Part A: Questions 1 – 6

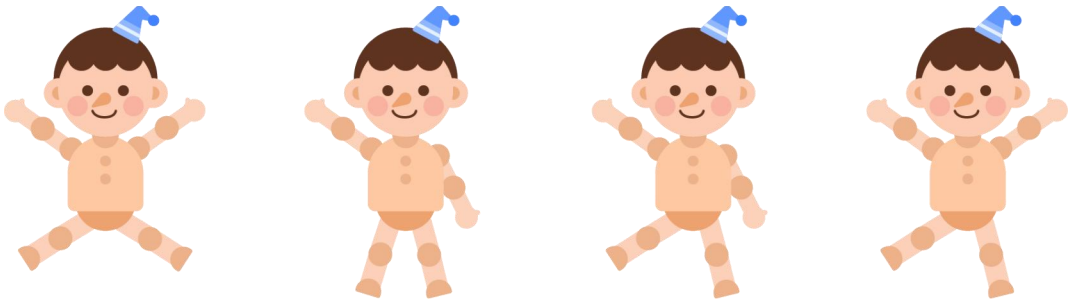
Part A: Questions 1–6

Multiple Choice Questions (3 points each)

---

1. Dancing Puppet

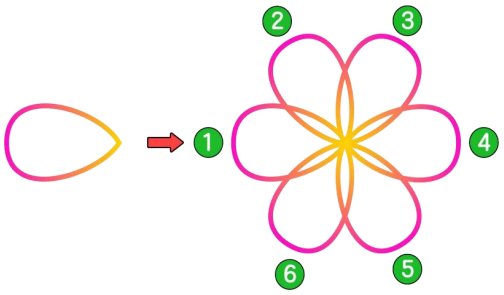
A child has choreographed a dance for a puppet, consisting of five moves. Each move involves changing the position of either a leg or an arm. However, the order of the five dance positions has been scrambled. Carefully observe to find the correct third move in the dance sequence.



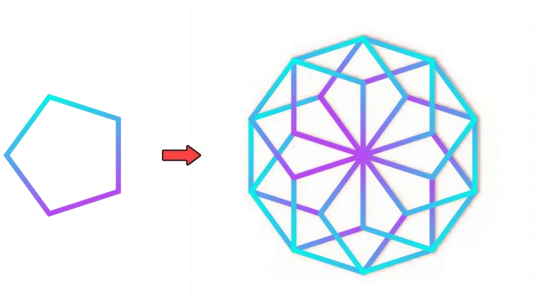
(A) (B) (C) (D)

2. Fascinating Repetitions

Repeating shapes can create beautiful patterns. For example, the flower below is created by repeating a shape six times.



In the next image, a pattern is created by repeating pentagons.
How many pentagons were repeated to create this pattern?



(A) 6 (B) 8 (C) 10 (D) 12

3. Decoding the Password

The ADFGVX cipher can convert the 26 letters and numbers 0-9 into coded messages. For instance, the code "AA" represents the intersection of row A and column A in the grid, which is "d." Similarly, "FD" represents the intersection of row F and column D, which is "b."

	A	D	F	G	V	X
A	d	h	x	m	u	4
D	p	3	j	6	a	o
F	i	b	z	v	9	w
G	1	n	7	0	q	k
V	f	s	l	y	c	8
X	t	r	5	e	2	g

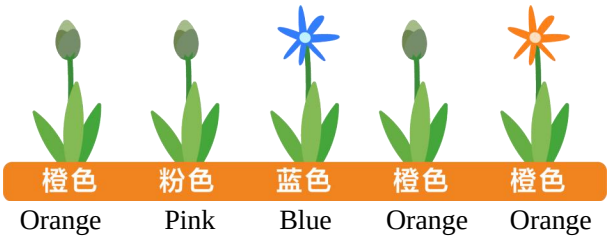
What word does this code represent?

(A) live (B) luck (C) love (D) long

4. Colorful Flowers

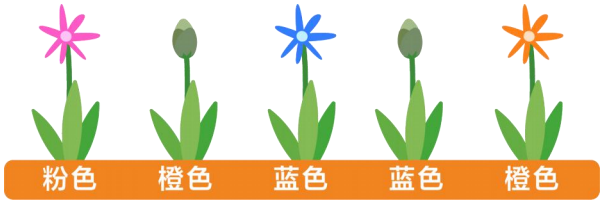
A child is playing a game to guess the colors of flowers. There are five flowers, each of which can be blue, orange, or pink. If the child guesses correctly, the flower blooms; if incorrect, it stays closed. Below are the results of two guessing attempts.

- The first guess



Orange Pink Blue Orange Orange

- The second guess



Pink Orange Blue Blue Orange

What are the colors of the five flowers?

(A) Blue Pink Blue Orange Orange (B) Pink Blue Blue Blue Orange

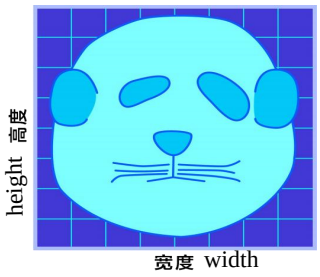
(C) Pink Blue Blue Pink Orange (D) Pink Pink Blue Pink Orange

5. Animal Recognition

A wild life research center has invented a machine that identifies animals based on facial characteristics, as shown in the table below (whisker width is the combined width of the left and right whiskers).

Characteristics	Rabbit	Beavers	Bear	Cat
Ear length	1/2 of Head Height	1/4 of Head Height	1/4 of Head Height	1/2 of Head Height
Whiskers width	Equals to Head width	1/2 of Head width	1/2 of Head width	Equals to Head width
Head width	1/2 of Head Height	1/2 of Head Height	Equals to Head Height	Equals to Head Height

Given the following facial features, which animal will the machine identify?



(A) Rabbit (B) Beaver (C) Bear (D) Cat

6. The Best Seats

Three friends, Xiaomi, Xiaoli, and Xiaoke, are planning to watch a movie and use the cinema's ticketing system to choose seats. The marked seats indicate those already sold.

The friends have the following preferences:

- Xiaomi: "I want to sit on the right side."
- Xiaoli: "I want all three of us to sit together in a row."
- Xiaoke: "I don't want to be too close to the screen, so not in the first three rows."

For example, choosing seats G3, G4, and G5 would make Xiaomi unhappy; D7, D9, and D10 would make Xiaoli unhappy; and A7, A8, and A9 would make Xiaoke unhappy.

How many seating arrangements can satisfy all their wishes?

(A) 3 (B) 4 (C) 5 (D) 6

Part B: Questions 7–9

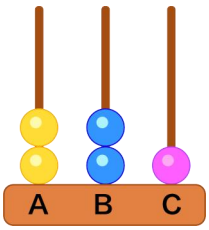
Part B: Questions 7–9

Each main question has three sub-questions, worth 2 points each.

Each answer is an integer between 0 and 99.

---

7. Bead Game



There are three pillars, A, B, and C, with three beads of different colors on them, as shown in the diagram.You can move beads from one pillar to another, but only one bead at a time.

For example, moving from Image 1 to Image 3 requires two moves.

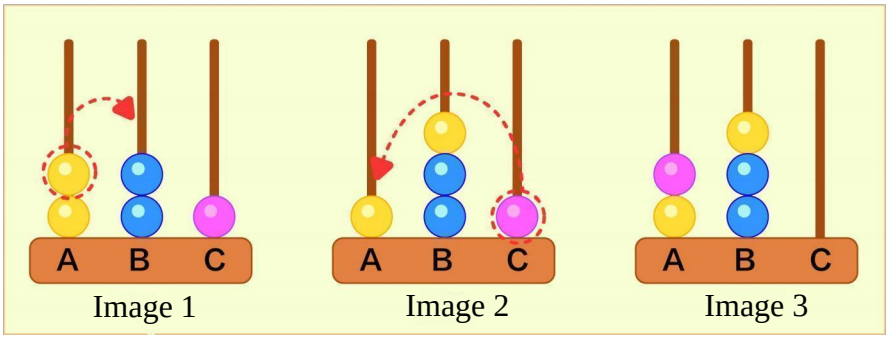
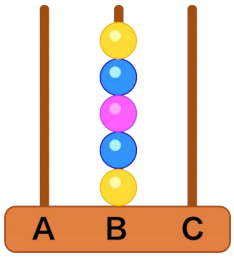
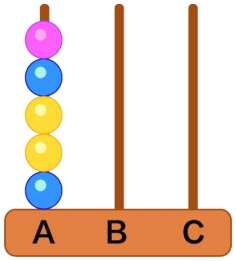


Image 1 Image 2 Image 3

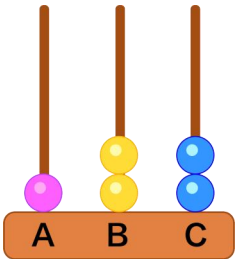
Question 1: What is the minimum number of moves required to reach the configuration in the diagram?



Question 2: What is the minimum number of moves required to reach the configuration in the diagram?

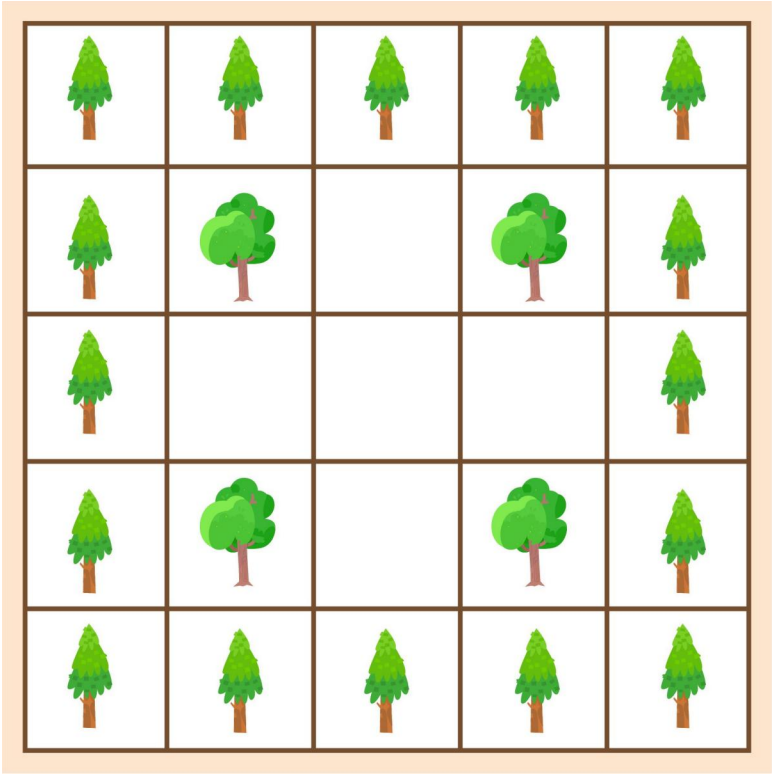


Question 3: What is the minimum number of moves required to reach the configuration in the diagram?



8. Protecting Rare Trees

To protect rare Metasequoia trees, a rule has been established: each square plot is surrounded by cypress trees, and the Metasequoia trees are planted in the top - left corner, with spaces left between them in each row and column.
The following example shows a 5×5 plot.



- Question 1: How many cypress trees are needed for a 7×7 plot?
- Question 2: How many cypress trees are needed to plant five rows of Metasequoia trees?
- Question 3: How many cypress trees are needed to plant 16 Metasequoia trees?

9. Rolling Balls

Numbered balls roll down a ramp and fall into holes. If there's enough space, the balls stay in the hole; if a hole is full, the balls roll to the platform on the left. After all balls have fallen, they can be bounced out of the holes.

The diagrams show an example with five balls.

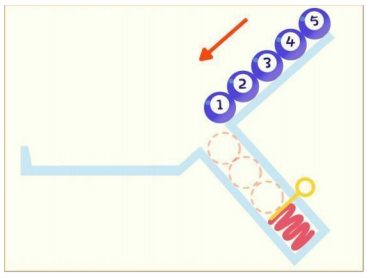


Image 1

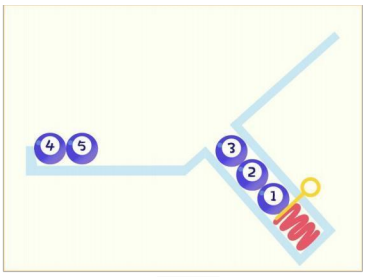


Image 2

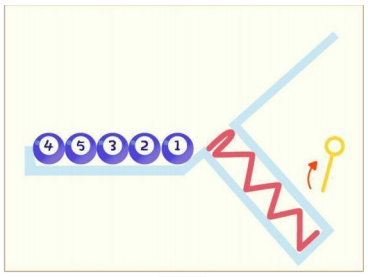
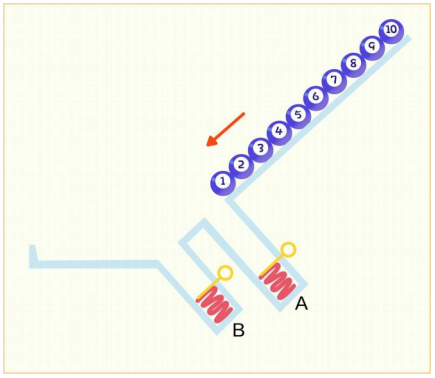
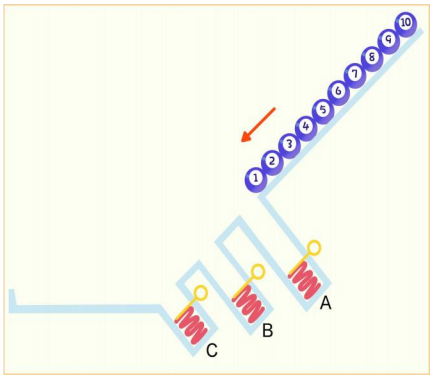


Image 3

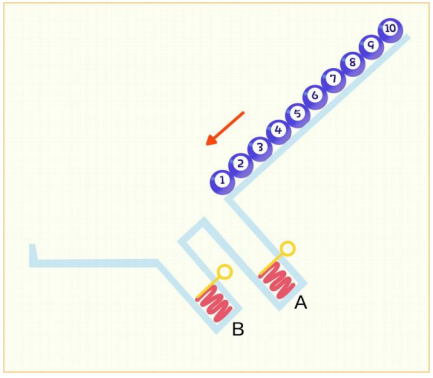
Question 1: For 10 balls, with Hole A holding 3 balls and Hole B holding 2 balls, which number is the last ball on the left platform?



Question 2: For 10 balls, with Hole A holding 3 balls, Hole B holding 2 balls, and Hole C holding 1 ball, what number is the sixth ball from the left on the plat form?



Question 3: For 10 balls, with Hole A holding 3 balls and Hole B holding 2 balls, and ejecting balls from Hole B first, then Hole A, which number is the last ball on the platform?



Part A: Questions 1–6

单选题（每题3分）

1.跳舞的小人

小朋友给木偶编制了一套舞蹈，这套舞蹈一共有五个动作，每个相邻动作中，要么改变一条腿的位置，要么改变一只手臂的位置。但是现在舞蹈的5个姿势顺序混乱了，请你仔细观察。找到该舞蹈的第三个动作。

(A)

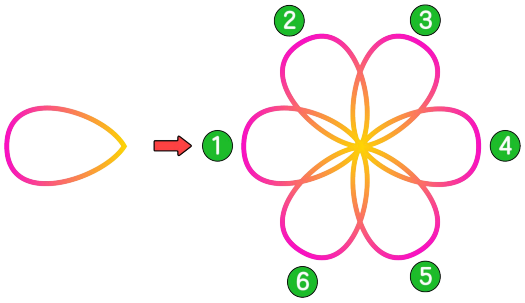
(B)

(C)

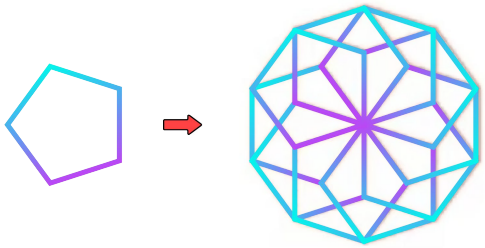
(D)

2.奇妙的重复

反复画同样的图形可以创造出美丽的图案。例如：下图这朵花，是重复了六次完成的。



那么下面这个图形是通过反复画五边形创造出来的，你能观察出来，它是通过重复画了几个五边形创造出来的吗？



(A) 6　　(B) 8　　(C) 10　　(D) 12

3.破解密码

ADFGVX密码可以将26个英文字母与数字0-9统统转换成密码信息。例如:AA这个密码就代表横向的A和纵向的A交叉方格的d，FD这个密码则代表横向F和纵向D交叉方格的b。

	A	D	F	G	V	X
A	d	h	x	m	u	4
D	p	3	j	6	a	o
F	i	b	z	v	9	w
G	1	n	7	0	q	k
V	f	s	l	y	c	8
X	t	r	5	e	2	g

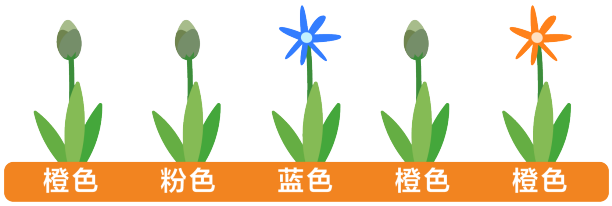
那么，**VF AV VV GX**　这个密码所代表的单词是？

(A) live　　(B) luck　　(C) love　　(D) long

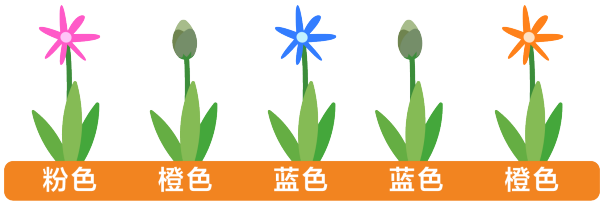
4.色彩绚丽的花朵

小朋友在玩猜一猜花朵颜色的游戏。五朵花的颜色可以是蓝色、橙色、粉红色中任意一种。猜对了，花就会开放，猜错了花不会开放。以下是小朋友两次猜测和尝试的结果。

· 小朋友第一次猜测结果如下图：



· 小朋友第二次猜测结果如下图：



请问，这五朵花分别是什么颜色？

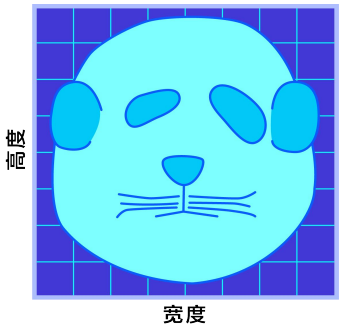
(A) 蓝 粉 蓝 橙 橙　(B) 粉 蓝 蓝 蓝 橙　(C) 粉 蓝 蓝 粉 橙　(D) 粉 粉 蓝 粉 橙

5.动物识别

野生动物基地发明了一台智能机器，该机器可以通过动物面部的基本特征数据识别。特征识别见下图。（胡子的宽度是左右两边胡子的宽度相加）

动物特征	兔子	海狸	熊	猫
耳朵的长度	头高的一半	头高的四分之一	头高的四分之一	头高的一半
胡子的宽度	与头的宽度相等	头宽的一半	头宽的一半	与头的宽度相等
头部的宽度	头高的一半	头高的一半	头高相等	与头的高度相等

现在要辨认的动物面部特征如下：

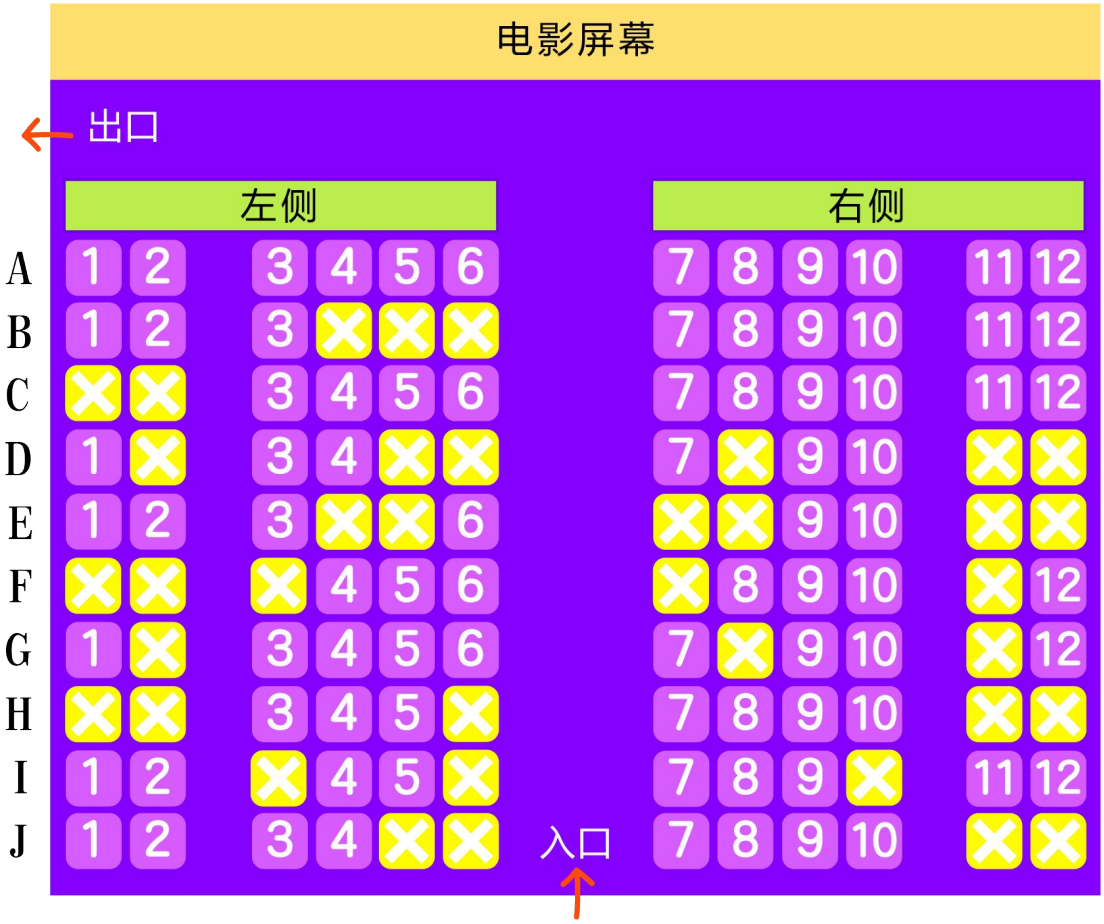


请问，智能机器将辨别该动物为哪一种动物？

(A) 兔子　(B) 海狸　(C) 熊　(D) 猫

6.最佳座位

小米、小丽和小可三个好朋友相约看电影，她们通过电影院的购票系统选择座位。图片中标记为 ⊠ 的座位表示无法选择(已经售出)。



小米、小丽和小可有以下愿望。
小米:“ 我想坐在右侧。 ”
小丽:“ 我希望我们三个并排挨着坐在起。"
小可:“ 我不想太靠近屏幕!我们不要坐在前三排。

例如：如果她们选择座位 G3、G4 和 G5，那么小米就会不高兴；
如果她们选择座位 D7、D9 和 D10，那么小丽就会不高兴；
如果她们选择座位 A7、A8 和 A9，那么小可就会不高兴。

那么，为满足她们三人的愿望，有多少种选择座位的方式?

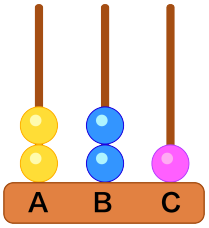
(A) 3　　(B) 4　　(C) 5　　(D) 6

Part B: Questions 7–9

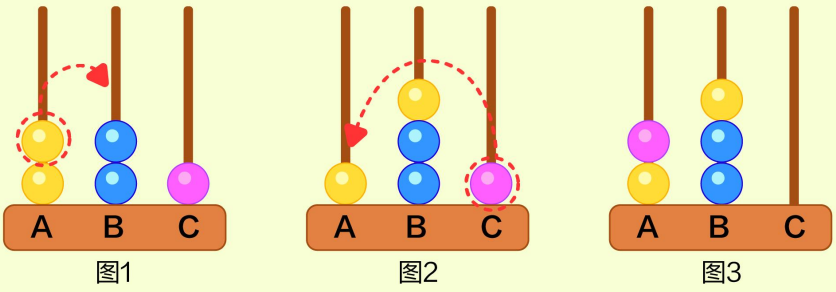
每一个大题有三个小题，每题2分。
每小题的答案都是一个介于0-99的整数。

7.串珠游戏

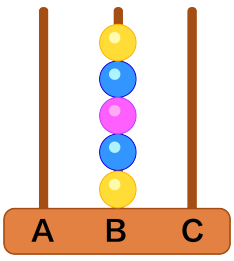
现有三根柱子A、B、C，上面放着三种不同颜色的珠子(如右图所示)。我们可以把珠子从一根柱子移到另一根柱子上，但是每次只能移动一个珠子。



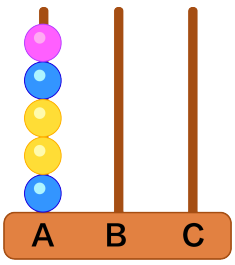
例如：下图需要从图1变为图3，需要移动两次。



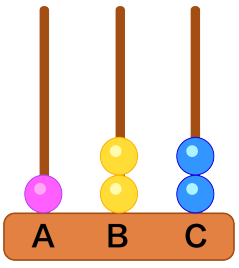
问题1：移动为下图最少需要几次？



问题2：移动为下图最少需要几次？

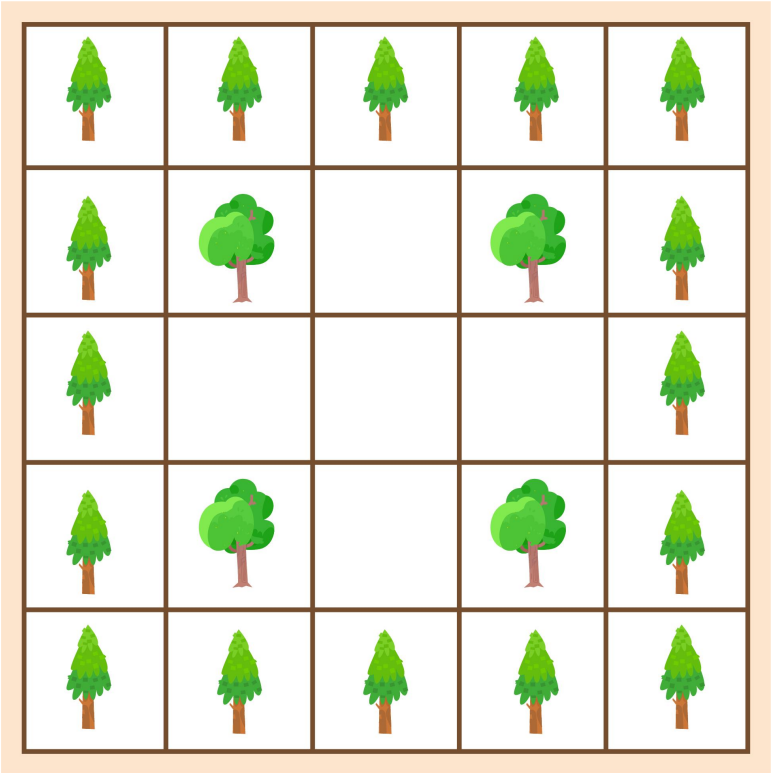


问题3：移动为下图最少需要几次？



8.保护珍惜树木

为了保护珍惜树木水杉，在水杉的种植区域做了如下种植规则：每个正方形区城内的四周要种植柏树进行保护，在柏树所构成的区域内左上角种植第一棵水杉，每行每列水杉之间都彼此留有一个空白区域。如下图所示是5 × 5区域内树木的种植情况。



问题1：在7 × 7的区域内种植，需要多少棵柏树？问

题2：种植5行水杉需要多少棵柏树？

问题3：种植16棵水杉需要多少棵柏树？

9.滚动的小球

带编号的球滚下坡道会依次落入孔中，孔中有足够空间球就会掉入，当孔中装满时，球会滚动到左边平台上，所有球滚落完毕，可以将孔中的球弹出。
如下图1-3所示，是5个球滚落时的例子。

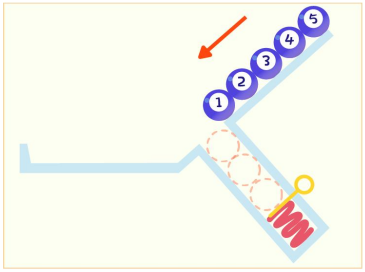


图1

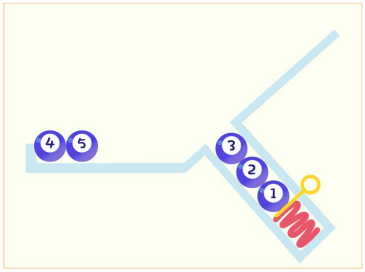


图2

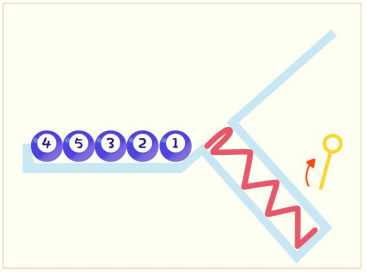
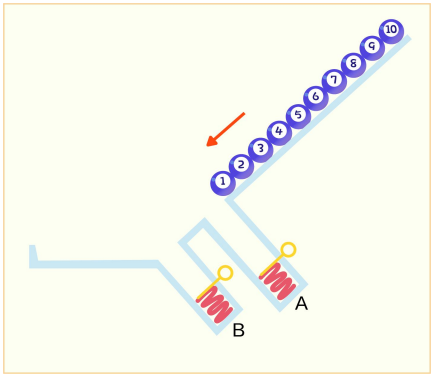
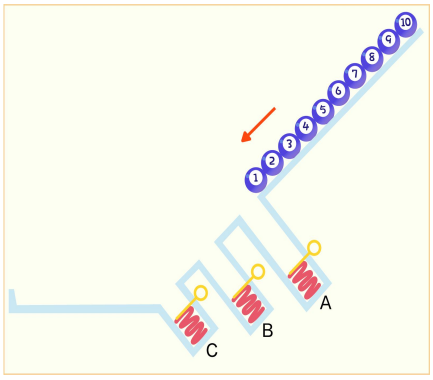


图3

问题1：如右图所示，10个球滚下来，孔A可容纳3个球，孔B可容纳2个球，所有球停止后，按照A、B的顺序将孔中的球弹出全部达到左边平台。在左边平台上的最后一个球是数字几？



问题2：如右图所示，10个球滚下来，孔A可容纳3个球，孔B可容纳2个球，孔C可容纳1个球，所有球停止后，按照A、B、C的顺序将孔中的球弹出全部达到左边平台。在左边平台从左到右第六个球是数字几？



问题3：如图所示，10个球滚下来，孔A可容纳3个球，孔B可容纳2个球，所有球停止后，按照B、A的顺序将孔中的球弹出全部达到左边平台。在左边平台最后一个球是数字几？