CEMC at Home

Grade 4/5/6 - Monday, June 1, 2020

Contest Day 5

Today's resource features a question from one of the recently released 2020 CEMC Mathematics Contests, along with a question from one of our past contests.

2020 Gauss Contest, #11

Each Tuesday, a bus makes its first stop at Gauss Public Library at 1 p.m. It continues to stop at the library every 20 minutes. Its last stop is at 6 p.m. What is the total number of times that the bus stops at Gauss Public Library on a Tuesday?

(A) 16 **(B)** 14 **(C)** 10 **(D)** 20 **(E)** 18

2016 Gauss Contest, #14

One soccer ball and one soccer shirt together cost \$100. Two soccer balls and three soccer shirts together cost \$262. What is the cost of one soccer ball?

(A) \$38 **(B)** \$50 **(C)** \$87.30 **(D)** \$45 **(E)** \$40

More Info:

Check out the CEMC at Home webpage on Monday, June 8 for solutions to the Contest Day 5 problems.

CEMC at Home

Grade 4/5/6 - Monday, June 1, 2020
Contest Day 5 - Solution

Solutions to the two contest problems are provided below.

2020 Gauss Contest, #11

Each Tuesday, a bus makes its first stop at Gauss Public Library at 1 p.m. It continues to stop at the library every 20 minutes. Its last stop is at 6 p.m. What is the total number of times that the bus stops at Gauss Public Library on a Tuesday?

(A) 16 **(B)** 14 **(C)** 10 **(D)** 20 **(E)** 18

Solution:

The bus stops at the library at 1:00 p.m., 1:20 p.m., and 1:40 p.m..
The bus stops at the library at 2:00 p.m., 2:20 p.m., and 2:40 p.m..
Similarly, the bus will stop at those same three times past each hour.
So over the 5 hours, it will stop $5 \times 3 = 15$ times, with an additional final stop at 6:00 p.m., making a total of $15 + 1 = 16$ stops.

ANSWER: (A)

2016 Gauss Contest, #14

One soccer ball and one soccer shirt together cost \$100. Two soccer balls and three soccer shirts together cost \$262. What is the cost of one soccer ball?

(A) \$38 **(B)** \$50 **(C)** \$87.30 **(D)** \$45 **(E)** \$40

Solution 1:

Since one of the given answers must be the correct cost of one soccer ball, we can test each of the amounts until we find one that works. For example, let's try \$50 for the cost of a ball.
If the cost of a ball is \$50, then a shirt would also cost \$50, because the cost of one ball and one shirt add up to \$100.
In this case, the cost of 2 balls and 3 shirts would be $5 \times \$50 = \$250$ but we are told this total cost is \$262.
This tells us that the cost of a ball is not \$50.

Let's try \$40 for the cost of a ball.
If the cost of a ball is \$40, then the cost of a shirt would be \$60, because $\$40 + \$60 = \$100$.
In this case, the cost of 2 balls is \$80 and the cost of 3 shirts is $3 \times \$60 = \$180$.
The total cost of the 2 balls and 3 shirts is $\$80 + \$180 = \$260$.
We are getting closer, but still just a little off, so let's try \$38 for the cost of a ball.

If the cost of a ball is \$38, then the cost of a shirt would be \$62, because $\$38 + \$62 = \$100$.
In this case, the cost of 2 balls is $2 \times \$38 = \$76$ and the cost of 3 shirts is $3 \times \$62 = \$186$.
The total cost of the 2 balls and 3 shirts is $\$76 + \$186 = \$262$.
Therefore, the cost of one ball is \$38.

Solution 2:

One soccer ball and one soccer shirt together cost \$100.
So then two soccer balls and two soccer shirts together cost $2 \times \$100 = \$200$.
Since we are given that two soccer balls and three soccer shirts together cost \$262, then \$200 added to the cost of one soccer shirt is \$262.
Thus, the cost of one soccer shirt is $\$262 - \$200 = \$62$ and the cost of one soccer ball is $\$100 - \$62 = \$38$.

ANSWER: (A)

CEMC at Home

Grade 4/5/6 - Tuesday, June 2, 2020

Famous Mathematicians

Throughout human history, many mathematicians have made important discoveries. These important historical figures often lead fascinating lives filled with interesting stories. Four of these mathematicians are listed below.

Archimedes	He is considered one of the greatest mathematicians and inventors in history. One thing he is famous for is his study of the surface area and volume of cylinders and spheres.
Leonhard Euler	Two different numbers are named after Euler. Many of the symbols we use when we write mathematics today are based on his writings.
Emmy Noether	She used her genius to figure out important things in mathematics. Her accomplishments were remarkable, but she didn't receive the attention and respect she deserved just because she was a woman.
Jingrun Chen	In the 20th century, he helped us understand some very important problems. Many of these problems involve prime numbers and have still not been fully solved today.

Choose two of these four mathematicians and for each one you choose:

1. Look up information about the mathematician online. Find a new fact about them that you find interesting and share what you find with friends or family.
2. Are there any mathematical words or ideas connected to this mathematician that sound familiar to you? Try to write down three to five of these words.
3. If you had the chance to go back in time and meet this mathematician, what question would you ask them?

More Info:

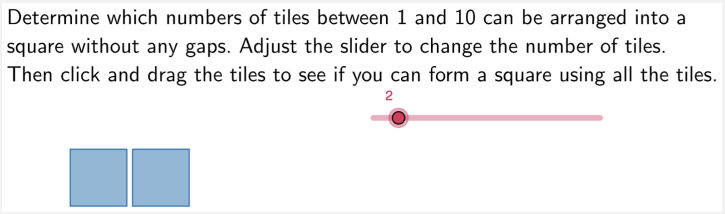
The CEMC Emmy Noether Circles are named in honour of Emmy Noether. This free online project aims to encourage the participation of both teachers and students at the Grade 5 and 6 level in solving problems for enjoyment and satisfaction.

CEMC at Home

Grade 4/5/6 - Wednesday, June 3, 2020
Interact with Mathematics

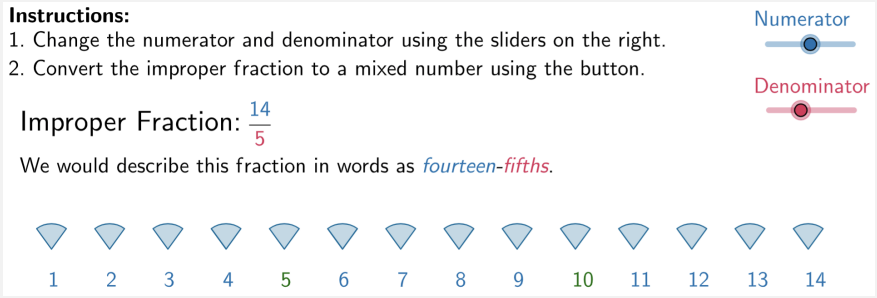
Technology can help us make mathematical discoveries and learn about mathematical objects. Three online examples of this from different areas of mathematics are featured below. Some of these examples show you some of the mathematics you will learn more about in future grades. However, there is still lots you can explore before you get there!

Making Squares: Try arranging different numbers of tiles to make a square.



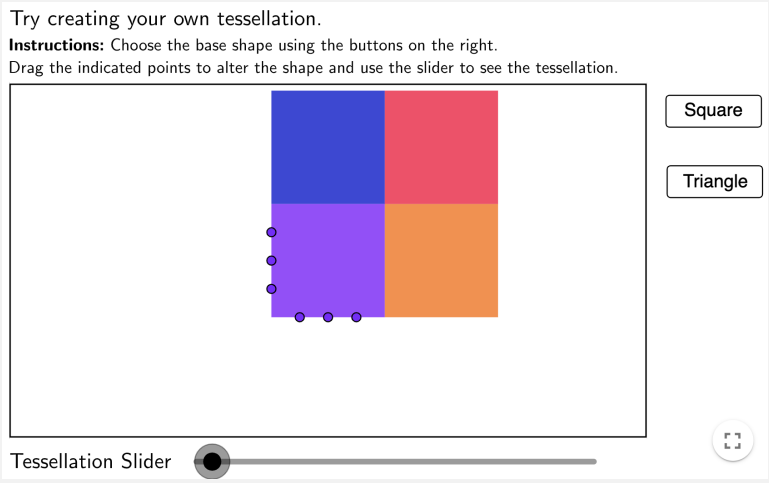
Link to App: https://www.geogebra.org/m/qgKdjyeq

Fraction Exploration: Explore how we represent improper fractions as mixed numbers.



Link to App: https://www.geogebra.org/m/gNZKP9G6

Tessellations: Create pictures using tessellations made from squares and triangles.



Link to App: https://www.geogebra.org/m/VZagPTjQ

More Info: CEMC courseware lessons feature hundreds of interactive mathematics applications.

CEMC at Home

Grade 4/5/6 - Thursday, June 4, 2020

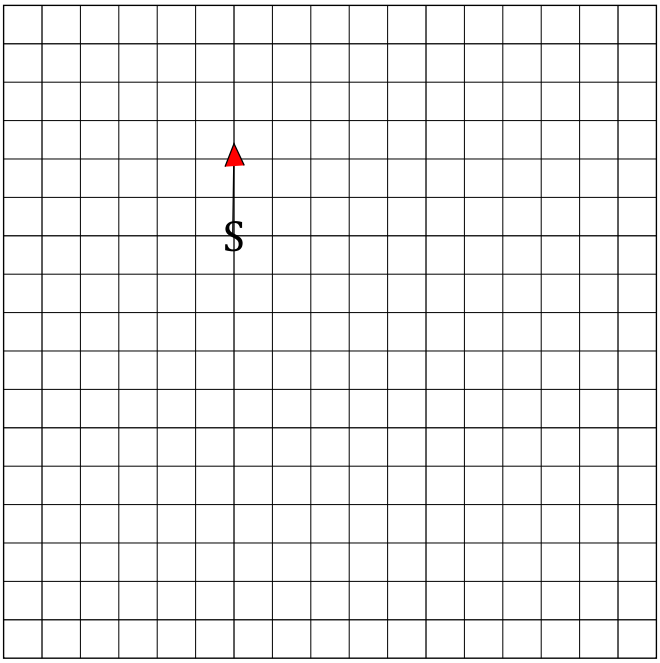
Crossing Paths

Red and Justin are planning a countryside ride on their ATV. They will follow this pattern:

- drive five kilometres and turn right;
- drive five kilometres and turn right;
- drive five kilometres and turn left;
- keep repeating these three steps until they return to their starting point.

(a) On the grid below, the side of each square is one kilometre. Map out their route, starting from the point **S** in the direction shown. Then determine how far they will have travelled when they get back to **S**.

(b) What is the name of the shape enclosed by their route? What is the area of this shape?



More Info:

Check out the CEMC at Home webpage on Friday, June 5 for a solution to Crossing Paths.

This CEMC at Home resource is a past problem from Problem of the Week (POTW). POTW is a free, weekly resource that the CEMC provides for teachers, parents, and students during the school year. POTW is wrapped up for the current school year and will resume on September 17, 2020. To subscribe to POTW and to find more past problems and their solutions visit:
https://www.cemc.uwaterloo.ca/resources/potw.php

CEMC at Home

Grade 4/5/6 - Thursday, June 4, 2020

Crossing Paths - Solution

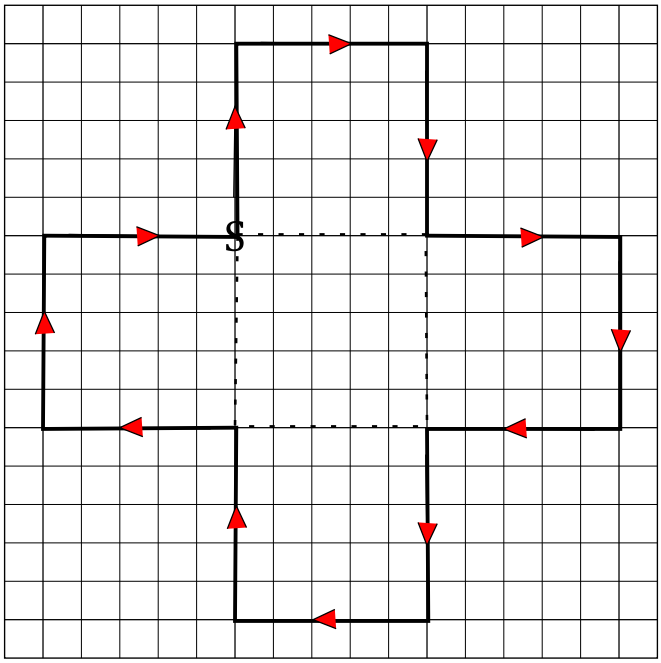
Problem:

Red and Justin are planning a countryside ride on their ATV. They will follow this pattern:

- drive five kilometres and turn right;
- drive five kilometres and turn right;
- drive five kilometres and turn left;
- keep repeating these three steps until they return to their starting point.

(a) On the grid below, the side of each square is one kilometre. Map out their route, starting from the point **S** in the direction shown. Then determine how far they will have travelled when they get back to **S**.

(b) What is the name of the shape enclosed by their route? What is the area of this shape?



Solution:

(a) Their route is shown on the above grid as a solid line, with arrows indicating the directions travelled. Since each line segment has length 5 km, the total distance they travelled is $12 \times 5 = 60$ km.

(b) The 12-sided geometric shape enclosed by their route is called an *irregular dodecagon*.
The dashed lines on the grid show that this shape consists of 5 squares, each with side length 5 km. Thus the total area enclosed is $5 \times (5 \times 5) = 125\,\text{km}^2$.

CEMC at Home

Grade 4/5/6 - Friday, June 5, 2020

Math and CS in the News

Most weeks, our CEMC Homepage provides a link to a story in the media about mathematics and/or computer science. These stories show us how important mathematics and computer science are in today's world. They are a great source for discussions.

Using this article from Gizmodo, think about the following questions. (URL also provided below.) You may want to read this article and watch the video with an adult. If there is a word that you don't understand, see if you can figure out what it means by yourself or with the help of an adult. Don't worry if you don't understand some of the higher level math discussed.

1. Who is your favourite Pixar character? Find an image of them online. What geometric shapes do you think were used to model the character?
2. Which Pixar character do you think was easier to model than Geri? Why?
3. Design your own character using any of these geometric shapes: sphere, ellipsoid, rectangular prism, cylinder or cone.
4. Predict the future: What will animated movies look like in 20 years thanks to new mathematics and computer science?

URL of the article:
https://gizmodo.com/how-pixar-uses-math-to-make-characters-look-perfect-1657339566

More Info:

A full archive of past posts can be found in our Math and CS in the News Archive. Similar resources for other grades may also be of interest.