



Filawhackers: mini 3D printable Boomwhackers



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Summary

Some playable, almost in tune, small scale and cheap boomwhackers that can be 3D printed.



2.50 hrs



1 pcs



0.32 mm



0.50 mm



PLA



85 g



Creality
Ender 3 V2

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Tags: [music](#) [tubes](#) [colorful](#) [notes](#) [boom](#) [pipes](#) [tune](#)
[whacker](#) [boomwhacker](#) [polywhackers](#)

How to print:

Quick summary:

- Material: PLA (I recommend not using silk filament)
- Print using vase mode or spiralize
- 0.5mm line width
- 0.3mm layer height
- 0 bottom layers

- 0s minimum layer time
- Print all parts seperately
- Choose the right folder for your printer size (25cm or 30cm+ build height).
- Press fit parts together if necessary

Should be about 85g of PLA in total and with 50mm/s wall speed you can print all of them in 2.5 hours. I recommend a lower print speed (30mm/s wall speed) if you want a perfect finish of the parts, but this will increase printing time to 4 hours in total.

Full explanation:

I created whackers for the C-major scale between C5 and C6.

Available whackers: C5, D5, E5, F5, G5, A5, B5, C6

Material: PLA

Each whacker can be printed using the vase mode (prusaslicer) or spiralize mode (cura). You have to set the bottom layers to 0, so only the outline will be printed. They are (almost) in tune with a wall thickness of 0.5mm and a layer height of about 0.3mm (I used 0.32mm). Changing the wall thickness changes the tune, volume and resonance slightly. Layer height has no effect, it only increases print time.

Whackers C5 and D5 are longer than 250mm (295.9 and 263.6mm respectively). Since the most common printers, including mine, don't have a tall enough build volume to accomodate for the length, I cut them into two pieces (short and long). You can print both parts in using the same settings and press fit them together. Make sure to print them seperately for vase mode to work. Glue is not necessary (I did not use glue in the demo video), but you can add it if you want. If your printer has a taller build volume, you can print the regular C5 and D5 versions in one go.

I recommend increasing your nozzle temperature slightly to give the layers a good chance to bond.

Tip: decrease or remove the minimum layer time if you have sufficient cooling. This will decrease the printing time drastically.

Recommended colors:

C5- Red (or pink)

D5- Orange

E5- Yellow (or gold)

F5- Green

G5- Dark green (or light blue)

A5- Blue

B5- Purple

C6- Red (or pink)

I had to use light blue since I don't have dark green PLA and blue since I don't have yellow PLA and my silk gold one broke. These colors create a rainbow for the wackers and are in-line with the original [Boomwhackers](#).

You can also go crazy with the colors! They don't affect the sound ;)

How I designed this

I saw this contest and wanted to create an instrument. I started googling some instruments and when I saw these it immediately clicked. Perfect for printing and fun colors!

I started by calculating the length for note A5. This note should have a frequency of 880Hz. With the standard formula for an open ended tube (harmonic number 1) I can calculate the length:

$$L = v / 2f$$

For $f = 880\text{Hz}$ and $v = 343\text{m/s}$ (speed of sound), L will be 196mm. I printed a tube of this length and of diameter 25mm. When I whacked the tube, it produced a frequency of about 790Hz measured using an app on my phone. This means that $v = 343\text{m/s}$ is probably not the correct constant for these tubes. I adjusted the value of v , by using this rewritten formula:

$$v = 2 \cdot L \cdot f = 309.7\text{m/s}$$

With the new value for L , based on real life measurements, we can calculate the lengths for all other notes and put them in the table below:

Color	Note	Frequency (Hz)	L (mm)
Red/pink	C5	523.25	295.9
Orange	D5	587.33	263.6
Yellow/gold	E5	659.26	234.9
Green	F5	698.46	221.7
Dark green/light blue	G5	783.99	197.5
Blue	A5	880.00	176.0
Purple	B5	987.77	156.8

Color	Note	Frequency (Hz)	L (mm)
Red/pink	C6	1046.50	148.0

I tested different wall thicknesses and diameters and found that these do make a difference:

Bigger diameters produce a more audible sound than smaller diameters and also lower the pitch slightly. You can try to go bigger than 25mm, but this will make the tubes weaker and increase printing time.

Thicker walls hurt more when you hit your leg, but maybe more importantly, it sounds more staccato (shorter). I tried 0.7, 0.5 and 0.3mm walls. I found that 0.5 is a good compromise between strength and a good sustained sound. Whereas 0.3mm walls are too thin to hold up to your whacking!

Model files



Split parts (for 25cm tall build volume)

10 files

whacker-1-c5-short-piece-46mm.stl

☐ Press fit into C5 - long piece

whacker-1-c5-long-piece-250mm.stl

whacker-2-d5-short-piece-46mm.stl

☐ Press fit into D5 - long piece

whacker-2-d5-long-piece-217mm.stl

whacker-3-e5-235mm.stl

whacker-4-f5-222mm.stl

whacker-5-g5-198mm.stl

whacker-6-a5-176mm.stl

whacker-7-b5-157mm.stl

whacker-8-c6-148mm.stl



Full length parts (for 30cm+ tall build volume)

8 files

whacker-1-c5-296mm.stl

whacker-2-d5-264mm.stl

whacker-3-e5-235mm.stl

whacker-4-f5-222mm.stl

whacker-5-g5-198mm.stl

whacker-6-a5-176mm.stl

whacker-7-b5-157mm.stl

whacker-8-c6-148mm.stl

Print files

filawhackers.gcode

🌀 PLA 📏 0.50 mm 📏 0.32 mm ⌚ 2.50 hrs ⚖️ 85 g

❏ This gcode is provided only to show print settings and estimates. Do not use this file!

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