

Project 6: The Hourglass

COSC 1423 | Fall 2023

Instructor: Megan Avery

Topics: for loops, nested loops

Goal: Draw an hourglass for a billionaire based on their preferred specs.

Turn In Instructions: See Project FAQ

Objective Definition (15 pts): See Planning Guide

Style (10 pts): See Style Guide

Implementation (55 pts):

An eccentric billionaire has commissioned a program that can make him hourglasses from size 1 to 5. He would also like to be able to pick the “sand” in his hourglass.

The billionaire (user) will give the size for their hourglass, which will be validated to be between 1 and 5 inclusive. Then the billionaire will indicate what “sand” they want to use, this will always be a single character.

Using nested for loops print the billionaire’s hourglass on the screen (see sample runs).

- You **must** use nested loops, you cannot use string multiplication.
- *Hint: figure out the math for each section, then do your loops. Focus on one section at a time.*

Test Cases (10 pts): See Project FAQ

Followup Questions (10 pts):

1. How long did this project take you?
2. Did you complete the extension?
3. Explain how you determined how to print the hourglass structure.
4. What did you learn from this project?
5. Explain your usage of AI in this project. What type of queries did you use during the development process?

Extension (+8 pts):

Update your code to draw a butterfly after the hourglass (see butterfly sizes). The butterfly will use the same size and character as the hourglass. No extra input is taken when the extension is implemented.

Sample Run 1: Size 1 with # sand

Hourglass time!

Size: 7

Invalid try again: 1

Sand: #

-

-

Sample Run 2: Size 2 with % sand

Hourglass time!

Size: 2

Sand: %

\$\$\$
\$
\$\$\$

Sample Run 3: Size 3 with o sand

Hourglass time!

Size: 3

Sand: o

ooooo
ooo
o
ooo
ooooo

Sample Run 4: Size 4 with * sand

Hourglass time!

Size: 4

Sand: *

*

Sample Run 5: Size 5 with @ sand

Hourglass time!

Size: -1

Invalid try again: 8

Invalid try again: 5

Sand: @

@@@@@@@@@
@@@@@@@@
@@@@@
@@@
@
@@@
@@@@@
@@@@@@@@@
@@@@@@@@@@@@@

Butterfly Sizes:

Size 1:

```
|*|
```

Size 2:

```
|* *|
```

```
|***|
```

```
|* *|
```

Size 3:

```
|*   *|
```

```
|** **|
```

```
|*****|
```

```
|** **|
```

```
|*   *|
```

Size 4:

```
|*       *|
```

```
|**      **|
```

```
|***     ***|
```

```
|*****|
```

```
|***     ***|
```

```
|**      **|
```

```
|*       *|
```

Size 5:

```
|*           *|
```

```
|**          **|
```

```
|***         ***|
```

```
|*****      *****|
```

```
|*****      *****|
```

```
|*****      *****|
```

```
|***         ***|
```

```
|**          **|
```

```
|*           *|
```