Virtual GEMS Programming

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GEMS (Girls Excelling in Math and Science) presents STEM experiences for girls in a time of social distancing.

Our program: In a time of isolation, quarantine and limited face-to-face school, GEMS continues to support the encouragement of girls in STEM field and careers. We hope that the suggestions and procedures outlined here will inspire you to continue the GEMS clubs and experiences that have served girls so well for over 26 years.

We provide directions for creating and maintaining an online/virtual STEM program that support girls and families in their STEM explorations and continues the rich environment produced by in-person GEMS clubs.

Components: Virtual GEMS experiences should contain the following:

- Introduction to the activity—a challenge to the girls, with an expectation that discoveries will be made. Predictions can be made, either in writing or thought.
- Written instructions for the challenge: Girls and parents can refer to these for clarification.
- Vocabulary—Identify and describe words that are new or used in the challenge
- Video demonstration: The leader makes this ahead of time, or links to a video of the experiment.
- Career connections: Link to an online video of a woman who is a professional in the field related to the challenge. Discussions and questions afterwards
- Online reporting and discussion of the results of the challenge.
- Online reflection on the challenge
- Supplementary follow-up activities

Physical Requirements: What each girl will need to participate

- Supplies provided by GEMS
- Technology
- Supplies common to most homes

Initial Preparation:

1. Choose the age level girls you want to serve. This will determine the kinds of STEM challenges you want to share.
2. Choose the number of girls you would like in your session. You will need to prepare all of the supplies, so take that into consideration.
3. Choose the length of your virtual session. Summer leaders have chosen a two-week window—others have stretched it out over the semester.
4. Determine your budget. This will also affect the challenges you choose.
5. Consider a reward/incentive for completion of the challenges. One leader budgeted for T-shirts that were given to girls upon completion of the summer challenges.
6. Choose and develop your online platform for sharing—Google classroom, Flip Grid, or whatever works best for you and your girls. Make sure it has support for video sharing, commenting and possibly a discussion forum.
7. Create your registration process and be sure to include a photo release.

Choosing the challenges:

1. Choose challenges that touch on all four areas of STEM. (See below for suggestions)
2. Choose challenges that are above the grade level of the girls involved. See the web site for our philosophy: https://gems.education.purdue.edu/activities/
3. Choose challenges that result in a product of some kind. Girls will be completing these at home, and it will be more meaningful to them if they actually create or produce something.
4. Choose challenges that can be clearly connected to a career.

Creating your videos:

1. Before you create your own videos, check to see if there are already videos available. But be very careful that the site does not link to anything harmful. You can use a PowerPoint and pictures if it is easier.
2. You can use your phone or camera—don't overthink it. But practice so that filming goes smoothly.
3. Write out your introduction first. Then list the supplies and show them to the girls in the video.
4. Go through the steps needed for the challenge and point them out in the video/PowerPoint.
5. Consider putting common mistakes at the end of the video. Or document possible misconceptions so that the girls know when they are going wrong.

Creating Your Instructions:

1. Make them as user-friendly as possible. You will not be there to answer questions. The GEMS member may be alone or not have adult help available.
2. Insert pictures wherever possible.
3. Use the new vocabulary in the directions only if you have the definition or picture in the instructions.

Career Connections:

1. Choose a video that accurately shows the STEM field the GEMS member is experiencing. But be careful to choose one that shows girls and women and a positive message, not one that talks about the lack of women in the field or the need for more.
2. Remember to emphasize that all girls can learn to do these things.
3. Look on these sites:
    a. https://www.fabfems.org/find
    b. https://www.youtube.com/watch?v=f3Q9UbcObpE
    c. https://usasciencefestival.org/women-in-stem-videos/
    d. https://www.theellaproject.com/
    e. https://www.youtube.com/watch?v=6-Pdut66v7Q&t=2s
    f. https://www.nasa.gov/stem/womenstem.html
    g. https://www.pbslearningmedia.org/collection/secret-life-of-scientists-and-engineers-women-in-stem/
    h. https://stelr.org.au/womeninstem/
    i. https://www.thirteen.org/get-the-math/
4. Create an opportunity for discussion and questions that the girls can use about careers.

Online Discussion and Reflection:

1. Establish and communicate your requirements for discussion/question posts and reflections.
2. Check them daily if you can in case there are questions about the challenge itself.
3. Respond to posts so that the girls feel that they are heard.

Supplementary Activities:

1. These can include links to extensions of the challenge and/or links to videos of other people completing the challenge.
2. Other supplementary activities can include titles of books related to the STEM field you explored or links to more information about that field.
3. Place this in the online platform so the girls can just click on links if possible.

For many more challenge ideas, check out the GEMS web site: https://gems.education.purdue.edu/

More Science Resources:

https://ngss.nsta.org/Classroom-Resources.aspx

http://chemcollective.org/home

https://enviroliteracy.org/teaching-resources/

More Technology Resources:

https://studio.code.org/courses

https://csfirst.withgoogle.com/s/en/home

https://csunplugged.org/en/

More Engineering Resources:

https://www.teachengineering.org/

http://teachers.egfi-k12.org/

https://tryengineering.org/teachers/

More Mathematics resources:

http://nlvm.usu.edu/en/nav/vlibrary.html

https://www.thirteen.org/get-the-math/category/the-challenges/

https://gregtangmath.com/