Grade 6 Math Circles
Nov 1/2/3, 2022
BCC Prep Problem Set
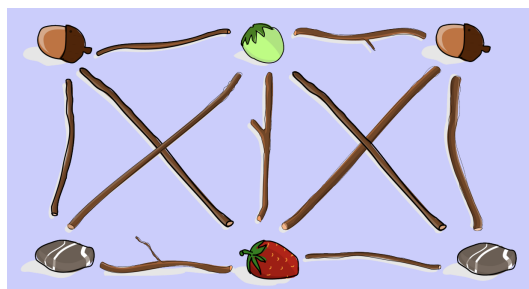
1. **Strawberry (BCC Grade 5/6 2021)**

   Anja makes a design on the ground using the following four types of objects.

   She then places sticks in her design according to her very important rule:

   Sticks cannot be placed between objects that are the same type.

   Here is Anja's completed design:

   Suddenly a bird swoops in and eats the ! Anja would like to avoid having this happen again.

   If possible, Anja would like to replace the with a different type of object, and without moving any sticks. Without breaking her very important rule, which object can Anja replace the with?

   (A)   (B)   (C)   (D) It is not possible. Only a could go there.

2. **Rare Mushrooms (BCC Grade 5/6 2020)**

Colby wants to take a picture of a rare mushroom. To determine whether or not a mushroom is rare, Colby assigns points to the stem and cap according to the following table:

| Points for Stem		Points for Cap		
Plain	Layered	Dotted	Horned	Striped
0 points	2 points	1 point	3 points	4 points

A mushroom that scores 5 points or more is rare and a mushroom that scores less than 5 points is not rare.

Which one of the following four mushrooms is rare?

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

3. **Plates (BCC Grade 5/6 2019)**

A beaver believes plates are only arranged properly if all the large plates are on the left, followed by all the medium plates, followed by all the small plates. For example, the beaver believes the three large plates, three medium plates, and two small plates shown are arranged properly.
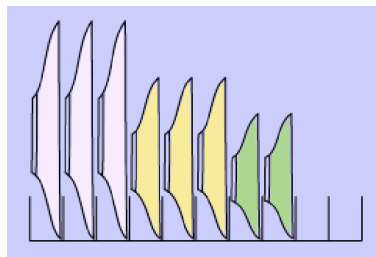
The beaver would like to add a large plate and arrange them properly.
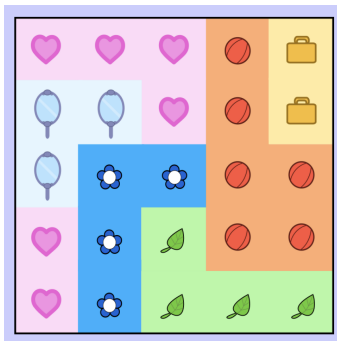
Of the eight original plates, what is the fewest number of plates that must be moved?

(A) 2   (B) 3   (C) 4   (D) 5

4. **Wallpaper (BCC Grade 5/6 2017)**

Robyn covers a wall with six overlapping rectangular sheets of wallpaper as shown. Each sheet of wallpaper is designed using a different image in a repeating pattern.

What is the order of the wallpaper pieces from the one placed first to the one placed last?

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

5. **Necklaces (BCC Grade 5/6 2021)**

A jeweller makes necklaces with hidden messages by replacing each letter of the alphabet with a bead pattern. Bead patterns are made using heart and diamond beads, and the same bead pattern always represents the same letter. Letters in a message are separated by oval beads and messages are read from left to right.

Here are two of the necklaces the jeweller has made along with their hidden messages.

Necklace	Hidden Message
	TRUTH
	CARE

Which of the following necklaces has the hidden message ART?

(A)

(B)

(C)

(D)

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6. **Push-Away Parking (BCC Grade 5/6 2019)**

In the parking lot shown, each car is either parked in a parking space or in front of two parking spaces.


Cars that are parked in front of two parking spaces may be moved forward or backward in order to allow blocked cars to exit. For example, Car A is not blocked and can exit without any other cars moving; however, Car L is blocked by Car Q. If Car Q is moved, then Car L can exit.

Which car cannot exit its parking space unless two different cars move?

(A) Car G   (B) Car H   (C) Car I   (D) Car B

7. **Special Towers (BCC Grade 5/6 2019)**

Consider the towers shown.
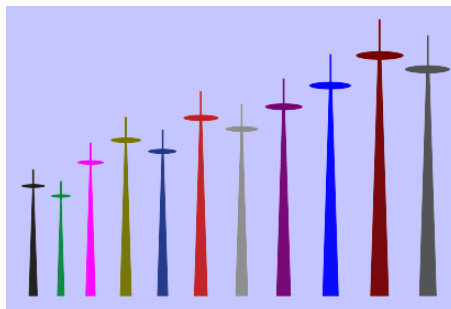
A tower is special if all towers to the left of it are shorter, and all towers to the right of it are taller.

How many special towers are there?

(A) 1   (B) 2   (C) 3   (D) 4

8. **Paintings (BCC Grade 5/6 2021)**

Paintings are brought to a warehouse for inspection before they are delivered to museums. The paintings are stacked on top of each other. When a painting arrives at the warehouse, it is put on top of the stack. When a delivery person departs with a painting, they take the painting from the top of the stack.

Records are kept of all paintings arriving at the warehouse and departing from the warehouse:

Arrivals			*Departures*	
Time	**Painting**		**Time**	**Delivery Person**
11:40	Beavers on the Grass		12:25	Pia
12:15	Happy Beaver		13:35	Raz
12:55	Sun and Moon		14:35	Stu
13:30	Enchanted Forest		14:40	Quy
14:18	Oak and Birch		15:20	Raz

Which delivery person took "Sun and Moon" to a museum?

(A) Pia　　　(B) Quy　　　(C) Raz　　　(D) Stu

9. **Jumping Kangaroo (BCC Grade 5/6 2020)**

Kanga Roo is jumping home along the vertical and horizontal paths. Kanga jumps over exactly one pile of bricks with each jump. Kanga cannot jump over brick piles that have a height of 3 bricks.

If Kanga wants to jump home using the fewest jumps possible, how many jumps must Kanga make?

(A) 8　　　(B) 13　　　(C) 14　　　(D) 16

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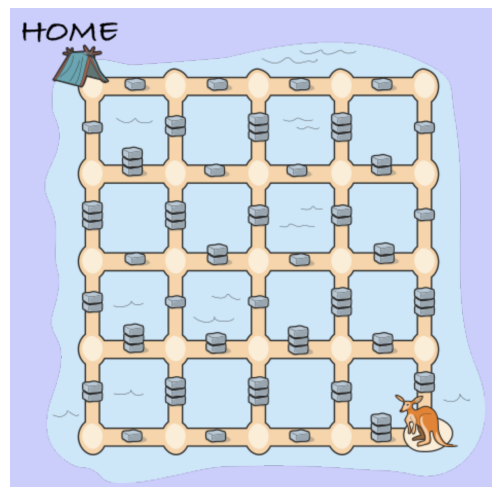
10. **Toy Storage (BCC Grade 5/6 2017)**

Tom has two types of toys: animal toys and vehicle toys. Tom fills three boxes by putting three toys in each box. As long as there is room, he puts vehicles into box A, animals with striped bodies into box B, and animals with spotted bodies into box C. However,

- Anytime he tries to put a toy in box A and it is full, he then tries to put the toy in box B.
- Anytime he tries to put a toy in box B and it is full, he then tries to put the toy in box C.
- Anytime he tries to put a toy in box C and it is full, he then tries to put the toy in box A.

Tom puts the following nine toys into boxes in the following order:

(1)   (2)   (3)   (4)   (5)   (6)   (7)   (8)   (9)

Where does Tom put the dog and zebra?

(A) Tom puts the dog in box C, and the zebra in box B.

(B) Tom puts both in box A.

(C) Tom puts both in box B.

(D) Tom puts both in box C.

11. **Bracket Bracelet (BCC Grade 5/6 2017)**

A jewelry shop produces chains used to make bracelets. The chains are built by continually adding matching pairs of bracket-shaped ornaments. There are two types of pairs, as shown on the right.

After choosing a starting pair, a second pair is either added to the end of the chain or inserted between the previously added pair. This process can be repeated any number of times.

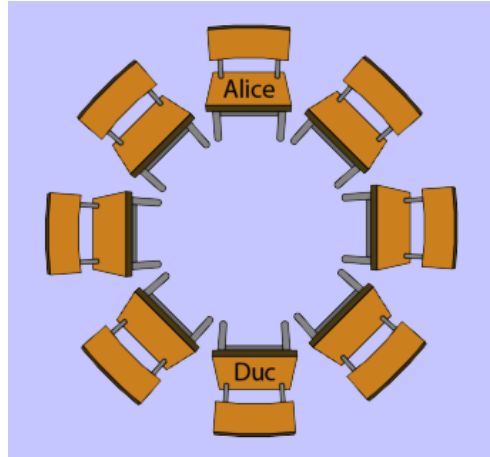Examples of three different chains that can be produced are shown below.
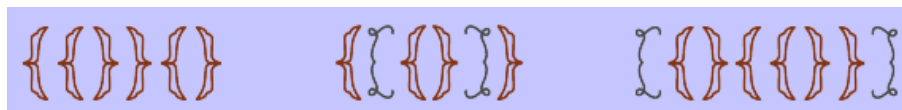
Which of the following chains can also be produced?

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

12. **Seating Plan (BCC Grade 5/6 2019)**

Berto and seven of his friends are sitting in a circle. They are all facing inwards.

We know the following facts about where the friends are sitting:

1. Alice is sitting directly across from Duc, as shown.
2. Greta and Eugene are both sitting beside Haakim.
3. Franny is not sitting beside Alice or Duc.
4. There is someone who is sitting next to both Greta and Chika.
5. Eugene is beside Duc, on Duc's left.

Which of these orders of friends, in a clockwise manner, is correct?

(A) Alice, Berto, Greta, Duc, Chika, Eugene, Franny, Haakim

(B) Alice, Greta, Haakim, Eugene, Duc, Berto, Franny, Chika

(C) Alice, Chika, Franny, Berto, Duc, Eugene, Haakim, Greta

(D) Alice, Haakim, Eugene, Greta, Duc, Franny, Berto, Chika

13. **Do They Meet? (BCC Grade 5/6 2021)**

On Lake Castor, lilypads are arranged in a grid, where rows are numbered from 1 to 5, and columns are labelled from A to H. Beaver Bob starts on pad A1 (in the bottom-left corner), and Beaver Nora starts on pad H3.
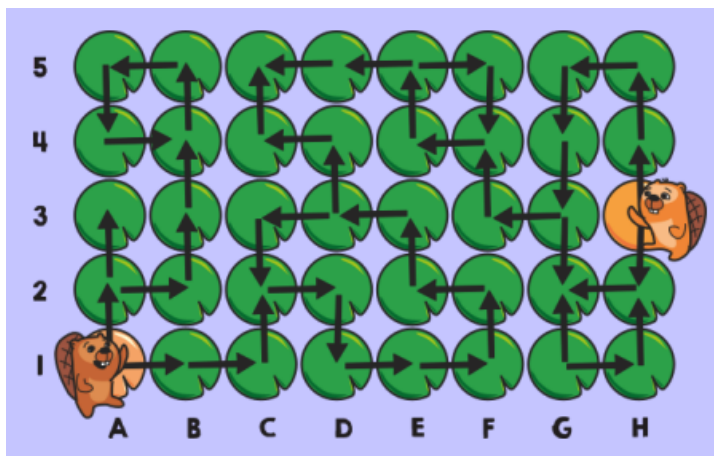
The beavers can move from one lilypad to another lilypad only if they are following an arrow. The beavers do not necessarily move at the same speed.

Which of the following statements is true?

(A) The beavers will never meet.
(B) The beavers could meet on pad C2.
(C) The beavers could meet on pad F4.
(D) The beavers could meet on pad C5.

14. For more practice, try writing the BCC Grade 5/6 2018 contest as though you were writing the actual contests. That is, no aid, no notes, and with a time limit of 45 minutes. Here is the link for the contest: https://cemc.uwaterloo.ca/contests/past_contests/2018/2018BCCContest5_6.pdf.