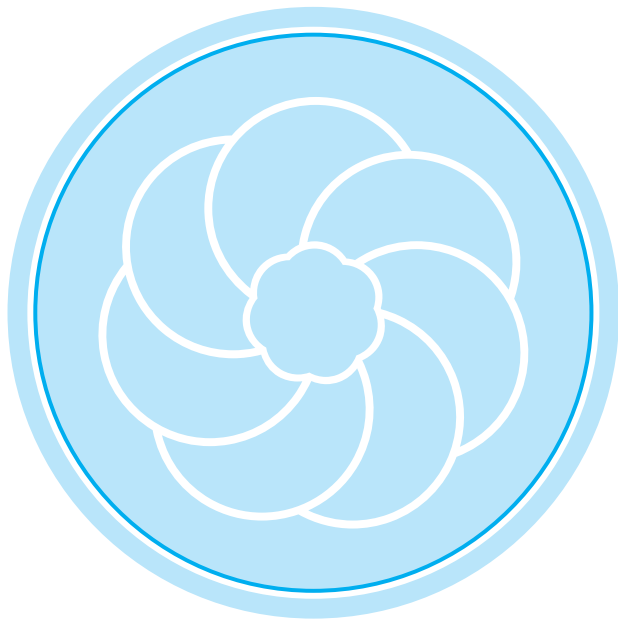
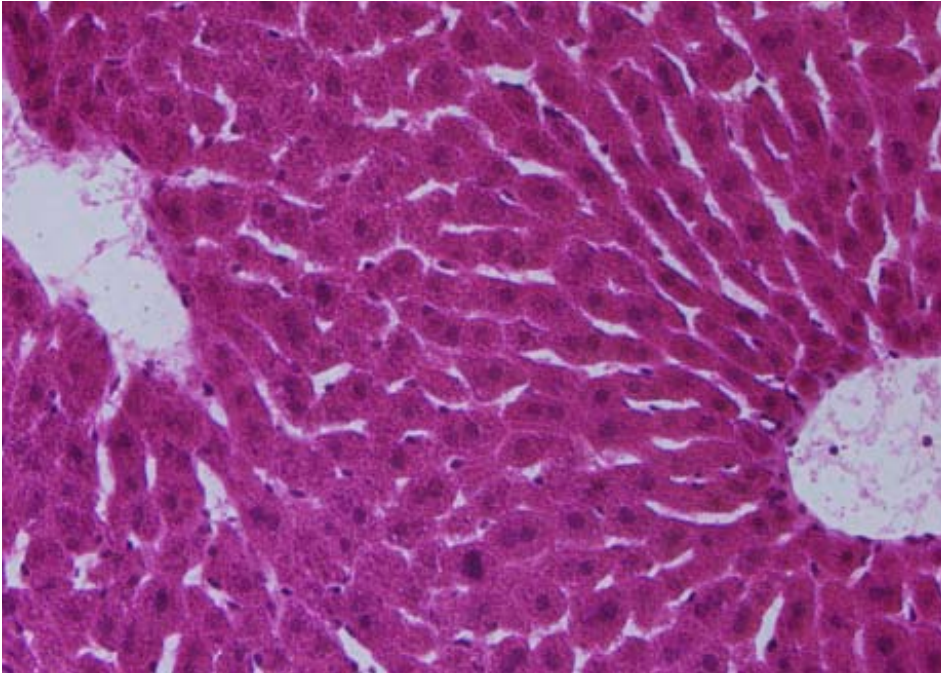


# Exploring Stem Cells: The Benefits of Stem Cell research

Steven Kielbasa



Art Institute of Tampa  
GR4900 Graphic Design Capstone  
Instructor Ms. Beverly Fanning  
Fall 2011 Quarter

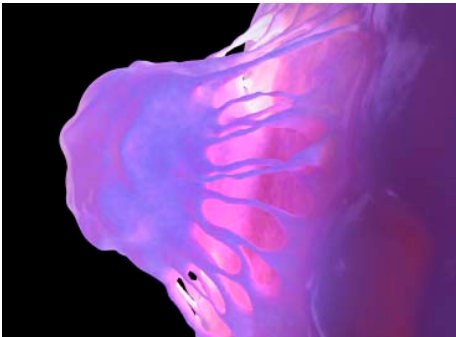


## THE PROBLEM

Stem cell research is an often discussed issue in today's society with zealots on both sides attacking one another. On one side of the argument are the majority of scientists favoring further research, seeing the potential benefits for mankind that would come from continued research; and on the other side are concerned citizens, who for one reason or another, often religious, are morally opposed to further research; and in the middle is the average citizen who does not quite understand just what exactly stem cells are and why they are so controversial, and because of that cannot choose a side or may do so blindly.

Those who oppose further research cite the high cost of stem cell research. The cost they speak of is not monetary but rather the fact that in order to harvest human embryonic stem cells (hESCs) scientists must rip apart embryos, effectively destroying them. Most in opposition consider this a murderous act, as an unborn child is lost. Furthermore, religion plays a large part in the debate. Devout Christians, and other religions alike, find the research sinful due to the act of 'murdering' a human that is required for research. In addition to that, those in opposition also detest the idea of 'playing god,' which they feel is what scientists are doing when performing cellular and geneo-manipulative research such as the study of hESCs.

The side against stem cell research is considerably more outspoken than those in favor of ongoing research. Soon a new generation will grow up hearing only of the horrors of stem cell research and nothing of the world changing advancements that stand to be made.





## THE SOLUTION

Most who oppose stem cell research do so without fully understanding the benefits that can come from further research. There are those who oppose research that do grasp just how monumental the rewards of stem cell research are and typically these people only oppose the use of human embryonic stem cells and have no qualms using adult stem cells for continued research.

As a general rule, the majority of people are set in their ways often with little chance of changing their opinions. Considering this fact, it was decided to instead target children with open minds, who, in all likelihood, have yet to build a bias regarding stem cells.

These children will be taught the numerous benefits that will come from stem cells research in an exciting, fun, and interactive environment. The way this will be achieved is through the development and deployment of a museum exhibit showcasing just how powerful stem cells are, what they can do now, and what they will eventually be able to do at Tampa's Museum of Science and Industry otherwise known as MOSI. Eventually the exhibit would tour the country visiting similar museums.

## On Demand Organ Printing

Medical Advancement

Using adult stem cells harvested from the patient doctors will be able use 3D printing technology to "print" an organ.



# SWOT ANALYSIS

## STRENGTHS

- Large captive audience
- Simple language
- Interactive
- Open-minded audience

While museum guests are free to come and go as they please, they feel obligated to experience every exhibit. While there they are captivated by interactivity that teaches them with simple language.

## WEAKNESSES

- Less than desirable appeal to secondary audience
- Adults with biases

While designed to interest people of all ages the exhibit is target at children and young adults; some older people may not be interested or may come with a preconceived view on stem cell research.

## OPPORTUNITIES

- In an respected learning environment
- Children are easily attracted to interactive components
- Fun doesn't feel like learning

When people are having fun they don't feel like they are learning which is an activity many people don't like. Being a part of MOSI goes a long way towards establishing the credibility of the information.

## THREATS

- Boycotting by those in opposition to stem cell research
- Cost of admission

Adults may protest the exhibit and boycott it by keeping their children from going to the exhibit. Given the current economy there is the possibility that people cannot afford to go to MOSI

## PERSONAL REFLECTION

Throughout this project I've had a lot of doubts. I wasn't sure that the project would come together as a whole. Despite the doubts, I could not think of any better solutions; which is something I began trying to figure long before I had even finished my research paper. With no other good idea I had little choice but to keep going on with the project as it stands now. Obviously it has changed over course of completing it—it's an evolution of the original, and admittedly half-baked idea. Now that it's finished and I step back and look at the project as a whole, my doubts have been settled. I'm actually quite pleased with the final product, and I feel like it really does the subject justice.

I feel like this exhibition does effectively speak to a good portion of museum goers, not just those who fall within the primary audience. It was designed in such a way that anyone who walks through the exhibits will get something out of it. That said, it is hard to design for *everyone*, so the exhibition is still geared towards children and young adults as they are the intended primary audience as well as the primary demographic of MOSI.

Exploring Stem Cells has the potential to be a huge success, which is why I would like to see it in other museums as well. From the beginning it was always meant to be temporary as it occupies MOSI's "rotating exhibit," a space that gets a new exhibit every six to 18 months. It's my goal that when the exhibition leaves MOSI it would travel to other museums around the country spreading the message about the benefits of stem cell research to people who otherwise would probably never learn about it, making an impact on future generations.

# TARGET AUDIENCE



## Primary Audience

Age: 11 – 18

Gender: Male and Female

Race: Any

Ethnicity: Any

Language: English

Education Level: Attending Middle /  
High School

Income Level: N/A

Mobility: Rely on parents / School

Occupation: Student

Location: Tampa Area

Household Size: 2 – 4

## Secondary Audience

Age: 5 – 55

Gender: Male Female

Race: Any

Ethnicity: Any

Language: English / Spanish

Education Level: Varied

Income Level: 0 – 50,000

Mobility: Varied

Occupation: Varied

Location: Tampa Area

Household Size: 2 – 4



## Primary Persona

Name: James Sickler

Age: 13

Gender: Male

Race: Caucasian

Ethnicity: Non Hispanic

Language: English

Education Level: Attending 8th Grade

Income Level: N/A

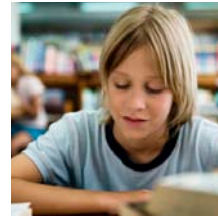
Mobility: Bus from School

Occupation: Middle School Student

Location: Hudson FL

Household Size: 3

James enjoys playing video games, reading, and building with Lego. While he has no specific interest in science, he does get good grades in both science and math. He has never heard of stem cells before.





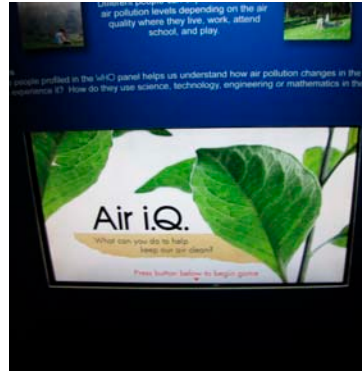
## FIELD RESEARCH



Panels used to create a room



36 week old fetus



There are lots of embedded displays



Example of educational text



Wall of monitors from the tornado exhibit



Four panel display about air pollution and its effects on people



A simple kiosk style display



Interactive kiosk display

In an effort to better understand both the space in which the exhibition will live and exhibition design in general, I went to MOSI and walked the entire complex from the perspective of a museum goer and again as a designer absorbing the nuances of the many exhibits looking for commonalities.

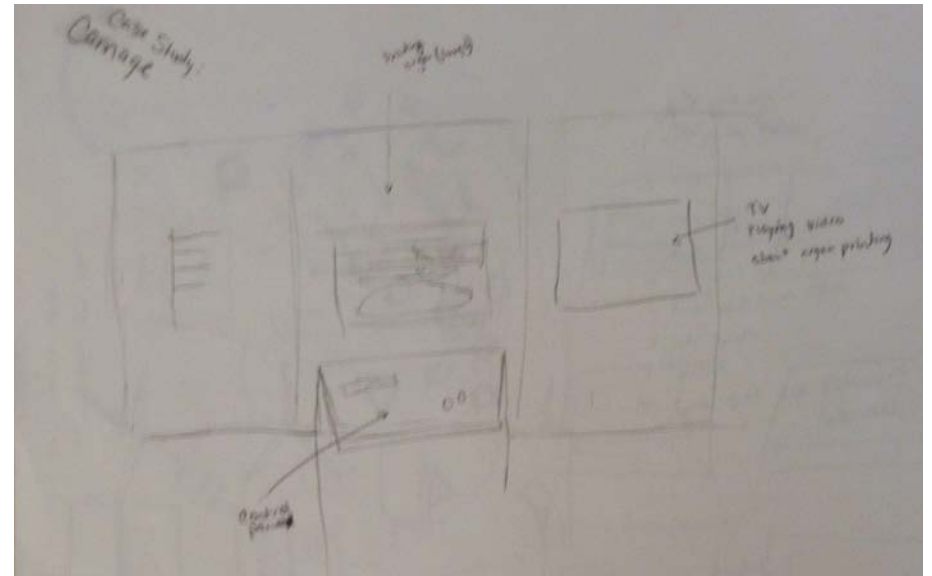
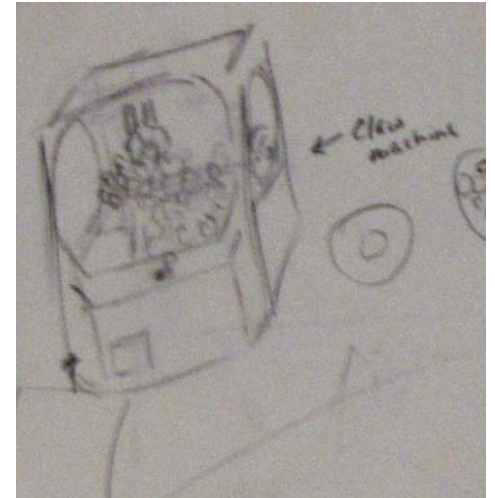
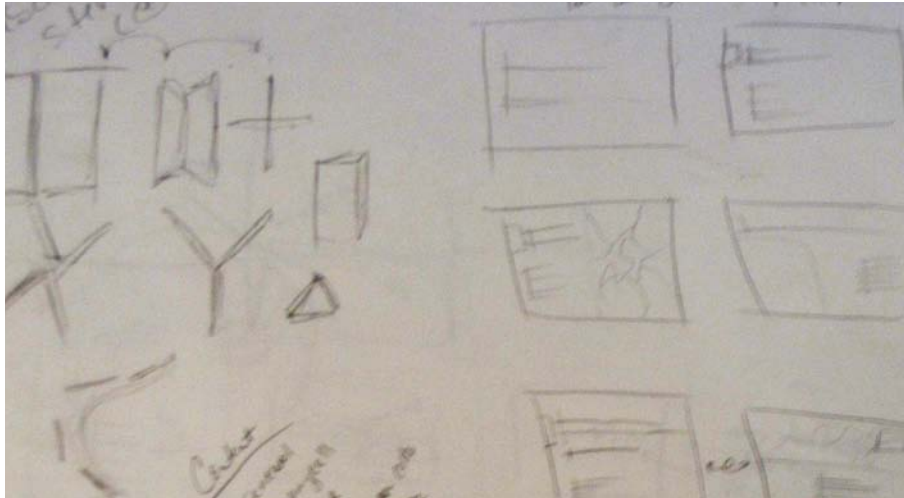


# INSPIRATION





# IDEATION



## SCHEDULE

| COMPONENT                                    | WEEK 1 | WEEK 2 | WEEK 3 | WEEK 4 | WEEK 5 | WEEK 6 | WEEK 7 |
|--|--------|--------|--------|--------|--------|--------|--------|
| On Demand Organ Printing Exhibit             |        |        |        |        |        |        |        |
| What are Stem Cells Exhibit                  |        |        |        |        |        |        |        |
| Stem Cell Division & Differentiation Exhibit |        |        |        |        |        |        |        |
| Claw Machine Exhibit                         |        |        |        |        |        |        |        |
| Re-grow Lost or Damaged Limbs Exhibit        |        |        |        |        |        |        |        |
| Exhibit Map                                  |        |        |        |        |        |        |        |
| Direct Mailer                                |        |        |        |        |        |        |        |
| In House Advertising                         |        |        |        |        |        |        |        |
| Exhibit Guide                                |        |        |        |        |        |        |        |
| Interactive Stem Cell Quiz                   |        |        |        |        |        |        |        |
| Science Kit                                  |        |        |        |        |        |        |        |



## 1. Exhibit Map

*Purpose: Guide the visitors through the exhibit in the optimal way*

*Components: Simple black and white map that can be readily reprinted by the museum*



## 2. Exhibit Guide

*Purpose: Give further information beyond what is on the displays*

*Components: A brochure*



## 3. What are Stem Cells Display

*Purpose: Give visitors an overview of stem cells*

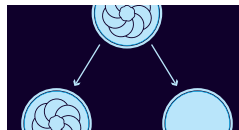
*Components: Multi-sided kiosk style display*



## 4. Organ Printing Display

*Purpose: Show a potential benefit of stem cell research*

*Components: 4 panel display with interactivity and digital display*



## 5. Cell Division Maze

*Purpose: Show how stem cells divide*

*Components: Walkthrough display*



## 6. Stem Cell Claw Machine

*Purpose: Gives opportunity for visitors to take something with them*

*Components: Claw machine filled with toys resembling cells*

## DELIVERABLES (CONTINUED)



### 7. Limb Re-growth Chair

*Purpose: Interactivly show a potential benefit of stem cell research*

*Components: Chair with hole visitors can stick their arm in to watch it grow back*

Test Your Smarts

### 8. Interactive Quiz

*Purpose: Teach visitors by testing knowledge*

*Components: Touch Display*

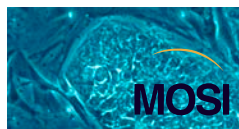
Bring Out the  
Scientist in You

Exploring Stem Cells is MOSI's newest exhibit where  
visitors can explore the science of Stem Cells, as you  
navigate cell division, grow a new arm, and find  
yourself a new lung as you learn all about the many

### 9. Direct Mailer

*Purpose: Market the new exhibition*

*Components: Postcard*



### 10. In House Advertisement

*Purpose: Inform visitors of the exhibition as the walk into the museum*

*Components: Ground mounted and window posters*



### 12. Science Kit

*Purpose: Packaged kit to sell in the gift shop to encourage science at home*

*Components: Lab coat, ID badge, experiment cards, magnifying glass, tweezers, petri dish*

Watermelon  
Flavor

Tare off pouch and follow the simple instructions  
on the back to grow you very own rock candy.

### 13. Grow Your Own Rock Candy Donation Gift

*Purpose: A "free" gift to encourage visitors to donate towards furthering stem cell research*

*Components: Packaging*



# COLORS AND TYPOGRAPHY

## Color Pallet



Scientific Purple  
Pantone: 5395  
CMYK: 75, 11, 0, 82  
RGB: 26, 0, 45



Division Purple  
Pantone: 527  
CMYK: 75, 11, 0, 82  
RGB: 26, 0, 45



Stem Cell Blue  
Pantone: 640  
CMYK: 75, 11, 0, 82  
RGB: 26, 0, 45



Progenitor Blue  
Pantone: 3005  
CMYK: 75, 11, 0, 82  
RGB: 26, 0, 45



Pale Blue  
Pantone: 7457  
CMYK: 75, 11, 0, 82  
RGB: 26, 0, 45



Terminal Tan  
Pantone: Warm Gray 1  
CMYK: 75, 11, 0, 82  
RGB: 26, 0, 45



Cyan  
Pantone: Process Cyan  
CMYK: 100, 0, 0, 0  
RGB: 0, 174, 239

## Typography

Helvetica Light  
abcdefghijklmnopqrstuvwxyz  
ABCDEFGHIJKLMNOPQRSTUVWXYZ  
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MOSI presents Exploring Stem Cells, a new exhibit that will be on display January 16, 2012 – December 3, 2012

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MOSI presents Exploring Stem Cells, a new exhibit that will be on display January 16, 2012 – December 3, 2012

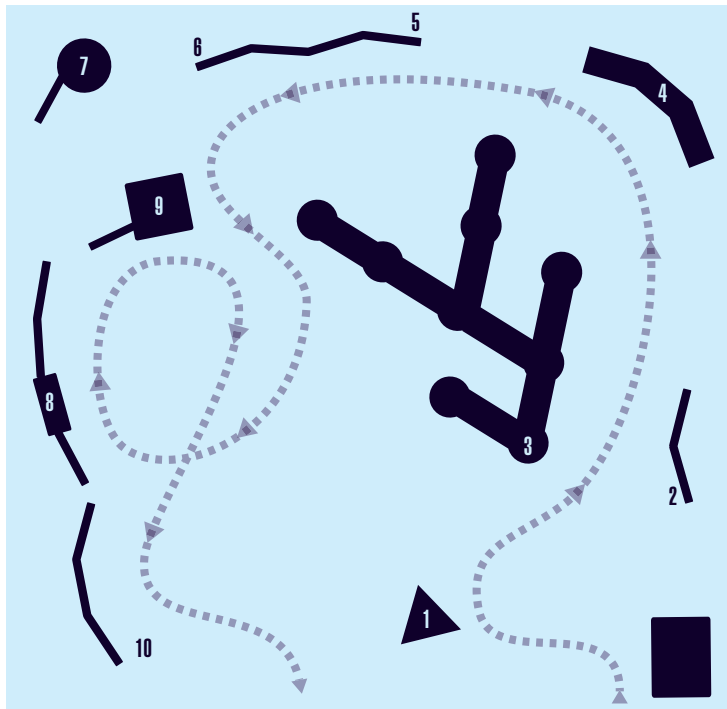
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**MOSI presents Exploring Stem Cells, a new exhibit that will be on display January 16, 2012 – December 3, 2012**

# EXHIBIT MAP

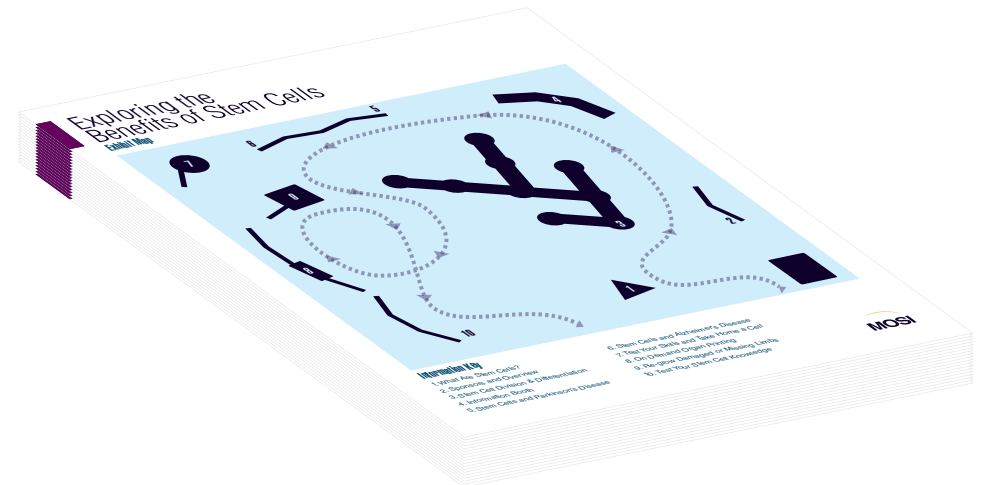
## Exploring the Benefits of Stem Cells

Exhibit Map



### Information Key

- |   |  |
|---|--|
| 1. What Are Stem Cells?                 | 6. Stem Cells and Alzheimer's Disease    |
| 2. Sponsors and Overview                | 7. Test Your Skills and Take Home a Cell |
| 3. Stem Cell Division & Differentiation | 8. On Demand Organ Printing              |
| 4. Information Booth                    | 9. Re-grow Damaged or Missing Limbs      |
| 5. Stem Cells and Parkinson's Disease   | 10. Test Your Stem Cell Knowledge        |



# EXHIBIT GUIDE

## Exploring the Benefits of Stem Cells

Exhibit Guide

An eye-opening look into the power of stem cells

On Exhibition at the Museum of Science and Industry, Tampa | January 16, 2012 – December 3, 2012

MOSI

ISOM

On Exhibition at the Museum of Science and Industry, Tampa | January 16, 2012 – December 3, 2012

## Exploring the Benefits of Stem Cells

Exhibit Guide

### Featured Exhibits

What You Will See

#### Stem Cell Division & Differentiation

Physically navigate your way through the process of cell division as you learn what cell division is and how the process defines what Stem Cells are.

You can choose your own path as you walk through the interactive maze of cell division. When you arrive at each stop you will gain insightful information on Stem Cells and how they function.

#### Stem Cells and Their Effects on Alzheimer's and Parkinson's

Stem Cells are currently being used in experimental treatments for patients who suffer from Alzheimer's Disease and Parkinson's Disease. Additionally scientist are working on many new treatments.

Learn about both the very real and the far off potential medical treatments doctors will be able to use to help treat patients suffering from Alzheimer's and Parkinson's Disease.

#### On Demand Organ Printing

Imagine this: you were just in a serious automobile accident that damaged you lungs beyond repair. Today that would be a certain death sentence. However, in the not too distant future doctors would be able to "print" you a new pair of lungs from nothing more than a few of you own stem cells.

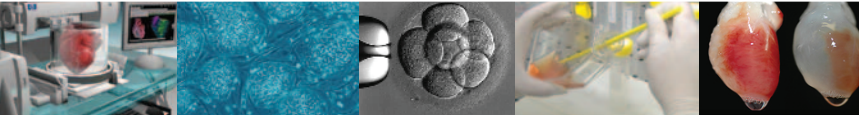
Take the roll of a doctor as you order up a new organ and watch as the organ gets printed.

#### Re-grow Lost or Damaged Limbs

As humans have the ability to grow new limbs and organs. However, that ability is lost after leaving the womb. Scientists believe that by recreating the environment of the womb it will trick the body into growing new limbs.

Dip you arm into a special chamber that recreates a womb-like environment, and watch as your arm re-grows, just like a lizard's tail.

MOSI

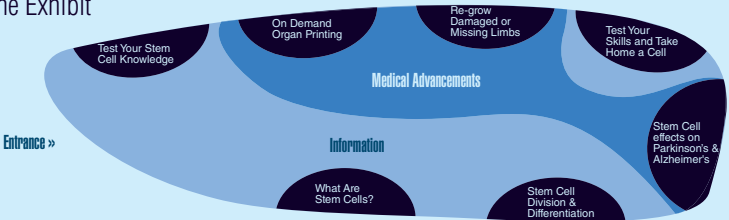


Organ Printing    Stem Cell Culture    Human Zygote    Growing Stem Cells    Printed Rat Heart

**Exploring Stem Cells** is MOSI's newest exhibit where guests can explore the science of Stem Cells, as you navigate cell division, grow a new arm, and "print" yourself a new lung as you learn all about the many benefits of Stem Cell research.

Find more information at:  
[www.mosi.org/Stem-Cells](http://www.mosi.org/Stem-Cells)

### Inside the Exhibit



Entrance »

Medical Advancements

Information

What Are Stem Cells?

Stem Cell Division & Differentiation

Stem Cell effects on Parkinson's & Alzheimer's

Test Your Skills and Take Home a Cell

Re-grow Damaged or Missing Limbs

On Demand Organ Printing

Test Your Stem Cell Knowledge

#### Admission

MOSI Exhibit Galleries, One Saunders Planetarium show, one standard IMAX® Dome Theatre Film and Kids In Charge!

|                                |             |
|--------------------------------|-------------|
| Adults 13 – 69.....            | \$20.95     |
| Seniors 60+.....               | \$18.95     |
| Child 2 – 12.....              | \$16.95     |
| Children under 2 admitted FREE |             |
| Parking Fee.....               | \$4 per car |

May not be combined with any other offers or discounts.  
Excludes engagement exhibitions, films, events, and ropes course.

#### Hours of Operation

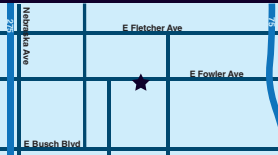
9am – 5pm Monday – Friday  
9am – 5pm Saturday & Sunday  
Open 365 days a year

#### Group Tours

Please contact the MOSI Reservations Department at (813) 987-6000 for group reservations.

#### Location

MOSI is located in north Tampa at 4801 E. Fowler Ave., across from the USF Sun Dome.



**Museum of Science & Industry**  
4801 E. Fowler Avenue  
Tampa, FL 33617

**More Information**  
813-987-6000  
800-995-MOSI (6674)  
[www.mosi.org](http://www.mosi.org)

# WHAT ARE STEM CELLS

## What are Stem Cells?

### Information

Stem Cells are a special kind of cell that have the ability to undergo cellular division infinitely, referred to as self-renewal, and they are the cells all other cells stem from.



## Lineage

As Stem Cells specialize they lose their ability to become other cells. With every step towards specialization there are less possible cells they can become; this is called lineage.



### Totipotent

Can become every cell including extraembryonic tissues.



### Pluripotent

Can become almost any cell except extraembryonic tissue.



### Multipotent

Can become many cells. This is the most potent an adult Stem Cell can be.



### Oligopotent

Can become few cells. This is the last "true" Stem cell.



### Unipotent

Cannot become any other cells, but still possess the ability to self-renew.

## Embryonic Stem Cells



Embryonic Stem Cells (ESCs) are the only totipotent Stem Cells. Harvesting ESCs is a controversial process as it requires destroying five day old embryo.

## Adult Stem Cells



Adult Stem Cells are much easier to obtain since they can be harvested from a baby's cord blood and tissue. Adult Stem Cells can also be harvested from various parts of the human body; many times with little or no side effects to the donor.



Top View





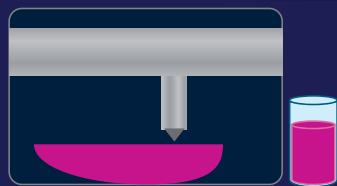
## On Demand Organ Printing

### Medical Advancement

Using adult stem cells harvested from the patient doctors will be able use 3D printing technology to "print" an organ.



Select the organ to print on the left, then press the green start button to watch as the printer creates a new organ.

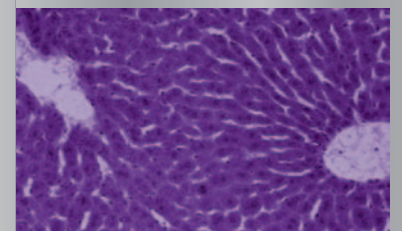
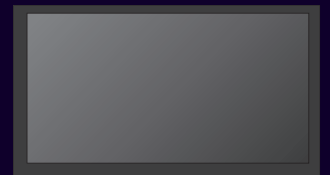


## How it Works

- 1** A patient in need of a new organ has a supply of their own stem cells harvested.
- 2** These stem cells are cultured to produce a large supply to be used as the "ink" in a 3D printer.
- 3** Using these cells, the printer assembles a fully functioning organ based on a computer model.
- 4** Since the organ is made with the patient's own cells there is no chance of the patient rejecting the organ.

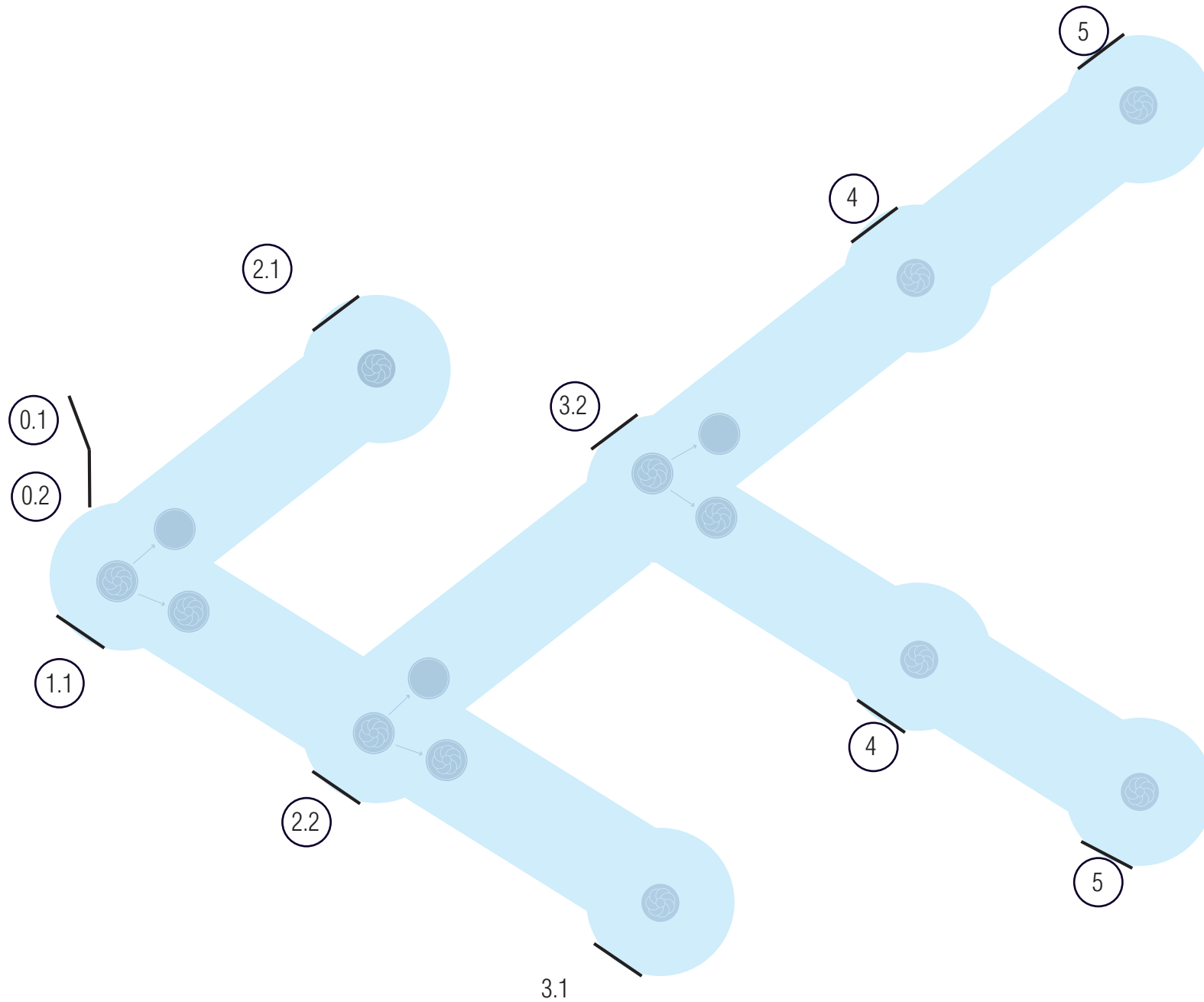
## Progress so Far

Scientists have successfully created a functioning rat heart with just stem cells and an ordinary ink jet printer.



# STEM CELL DIVISION AND DIFFERENTIATION

## Layout and Placement



# STEM CELL DIVISION AND DIFFERENTIATION

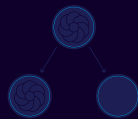
Title and Instructions

0.1

## Stem Cell Division & Differentiation

### Information

During cell division Stem Cells can create further specialized cells while also creating another copy of itself.



0.2

## How to Navigate Cellular Division

Follow the path to take a trip through cell division. You will find more information about each step as you go. The Phases are color coded to help you find your way.

### Starting Stem Cell

The original Stem Cell that started cellular division.

### Progenitor Cell

A further Specialized Stem Cell that has lost some of its potency.

### Terminal Differentiation

This is no longer a Stem Cell and is just an ordinary cell.

# STEM CELL DIVISION AND DIFFERENTIATION

## Division Steps

1.1

### Original Stem Cell

At the start of cellular division there is only one Stem Cell which will split itself into two identical Stem Cells. One of the new Stem Cells is a replacement for the one that divided; the other Stem Cell will undergo further division.



**Multipotent**

2.2

### Stem Cell Copy One

This Stem Cell is just a replacement for the cell that just divided itself. This is what makes Stem Cells unique and how self-renewal works.



**Multipotent**

2.3

### Stem Cell Copy Two

The purpose of this cell is to create further specialized cells. This Stem Cell will divide itself into another Stem Cell to replace itself and a further specialized cell.



**Multipotent**

3.2

### Original Progenitor Cell

Progenitor Cells are a further specialized cell and, much like regular Stem Cells can become many different kinds of cells. However, Progenitor Cells do not possess self-renewal, and can only divide a set number of times.



**Oligopotent**





# STEM CELL DIVISION AND DIFFERENTIATION

## Division Steps Continued

3.1

### Stem Cell Copy Three

This Stem Cell is just a replacement for the cell that just divided itself. This is the final stage of the original division; there are now two remaining copies of the original stem cell and a progenitor cell to continue specialization.



**Multipotent**

4

### Copy of Progenitor Cell

This is one of the limited number of copies that can be made of a Progenitor Cell. They are a further specialized cell and, much like regular Stem Cells can become many different kinds of cells. However, Progenitor Cells do not possess self-renewal.



**Oligopotent**

5

### Terminal Differentiation

These are the most specialized of all cells and cannot become a different kind of cell. Most of these types of cells do not possess the ability to self-renew. Terminally differentiated cells are the ordinary cells that make up all of the world around you.

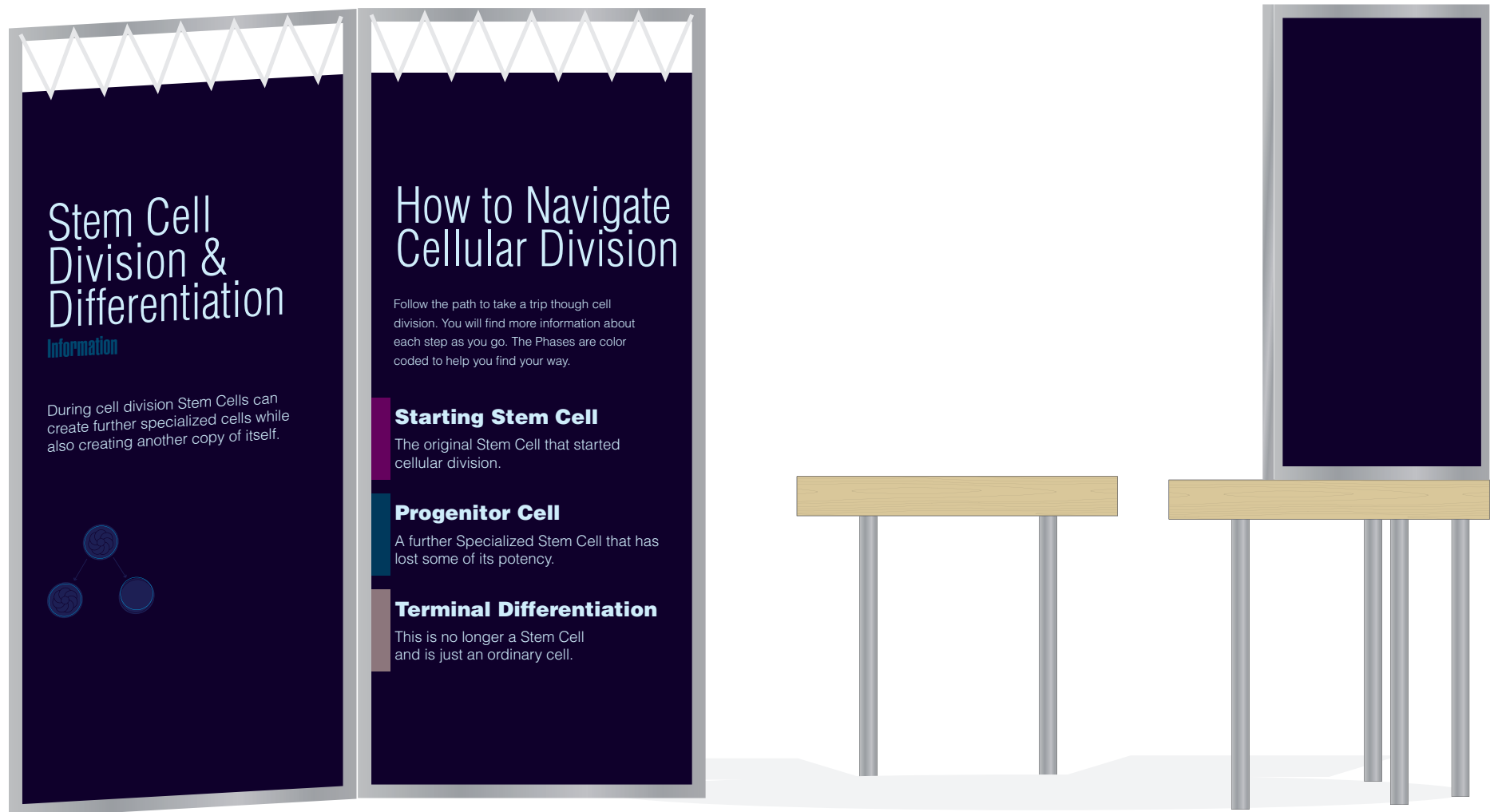


**Unipotent**



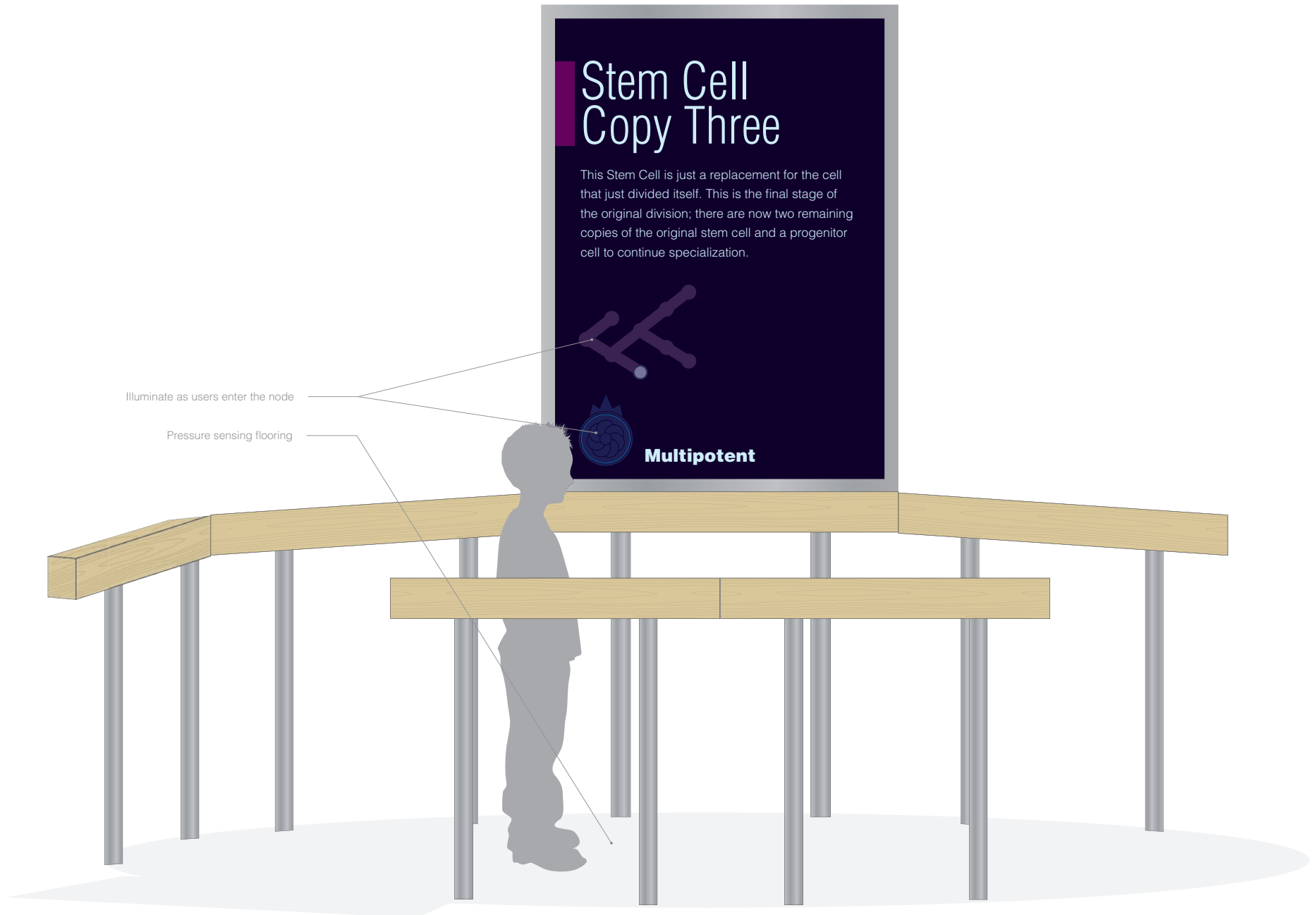
# STEM CELL DIVISION AND DIFFERENTIATION

Entrance

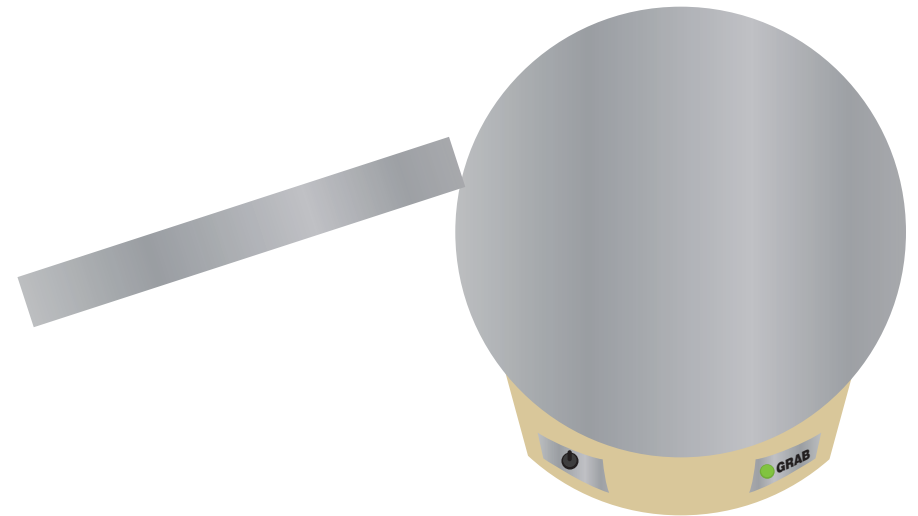
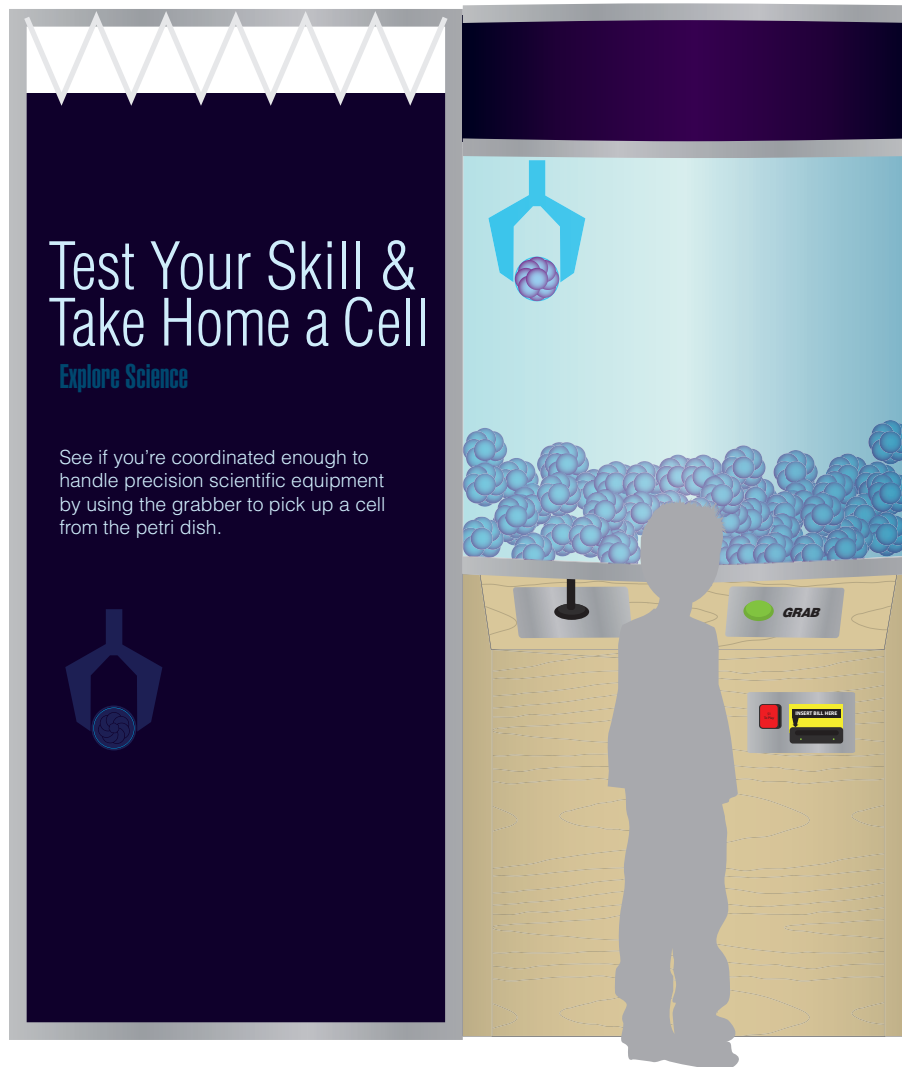


# STEM CELL DIVISION AND DIFFERENTIATION

## Node



## CLAW MACHINE



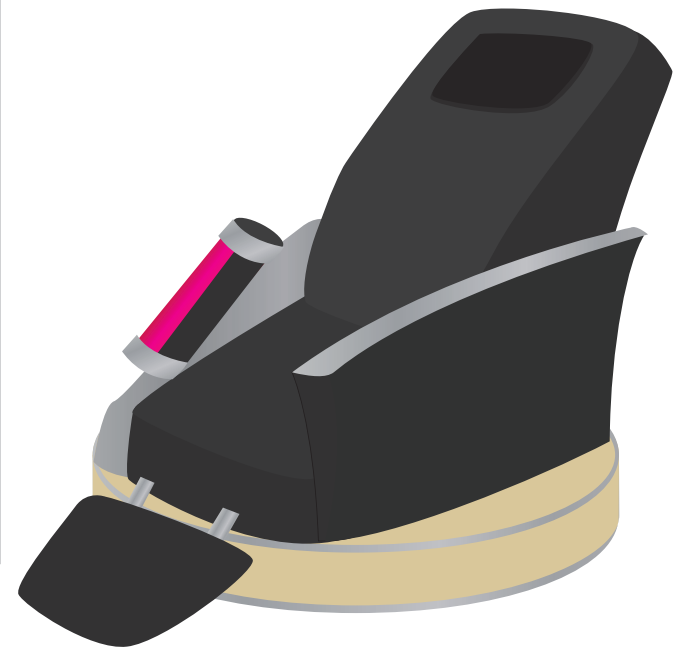
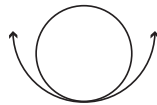
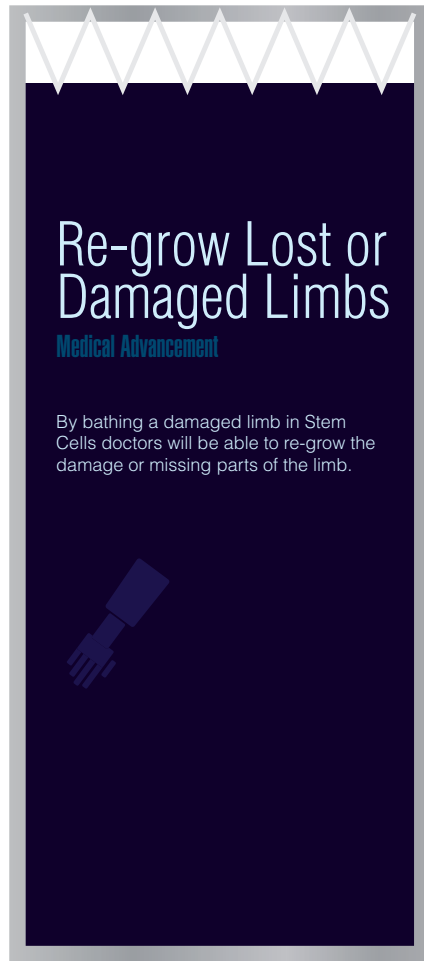
Top View

Visitors will be able to attempt to win "cell" balls from a claw machine. The prizes are bouncy balls that resemble zygotes and single cells.



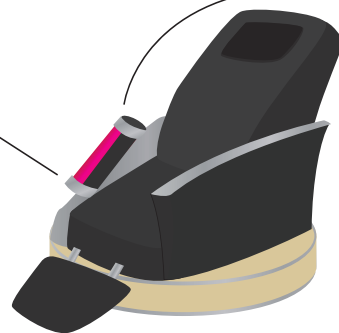
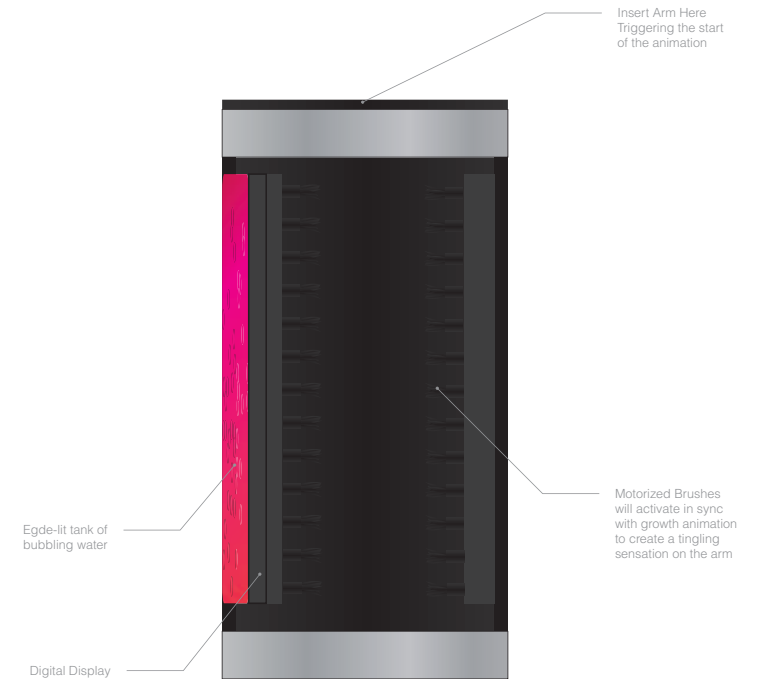
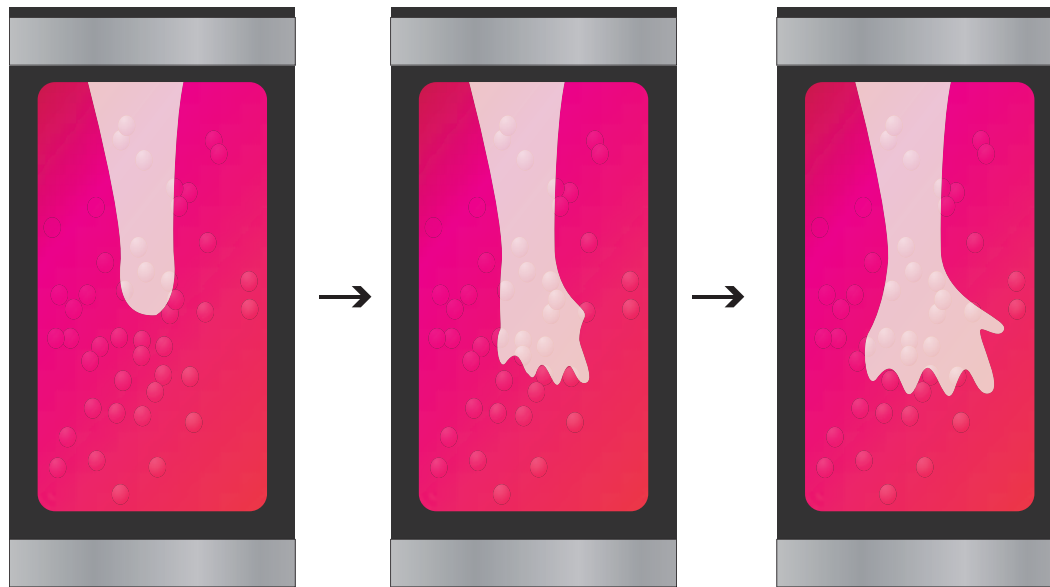
# RE-GROW LOST OR DAMAGED LIMBS

## Components



# RE-GROW LOST OR DAMAGED LIMBS

## Functionality



Guests would insert their arm into the tank to watch their arm re-grow. The chamber looks like it is simulating a womb to trigger stem cell growth. The digital display and brushes on the inside give guests a visual and tactile experience of the arm growing.

## Think You're a Stem Cell Wiz, Then Test Your Stem Cell IQ

Try to answer as many of the following questions correctly

Tap Here to See How Smart  
You Really Are

Think You're a Stem Cell Wiz,  
Then Test Your Stem Cell IQ

Try to answer as many of the following questions correctly

Tap Here to See How Smart  
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Stem Cells Can be Used  
to Re-grow Which of the Following?

- Skin
- Organs
- Hair
- Teeth
- All of the above
- None of the above

Congratulations  
You Finished the Quiz

If you did well then put yourself on the back; you're now one step closer to being a scientist

Tap Here to Start Over

# INTERACTIVE QUIZ

Stem Cells Can be Used to Re-grow Which of the Following?

- Skin
- Organs
- Hair
- Teeth
- All of the above
- None of the above

What is a Progenitor Cell?

- A Further specialized stem cell
- A cell that helps stem cells
- A cell that keeps your insides clean
- A cell that regenerates

Scientists Have Used Stem Cells to Print Which of the Following Organs?

- Goose gizzard
- Rat heart
- Squirrel lungs
- Moose gallbladder

Which the Highest Level of Stem Cell Lineage?

- Oligopotent
- Differentiated
- Multipotent
- Totipotent
- Unipotent

What Makes a Stem Cell Unique?

- They make an endless amount of copies
- They can make new cells
- They range in potency
- They divide asymmetrically
- All of the above
- None of the above

Stem Cells Can be Used to Re-grow Which of the Following?

- Skin
- Organs
- Hair
- Teeth
- All of the above
- None of the above

Terminal Differentiation is When a Stem Cell Has Done What?

- Died
- Lost all its potency
- Divided into other cells
- Got attacked by a virus

What is the Major Difference Between Adult & Embryonic Stem Cells?

- Embryonic cells are too young to use
- Adult cells can't make new cells
- Adult cells can be harvested safely
- Embryonic cells need constant supervision

True or False: There are Many Different Kinds of Stem Cells

- True
- False



### Exploring Stem Cells Schedule

January 16, 2012 – December 3, 2012

### Hours of Operation

9am – 5pm Monday – Friday

9am – 5pm Saturday & Sunday

Open 365 days a year

### More Information

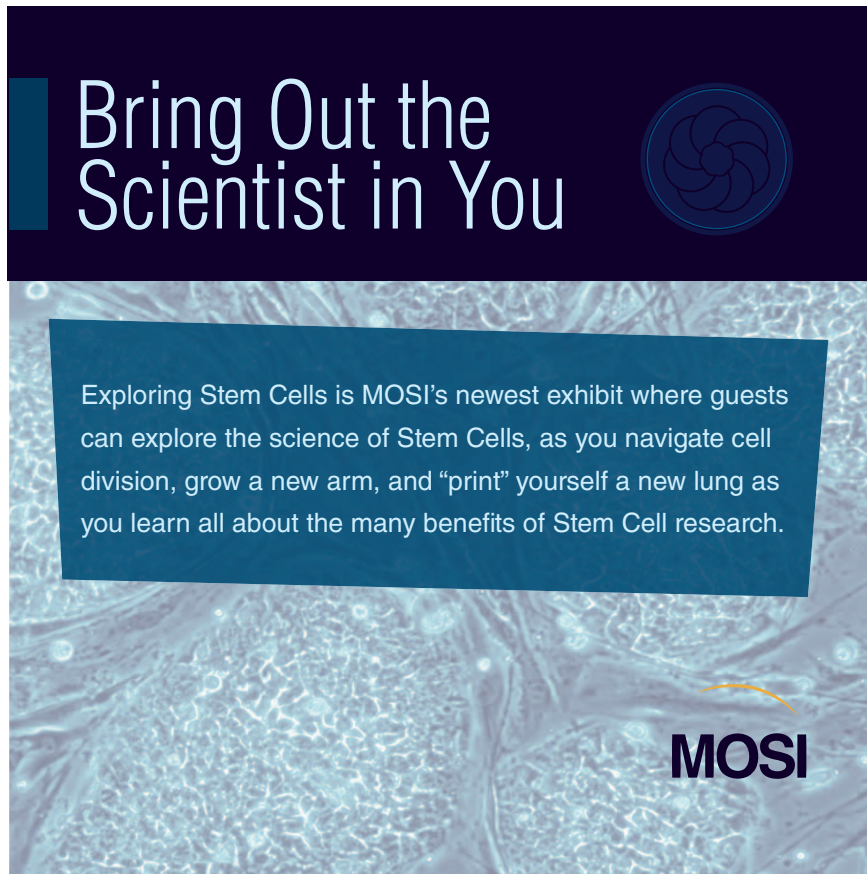
800-995-MOSI (6674)

[www.mosi.org](http://www.mosi.org)

# Bring Out the Scientist in You


Exploring Stem Cells is MOSI's newest exhibit where guests can explore the science of Stem Cells, as you navigate cell division, grow a new arm, and "print" yourself a new lung as you learn all about the many benefits of Stem Cell research.





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 MOSI

This is designed to be used in a variety of locations throughout the museum. Applications include windows, free-standing signs, walls, and hanging overhead signs.



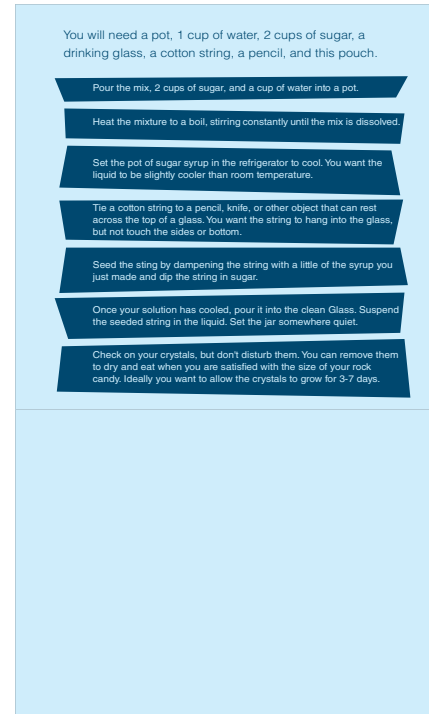
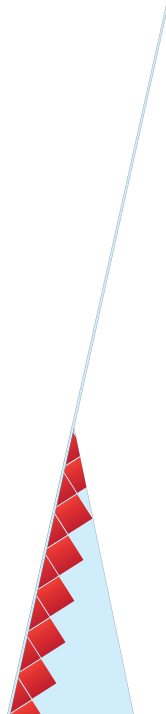
## SCIENCE KIT



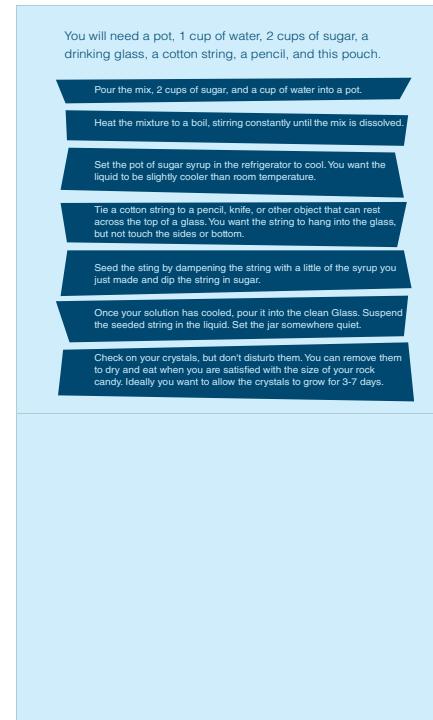
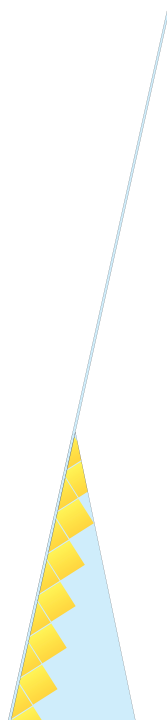
## SCIENCE KIT



# GROW YOUR OWN ROCK CANDY DONATION GIFT



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