  Amazon took 24 damage and is left with 52 health  Barbarian regained 5 mana for up to 30</p> <p>===== Staring turn 4 =====  Amazon casting LightningArrow for 20 mana  Barbarian took 75 damage and is left with -35 health  Amazon has won!</p>
<p>190 30 20  140 40 8  Bash 24  Whirlwind 44 30  PowerStrike 32  LightningArrow 60 30</p>	<p>===== Staring turn 1 =====  Barbarian casting Whirlwind for 30 mana  Amazon took 44 damage and is left with 96 health  Barbarian regained 20 mana for up to 20</p> <p>===== Staring turn 2 =====  Amazon casting LightningArrow for 30 mana  Barbarian took 60 damage and is left with 130 health  Amazon regained 8 mana for up to 18</p> <p>===== Staring turn 3 =====  Barbarian casting Bash for 0 mana  Amazon took 24 damage and is left with 72 health  Barbarian regained 10 mana for up to 30</p> <p>===== Staring turn 4 =====  Amazon casting PowerStrike for 0 mana  Barbarian took 40 damage and is left with 90 health  Amazon regained 8 mana for up to 26</p> <p>===== Staring turn 5 =====  Barbarian casting Whirlwind for 30 mana  Amazon took 44 damage and is left with 28 health</p>

	<p>Barbarian regained 20 mana for up to 20</p> <p>===== Staring turn 6 =====</p> <p>Amazon casting PowerStrike for 0 mana</p> <p>Barbarian took 16 damage and is left with 74 health</p> <p>Amazon regained 8 mana for up to 34</p> <p>===== Staring turn 7 =====</p> <p>Barbarian casting Bash for 0 mana</p> <p>Amazon took 24 damage and is left with 4 health</p> <p>Barbarian regained 10 mana for up to 30</p> <p>===== Staring turn 8 =====</p> <p>Amazon casting LightningArrow for 30 mana</p> <p>Barbarian took 75 damage and is left with -1 health</p> <p>Amazon has won!</p>
<p>240 40 10</p> <p>190 40 15</p> <p>DoubleSwing 24</p> <p>Frenzy 44 30</p> <p>Jab 16</p> <p>PlagueJavelin 60 30</p>	<p>===== Staring turn 1 =====</p> <p>Barbarian casting Frenzy for 30 mana</p> <p>Amazon took 44 damage and is left with 146 health</p> <p>Barbarian regained 10 mana for up to 20</p> <p>===== Staring turn 2 =====</p> <p>Amazon casting PlagueJavelin for 30 mana</p> <p>Barbarian took 60 damage and is left with 180 health</p> <p>Amazon regained 15 mana for up to 25</p> <p>===== Staring turn 3 =====</p> <p>Barbarian casting DoubleSwing for 0 mana</p> <p>Amazon took 24 damage and is left with 122 health</p> <p>Barbarian regained 10 mana for up to 30</p> <p>===== Staring turn 4 =====</p> <p>Amazon casting Jab for 0 mana</p> <p>Barbarian took 20 damage and is left with 160 health</p> <p>Amazon regained 15 mana for up to 40</p> <p>===== Staring turn 5 =====</p> <p>Barbarian casting Frenzy for 30 mana</p> <p>Amazon took 44 damage and is left with 78 health</p>

Barbarian regained 10 mana for up to 10

===== Staring turn 6 =====

Amazon casting PlagueJavelin for 30 mana  
Barbarian took 30 damage and is left with 130 health  
Amazon regained 15 mana for up to 25

===== Staring turn 7 =====

Barbarian casting DoubleSwing for 0 mana  
Amazon took 24 damage and is left with 54 health  
Barbarian regained 10 mana for up to 20

===== Staring turn 8 =====

Amazon casting Jab for 0 mana  
Barbarian took 20 damage and is left with 110 health  
Amazon regained 15 mana for up to 40

===== Staring turn 9 =====

Barbarian casting DoubleSwing for 0 mana  
Amazon took 24 damage and is left with 30 health  
Barbarian regained 10 mana for up to 30

===== Staring turn 10 =====

Amazon casting PlagueJavelin for 30 mana  
Barbarian took 60 damage and is left with 50 health  
Amazon regained 15 mana for up to 25

===== Staring turn 11 =====

Barbarian casting Frenzy for 30 mana  
Amazon took 44 damage and is left with -14 health  
Barbarian has won!