Grade 6 Math Circles

November 1/2/3, 2022

BCC Prep

Beaver Computing Challenge

The Beaver Computing Challenge (BCC) is an online problem-solving contest with a focus on computational and logical thinking. No prior coding experience is required. The questions are inspired by topics in computer science but students only require the concepts taught in the mathematics curriculum common to all provinces.

Students in grade 6 or below can write the Grade 5/6 BCC. The Grade 5/6 BCC consists of 12 multiple choice questions divided into 3 parts with 60 marks total: 4 questions in Part A worth 6 marks each, 4 questions in Part B worth 5 marks each, and 4 questions in Part C worth 4 marks each. Students are given exactly 45 minutes to answer the questions. Some calculators are permitted.

Each question on the BCC is given by a story and a question. The story provides the background information required to solve the question.

More information on the BCC: https://cemc.uwaterloo.ca/contests/bcc.html
Past contests/solutions: https://www.cemc.uwaterloo.ca/contests/past_contests.html#bcc

Strategies

Solving the BCC problems requires computational and logical thinking. Listed here are a few strategies to approach these types of problems.

- First read the story, then the question, then reread the story. This will help with finding the details needed to solve the question as well as understanding what the question is asking.
- Underline or write down the important information in the story and question.
- If the question is long and/or challenging, split it into pieces or steps. Focus on one step at a time, then connect them all together at the end.
- Make a chart or diagram to help organize what is given in the story. Or create another image

that will help to visualize what is happening in the problem.

- Rule out answers that are impossible or that you can show aren't the solution. The problems are all multiple choice and will have 4 options, so ruling out a couple incorrect answers can help with deciding on the correct answer. When in doubt, make a logical guess.
- Have fun writing the contest! This contest is meant to be an enjoyable experience that will motivate your interest in math and computer science. The BCC emphasizes participation rather than competition, so be proud of trying.
- Following the end of the contest window, solutions will be posted on the website at this link: https://www.cemc.uwaterloo.ca/contests/past_contests.html#bcc.

Past Contest Problems

Bear Selection (BCC Grade 5/6 2020)

Story

Ren is allowed to bring one of his four teddy bears to school. Ren brings the bear that has a star on one of its feet, and is wearing a scarf or a bow, but not glasses.

Question

Which bear did Ren bring to school?

(A) 

(B) 

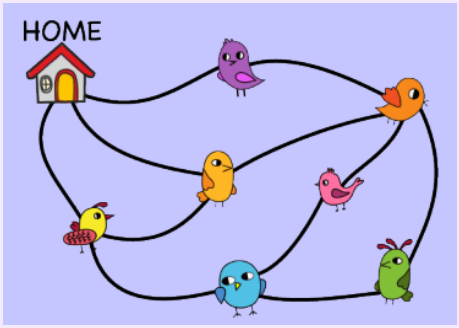
(C) 

(D) 

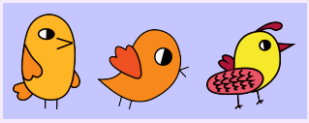
Bird Watching (BCC Grade 5/6 2020)

Story

A family went for a walk. They started from their home and walked along some paths, eventually returning home. They did not walk on any path more than once.



During their walk they saw exactly four birds. Three of the four birds they saw are shown below:

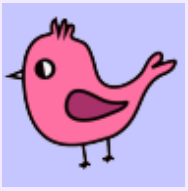


Question

Which other bird must they have seen?

(A) 

(B) 

(C) 

(D) 

Market Exchange (BCC Grade 5/6 2020)

Story

A beaver goes to a market to trade items. It has one carrot but needs one fir tree. Each stall of the market allows a different trade as shown:

Stall	Give	Get
P	carrot	fish
Q	coin	fish
R	ring	cupcake
S	carrot	cupcake
T	coin	fir tree
U	ring	fir tree
V	cupcake	ring
W	carrot	maple leaf

Question

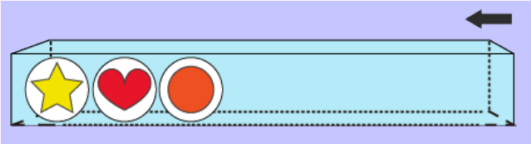
Which of the following sequences of stalls should the beaver visit in order to trade its carrot for one fir tree?

(A) P, Q, T (B) W, T, U (C) S, V, U (D) S, R, U

Box of Balls (BCC Grade 5/6 2019)

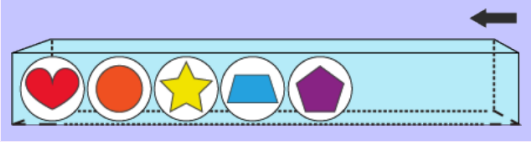
Story

A beaver has a box with an opening on the right-hand side.



At any time, the beaver can take out the rightmost ball from the box, or put in a new ball from the right. For example, if the beaver wants in between and , it needs to take out , put in , and then put in .

Now suppose the beaver has five balls in the box as shown, and two balls (and) out of the box.



The beaver wants the balls in the box to be in the order: , , , , , , .

Question

What should the beaver do?

(A) Take out , take out , put in , put in , put in , and then put in .

(B) Take out , take out , put in , put in , put in , and then put in .

(C) Take out , put in , put in , and then put in .

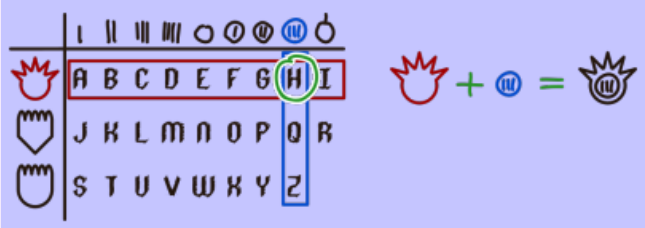
(D) Take out , take out , put in , put in , put in , and then put in .

Ancient Code (BCC Grade 5/6 2019)

Story

Beaver Cleveria discovered a table of symbols carved in wood.

After studying the table, Cleveria figures out that it is an ancient code. The symbol assigned to a row and the symbol assigned to a column are combined to form a single image. This image is the code for the letter where that row and column meet. For example, the letter H is encoded as shown:



Later, Cleveria sees the following coded message on a tree:

Question

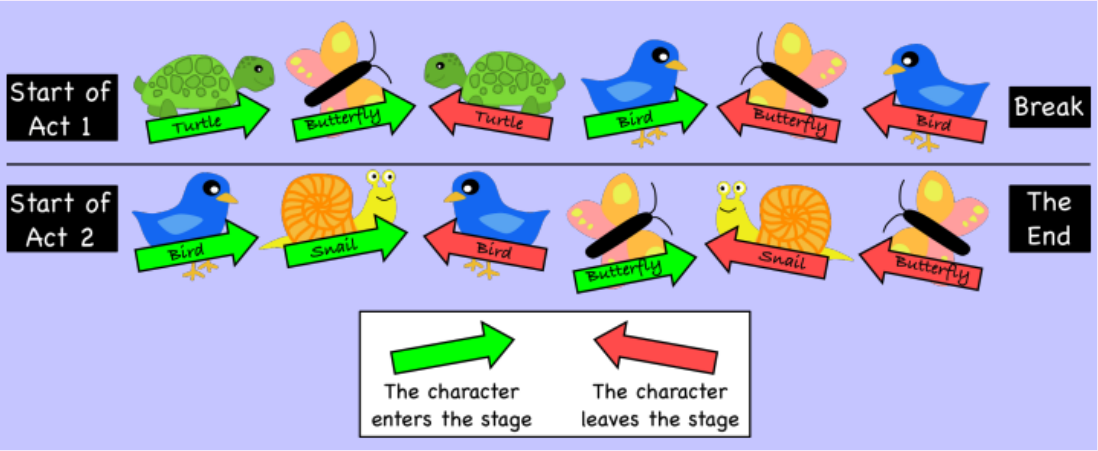
What is the message?

(A) LOVEWATER (B) SLEEPDAYS (C) LOVEMYSUN (D) CAREFORME

Theatre Performance (BCC Grade 5/6 2020)

Story

Four characters are in a play. They enter and leave the stage according to the order shown, read from left to right. The play has two acts and one break between the acts.



Question

Which statement is *not* true?

(A) The snail and the butterfly were together on the stage.

(B) The turtle and the bird were together on the stage.

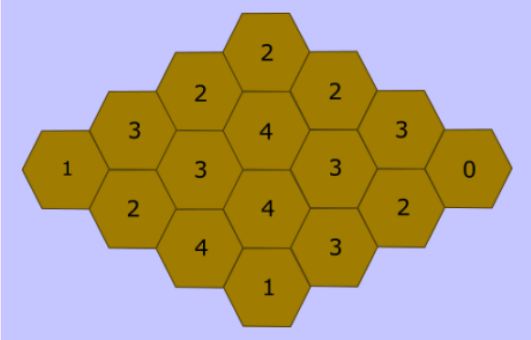
(C) The snail entered the stage after the break.

(D) The snail and the bird were together on the stage.

Beehive (BCC Grade 5/6 2017)

Story

A bear studies how many hexagons in a honeycomb contain honey. For each hexagon, the bear records how many other hexagons touching this hexagon contain honey. So this number could be 0, 1, 2, 3, 4, 5 or 6. The results of the bear's study are below.



Question

How many hexagons contain honey?

(A) 7 (B) 8 (C) 9 (D) 10

Shapes (BCC Grade 5/6 2021)

Story

Here is a line of shapes.

The line has a run of stars of length 2. A run is an unbroken chain of identical shapes. Ali likes to create long runs by changing shapes. For example, if Ali changes the middle square to a star in the line above, then he can create a longer run of length 4.

Question

Suppose Ali chooses and changes exactly 3 of the 16 shapes in the following line:

What is the length of the longest possible run that Ali can create?

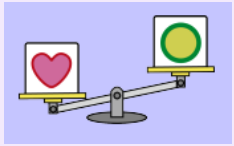
(A) 4 (B) 5 (C) 6 (D) 7

Weighing Boxes (BCC Grade 5/6 2020)

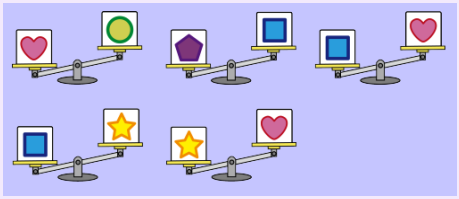
Story

There are five boxes, each featuring a different shape, and each having a different mass. Using a scale we can compare the masses of two boxes.

For example, the following scale shows that  is heavier than  :



Five comparisons were made, and the results are shown on the following scales:



Question

If we arrange the boxes in order from heaviest to lightest, which box would be in the middle?

(A)  (B)  (C)  (D)