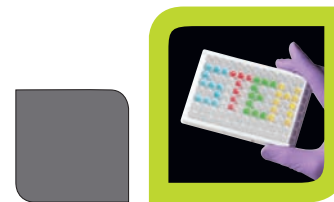


STEAM Activity



Microplate Art Pipetting: Science and Art Unite!

In this activity your students will be both artist and scientist.

Accurate pipetting is an essential skill in the laboratory and this fun activity provides practice for your students. They will pipet microliter volumes, assess pipetting accuracy, and navigate 96-well microplates to create works of art. For an instructional video on using micropipets visit, bio-rad.com/web/WatchMicropipet.

Equipment Required

- | | |
|---|---------------|
| <ul style="list-style-type: none"> Adjustable micropipets or fixed volume micropipets
2–20 μl (#166-0551EDU or #166-0506EDU)
or 20–200 μl (#166-0552EDU or #166-0507EDU)
or 20 μl (#166-0513EDU)
or 50 μl (#166-0515EDU) | 1 per student |
| <ul style="list-style-type: none"> Scale (for testing accuracy of pipetting) | ≥ 1 |
| <ul style="list-style-type: none"> Beaker and stir sticks (for mixing colored waters) | 1 per color |

Supplies Required

- | | |
|--|-----------------|
| <ul style="list-style-type: none"> Pipet tips, 20–200 μl, BR-35 (#223-9035EDU), or TBR-35 (#223-9347EDU) | 1 bag or 1 rack |
| <ul style="list-style-type: none"> Microplates with 12-well strips (8 rows of 12 wells), 3 plates (#166-2405EDU) | 1 per student |
| <ul style="list-style-type: none"> EZ Micro™ Test Tubes, 2 ml (#223-9430EDU) | 1 bag |
| <ul style="list-style-type: none"> Disposable plastic transfer pipets (#166-0480EDU) | 1 bag |
| <ul style="list-style-type: none"> Water | |
| <ul style="list-style-type: none"> Food coloring | |

STEAM Activity



Teacher Setup

- 1) Choose the volume (20–150 μ l) of liquid you'd like to be pipetted into each well of the microplate.
- 2) Create your own templates or choose from Bio-Rad's predesigned templates.
- 3) Set up sample microplates for your students to use as templates. These can be displayed on an overhead projector or you can print out copies for students.
- 4) Premix food coloring and water in beakers to make the desired colors of water. Use disposable plastic transfer pipets to aliquot the colored water into test tubes for student use. **Note:** Make about 20% more colored water than your class will need to account for pipetting errors.
- 5) Share your students' microplate artwork by submitting a photo and your contact details to Bio-Rad's Explorer Community (bio-rad.com/en-us/applications-technologies/science-artwork).

Student Activity

- 1) Weigh the empty microplate and write down results.
- 2) If using an adjustable micropipet, set the micropipet to the appropriate volume.
- 3) Pipet colored water into the appropriate wells of your microplate to match the template.
- 4) Weigh your completed microplate and write down results.
- 5) Calculate the accuracy of your pipetting (Volume = ml, Mass = g and Accuracy = %).

a. Actual volume = $1 \frac{\text{ml}}{\text{g}} \times [\text{Mass of completed microplate} - \text{Mass of empty microplate}]$

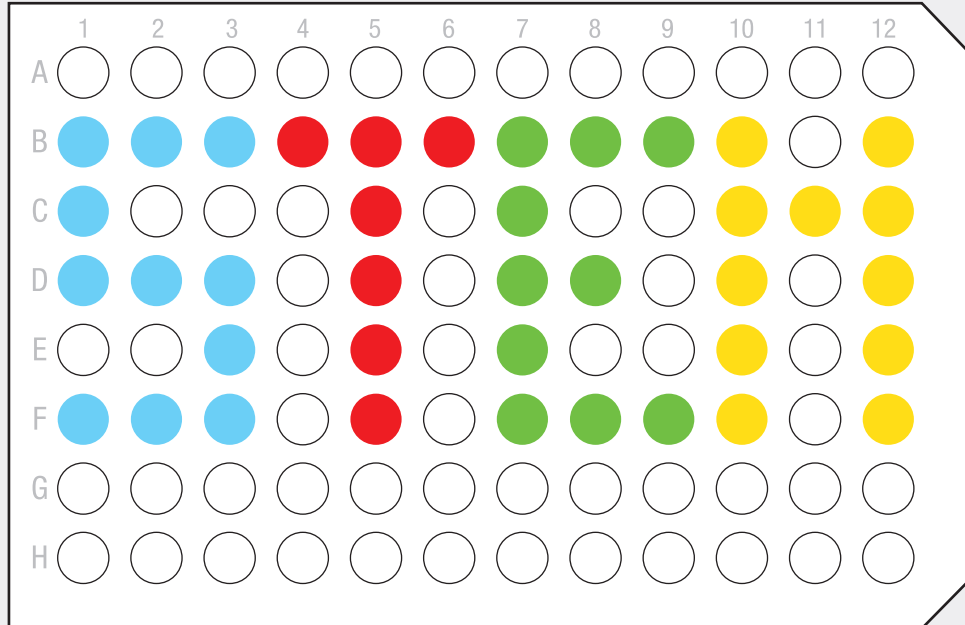
b. Forecast volume = Volume of liquid pipetted per well x Number of wells filled

c. Accuracy = $100 \% \left(1 - \left| \frac{\text{Actual volume} - \text{Forecast volume}}{\text{Actual volume}} \right| \right)$

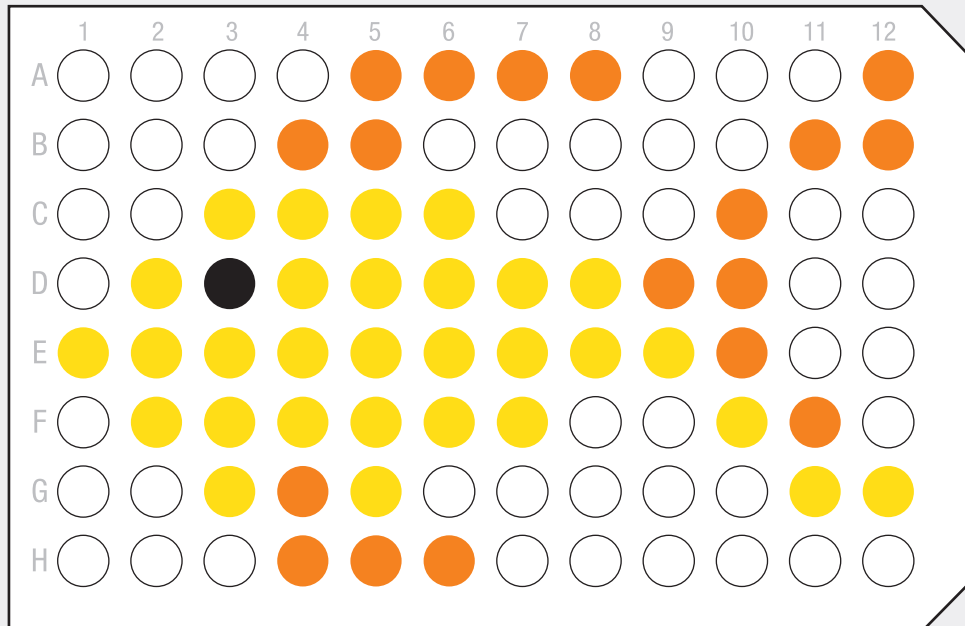
STEAM Activity Templates



STEM



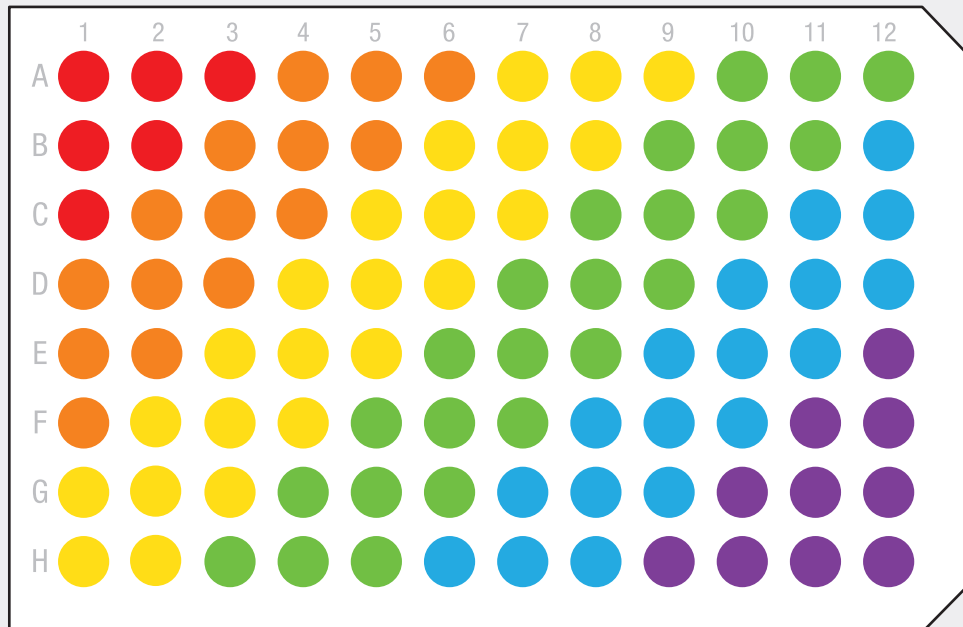
Angelfish



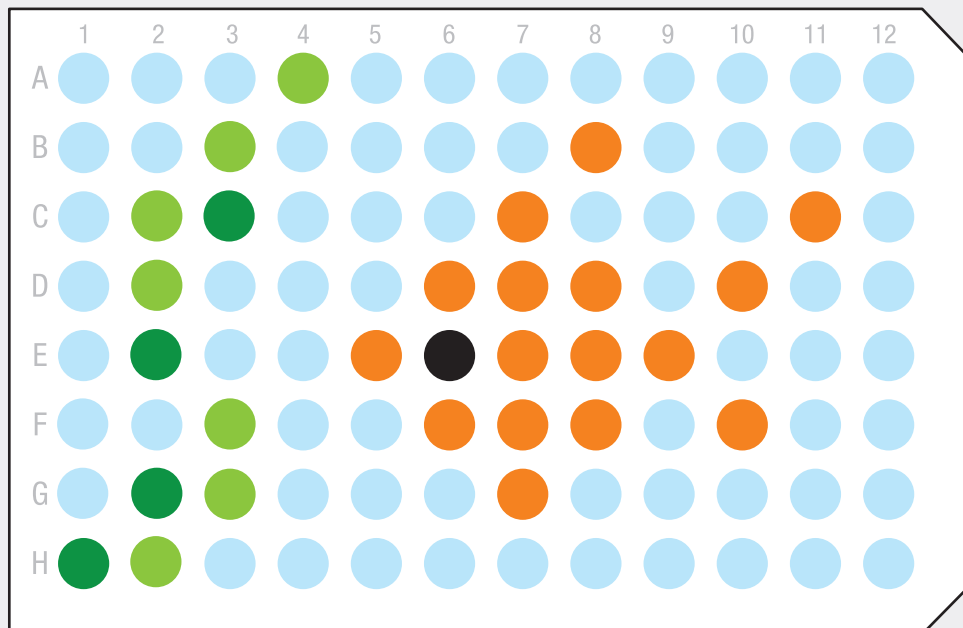
STEAM Activity Templates



Rainbow



Goldfish



STEAM Activity Templates



Create
Your Own
Templates

	1	2	3	4	5	6	7	8	9	10	11	12
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G	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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