

# Sample Questions

## Grades 1 - 2: Preparatory Computational Thinking

For more sample questions, visit <https://form.simcc.org/lms-home/>

Please register an account at our Member Development Portal (<https://form.simcc.org/>) to access the questions.

**Grade 1, BeeBug:** A bee and a bug fly together from one flower to the next one from left to right. The flowers are shown in the picture below. If the next flower is higher than the previous flower the bee increases its number by 1. If the next flower is lower than the previous one, then the bug increases its number. If they start with their numbers equal to 0, with what numbers will they end this trip ?



- a) Bee – 1, Bug – 1
- b) Bee – 2, Bug – 2
- c) Bee – 3, Bug – 2
- d) Bee – 2, Bug – 3

**Answer:** c

**Grade 2, Swap Sorting:** There are seven numbers in a row: 7 6 5 4 3 2 1. Alice wants to have the numbers written in ascending order: 1 2 3 4 5 6 7. She can swap any two numbers having another number between them. For example, she can swap 7 and 5, as there is 6 between them, but she cannot swap 7 and 6 or 7 and 4. What is the minimum number of swaps required to sort the numbers ?

- a) 6
- b) 7
- c) 8
- d) 9

**Answer:** d

# Sample Questions

## Grades 3 - 4: Computational Thinking 1

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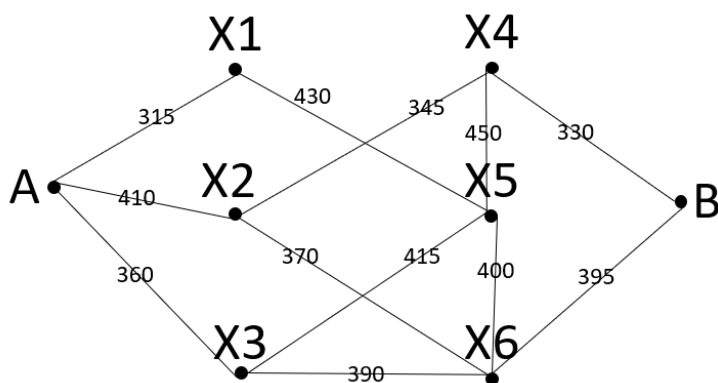
**Grade 3, Change in the pocket:** Liam is planning to go to a store to buy some candies. But he doesn't know how much he will have to pay, and he only likes paying the exact amount. Liam knows that candies can't cost more than \$20. There are bills of \$1, \$5, and \$10, as well as coins of 1c, 5c, 10c, 25c, and 50c. So Liam wants to take with him enough bills and coins to pay any price between 1c and \$20, but carry as few bills and coins as possible. How many bills and coins in total will Liam have with him?

- a) 13
- b) 14
- c) 15
- d) 16

**Answer:** c

**Grade 4, Go through tunnels:** You own a delivery company in Switzerland where your trucks deliver goods to customers. But there are a lot of tunnels through the mountains in that country, and every tunnel has a prescribed limit (in cm) on the height of the vehicle that can go through that tunnel. Here is a map of tunnels between two cities A and B.

What is the height of the tallest truck that can go from A to B? (trucks can go using any road available if their height is smaller or equal to a tunnel height limit)



- a) 410
- b) 370
- c) 330
- d) 360

**Answer:** b

# Sample Questions

## Grades 5 - 6: Computational Thinking 2

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**Grade 5, Ascend:** Kyle has the following sequence of numbers and he wants to eliminate as few of them as possible so that all remaining numbers are in increasing order. What is the fewest number of numbers he can eliminate?

5, 6, 10, 7, 19, 25, 3, 44, 24, 72, 17, 31, 5, 42, 28, 56, 69

- a) 8
- b) 9
- c) 10
- d) 11

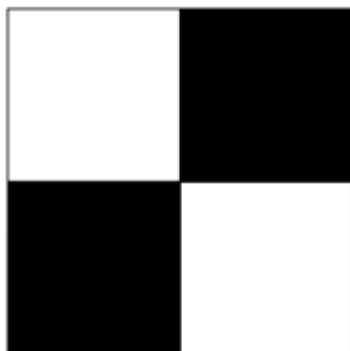
**Answer:** a

**Grade 6, Painting squares:** Alice has a white square. She divides it into four equal smaller squares and paints lower left and upper right squares black. She repeats this procedure to two smaller white squares, obtaining more smaller white and black squares.

A square screen is initially white. The following procedure is applied to the screen four times:

“Find all white squares on a screen, divide each of them into four smaller squares and paint left lower and right upper small squares black”.

How many small white squares will be on the screen in the end? Below is the image of the screen after the first iteration.



- a) 14
- b) 15
- c) 16
- d) 17

**Answer:** c

# Sample Questions

## Grades 7 - 8: Programming 1

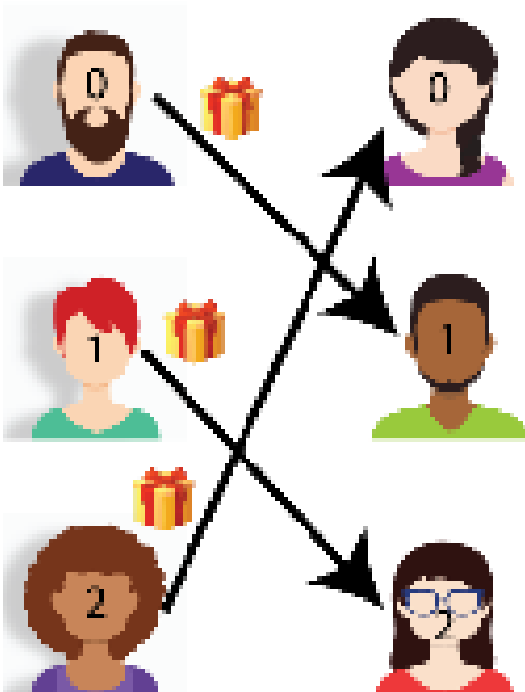
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**Grade 7, Gifts:**  $N$  people, labelled  $0, 1, 2, \dots, N - 1$  are exchanging gifts. Person  $i$  gives a gift to  $P[i]$ .

Now, each person wants to find out whose gift he received (array  $Q$ ).

For example, if  $P = \{1, 2, 0\}$ , then  $Q = \{2, 0, 1\}$ .



Explanation: 2 gave his gift to 0, 0 gave his gift to 1, 1 gave his gift to 2.

If  $P = \{4, 1, 5, 2, 8, 9, 7, 3, 6, 0\}$ , find  $Q$ .

- a) 9, 1, 3, 7, 0, 2, 8, 6, 4, 5
- b) 9, 3, 1, 0, 7, 8, 2, 6, 4, 5
- c) 5, 1, 3, 7, 0, 2, 8, 6, 4, 9
- d) 5, 3, 1, 0, 7, 2, 8, 6, 4, 9

**Answer:** a

**Grade 8, log<sub>2</sub>:** For example,  $\log_2(2) = 1$ . Since  $2/2 = 1$ ,  $\log_2(7) = 2$  since  $7/2 = 3.5$ ,  $3/2 = 1.5$ .

What is the value of  $\log_2(2020)$ ?

- a) 9
- b) 10
- c) 11
- d) 20

**Answer:** b

# Sample Questions

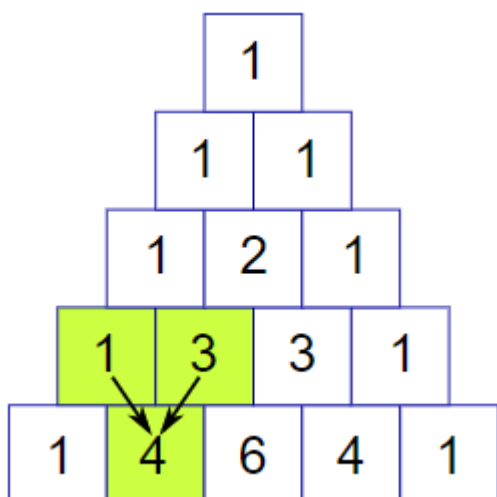
## Grade 9 - 10: Programming 2

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**Grade 9, Pascal:** The rows of Pascal's triangle start with row  $n = 0$  at the top (the 0th row). The entries in each row are numbered from the left beginning with  $k = 0$  and are usually staggered relative to the numbers in the adjacent rows. For example, the number at  $n=4, k=1$  is 4.

The triangle may be constructed in the following manner: In row 0, there is an entry of 1. Each entry of each subsequent row is constructed by adding the number above and to the left with the number above and to the right, treating blank entries as 0.



What is the number at  $n=12, k=5$ ?

- a) 970
- b) 792
- c) 972
- d) 729

**Answer:** b

**Grade 10, findnumber:** I am thinking of an integer  $x$  from 1 to 100. You want to find out what  $x$  is by asking questions that go like: "is  $x$  greater than  $y$ ?", where  $y$  is an integer of your choice.

What is the minimum number of questions you must ask to guarantee you can find the correct value of  $x$ ?

- a) 5
- b) 6
- c) 7
- d) 8

**Answer:** c

# Sample Questions

## Grade 11 - 12: Introduction to Algorithm Design 2

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**Haystack:** There are 8 haystacks arranged from left to right, each with a certain number of haybales. We can move haybales, where each move involves shifting 1 single haybale from 1 haystack to an adjacent haystack.

How many moves are required to make it such that every haystack has the same number of haybales?

2	5	5	3	6	0	4	7
							

- a) 8
- b) 9
- c) 10
- d) 11

**Answer:** d

**Meal:** There is a line of 10 dishes, with weights = {9, 8, 2, 3, 7, 2, 4, 8, 5, 6} grams. What is the maximum number of consecutive dishes to eat with a total of at most 20 grams?

									
9	8	2	3	7	2	4	8	5	6

- a) 4
- b) 5
- c) 6
- d) 7

**Answer:** b