



2.3 The depth grid

Sensing · Robot club · about 20 min

Name _____

Class _____

Date _____

What this lesson is about

64 readings, 8 columns: seeing left and right, not just ahead.

- `tof_grid()`
- Seeing it as a picture
- Columns are directions
- Left and right

Questions

7 marks in all

1. The grid is 8 rows of 8, and a reading is at `grid[row * 8 + col]`. At what position in the list is row 2, column 5? [1 mark]

2. Which rows of the grid look level, straight ahead? [1 mark]
☐ A Rows 2 and 3
☐ B Rows 0 and 1
☐ C Rows 6 and 7
☐ D All eight rows
3. Why are the bottom rows of the grid always close readings? [1 mark]
☐ A The sensor sits 3 cm above the mat, so the bottom rows see the mat a few centimetres ahead
☐ B There is always a wall in front
☐ C The bottom rows are broken
☐ D The robot is always driving uphill
4. Which direction does column 0 look? [1 mark]
☐ A About 20 degrees to the left
☐ B About 20 degrees to the right
☐ C Straight ahead
☐ D Straight down at the mat
5. What does this program print? [1 mark]

```
row = [30, 90, 60, 20]
line = ""
for d in row:
    line += "#" if d < 40 else "+" if d < 80 else "."
print(line)
```

6. What does this program print?

[1 mark]

```
left_side = 45
right_side = 80
if left_side < right_side:
    print("more room on the right")
else:
    print("more room on the left")
```

7. The level-row readings for columns 0 to 7 are 35, 38, 90, 120, 110, 40, 33, 30. Which way is the way through?

[1 mark]

- ☐ A Column 3, about straight ahead
- ☐ B Column 0, the left edge
- ☐ C Column 7, the right edge
- ☐ D Column 5

The task: widest gap

There are two blocks ahead, one left and one right, with a gap between. Without moving, print `clear: column <n>` for the column with the largest reading in the level rows: that is the way through.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()

# 64 distances, 8 rows of 8
grid = tof_grid()
best_col = 0
best = 0
# find the column whose reading in the level rows is the largest
print("clear: column", best_col)
```

Plan your program here, then type it in and press Run.



Do it on the robot

www.bugbotlab.com/learn/2-3-the-depth-grid/

The simulator checks it and tells you when it passes. Nothing to install, no account.

Challenges

1. Print the grid picture every half second while driving slowly forward.
2. Write `column_distances()` that returns the 8 per-column numbers from the level rows as a list.
3. Steer towards the widest gap: strafe left if it is in columns 0 to 3, right if 4 to 7, then drive forward.