Computer
Talent Search

A project of the Institute of IT Professionals South Africa

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SENIOR

Grades 10 and 11

Not to be used before 7 March

If you are NOT in grade 10 or 11, please report that you have the wrong paper.
Only when the teacher says "START", may you begin.

1. Write your personal details and your answers on the answer sheet provided.
2. You will have 45 minutes to complete the 15 tasks.
3. You may answer the questions in any order, but it is important to place the answer in the correct line on the answer sheet.
4. Leave the tasks you find difficult for last.

The mark allocation is as follows.
A section: +6 marks for every correct answer.
B section: +7 marks for every correct answer.
C section: +7 marks for every correct answer.
If you do not answer a question or answer incorrectly, you get 0 (zero) for that task.
The maximum mark is 100.

Wait for the teacher to say "START".

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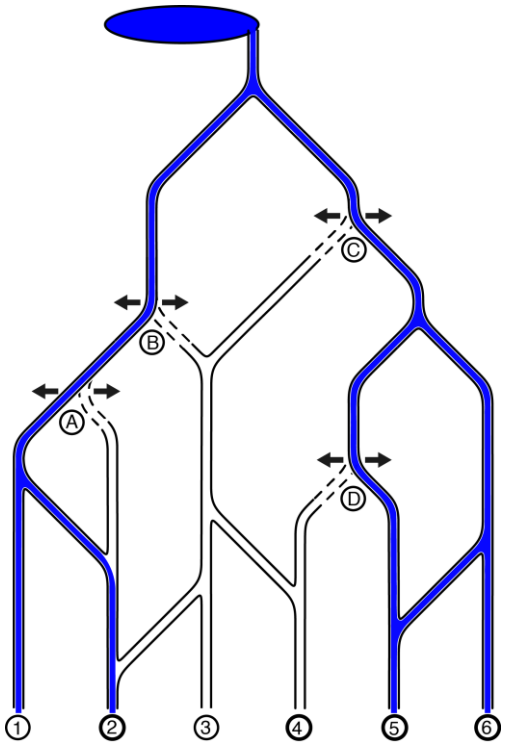
A1 Irrigation System

ID331 / SA1



The beavers have created a clever irrigation system for their fields. The water flows from a lake at the top of the hill all the way down to the fields numbered 1 to 6 at the bottom.

Along the water canals, the beavers have installed four water gates A, B, C and D, where the water can only flow either to the left or to the right.

Question:

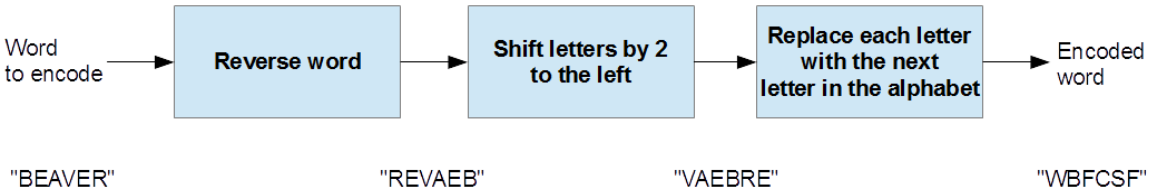
Direct the water so that only fields 2, 4, 5 and 6 are irrigated. Which combination will water the correct fields? Write down only the letter of the correct answer in the appropriate block on your answer sheet.

A. At A right, at B right, at C left, at D left,
B. At A right, at B left, at C right, at D left,
C. At A left, at B left, at C right, at D right,
D. At A left, at B right, at C right, at D left,

A2 You Won't Find It

ID374 / IB3 / SA2 / EA2

Alex and Betty send each other messages using the following sequence of transformations on every word.



For example, the word "BEAVER" is transformed to "WBFCSF".

Betty receives the encoded message "PMGEP" from Alex.

Question:

What did Alex want to say? Write down the word in the appropriate block on your answer sheet.

LODGE
FLOOD
RIVER
KNOCK

A3 Super Power Family

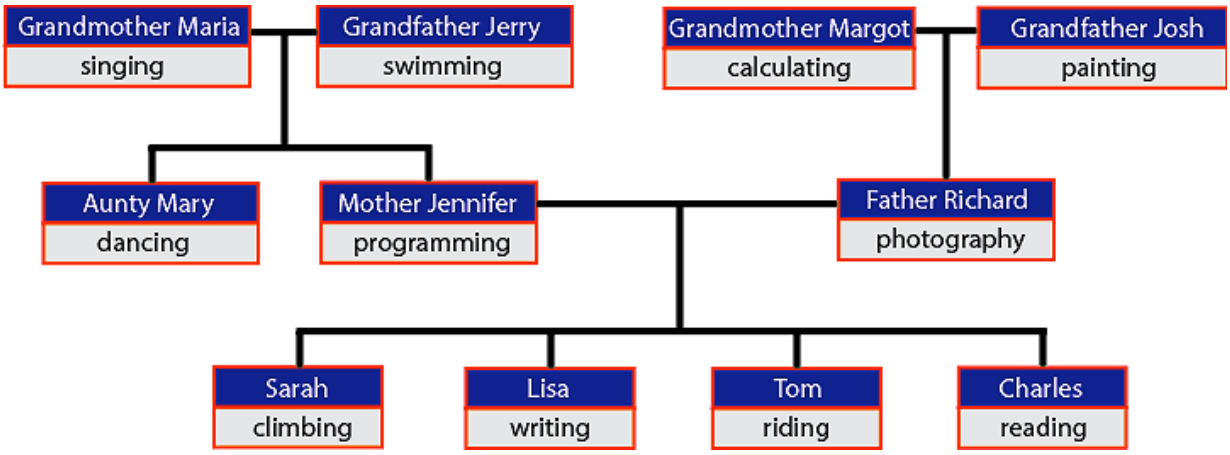
ID329 JB4 / IA4 / SA3 / EB1

- All members of this family have abilities.
- A daughter inherits all her abilities from her mother.
- A son inherits all his abilities from his father.
- Each family member also has one extra ability.

The diagram below shows the relationships between the members. It also shows the extra ability for each member.

Examples:

- Mother Jennifer has inherited the ability to sing from Grandmother Maria, and she also has the ability to program.
- Lisa inherits two abilities from her mother and also has the ability of writing. This means she can write, program and sing.



Question:

Look at the diagram above. Which one of the following statements is true? Write down the letter of the answer in the appropriate block on your answer sheet.

A. Sarah has abilities in reading, programming and singing.
B. Aunt Mary has abilities in dancing and swimming.
C. Tom inherits from Grandmother Margot the ability to calculate.
D. Tom's abilities are riding, painting and photography.

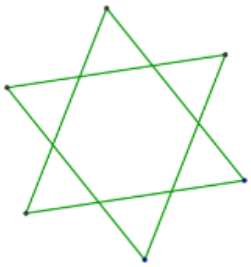
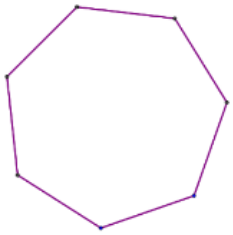
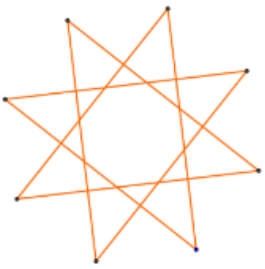
A4 Drawing Stars

ID342 / IB1 / SA4 / EA3

Stella loves to draw stars. She has devised a system for labelling her stars according to their shape. She uses two numbers:

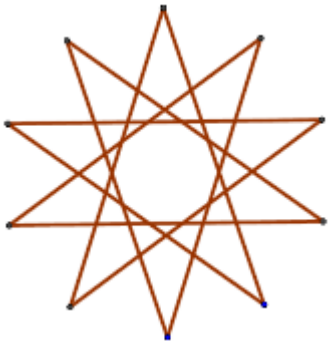
- A number of points for the star.
- A number indicating if a line from a dot is drawn to the nearest point (the number is 1), the second closest point (the number is 2), etc.

Here are four examples of Stella's labelling system:

			
5:2	6:2	7:1	8:3

Question:

How would Stella label the following star? Write down the letter of the correct answer in the appropriate block on your answer sheet.



A. 9:3
B. 9:4
C. 10:4
D. 10:5

A5 E-mail

ID330 / SA5 / EA4

Edgar is looking for a new home to live in.

He searched the internet and found a perfect flat for a very good price.

He has sent an e-mail to Francis, who is selling the flat, and received a quick reply:

> Hi,
>
> Thank you for your interest in my flat.
>
> Although I am not in town, I can send you the key to the flat so you can inspect it, but I need a security deposit of R50 000 - beforehand.
>
> To show my trustworthiness, I attach a copy of my ID.
>
> Cheers,
>
> Francis

Edgar is unsure what to do and is asking for your help.

Question:

What would be your best advice? Write down the letter of the best advice in the appropriate block on your answer sheet.

A. Pay the deposit. With the ID you can always go to the police if you don't get the deposit back.
B. That is perfect. If you like the flat, you can keep the key right away.
C. Don't pay the deposit, there is a high chance that this is a mail fraud.
D. Pay the deposit, go and have a look and decide later on.

B1 Throw the dice

ID376 / JC3 / IB4 / SB1

After school the young beavers are used to playing together.

To avoid quarrels about where to play, they throw a normal six sided die.

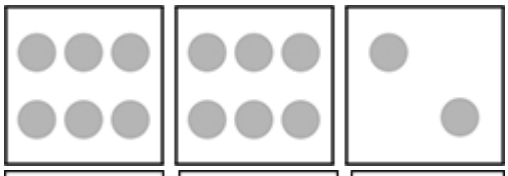
The decision is found according to this rule:

1	IF	The first throw is greater than the second throw	
2	THEN	We go to play in the woods	
3	ELSE		
4		IF	The third throw is less than the first throw
5		THEN	We go to play at the river
6		ELSE	We go to play on the sports field

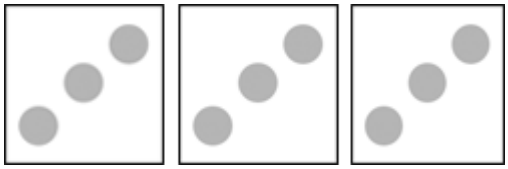
Question:

Which sequence of throws will send the young beavers to the sports field? Write down the letter of the answer in the appropriate block on your answer sheet.

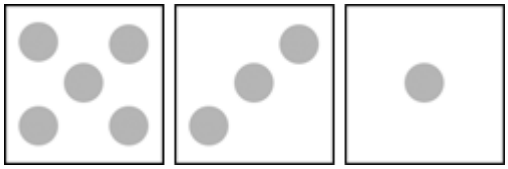
A.



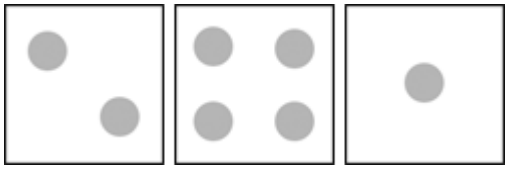
B.



C.



D.



B2 Word Chains

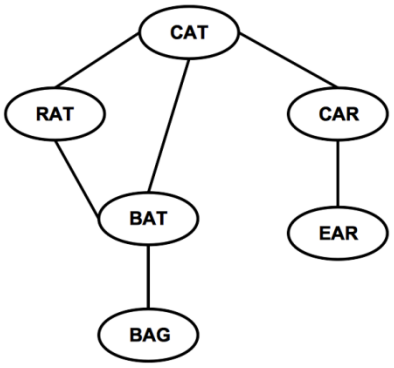
ID337 / SB2 / EA1

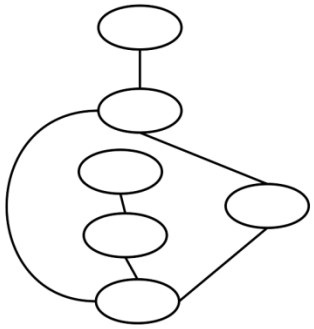
For his homework, Thomas had to write words on cards and connect them with rubber bands.
The teacher told him to connect any two words that differ by exactly one letter.

Thomas did this, as you can see in the picture on the right.

When Thomas returned from having a break he got a surprise.

Peter, his little brother, had erased all the words!





Also, the cards were completely mixed up, as you can see in the image on the left.

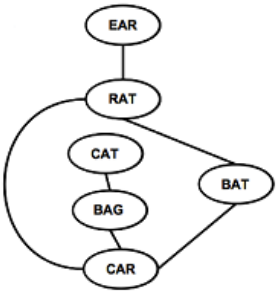
Importantly, the rubber bands still connected them as before.

Thomas was sure he could put the words back in the correct place.

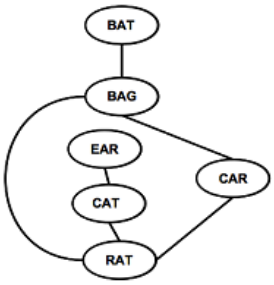
Question:

Which picture below contains the words in exactly the right places? Write down the letter of the answer in the appropriate block on your answer sheet.

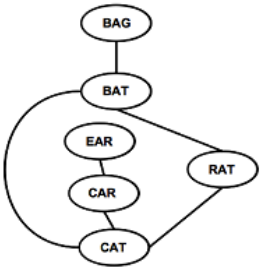
A.



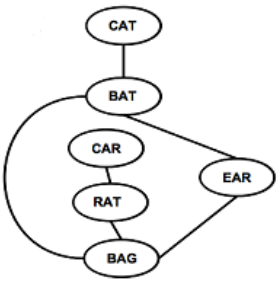
B.



C.

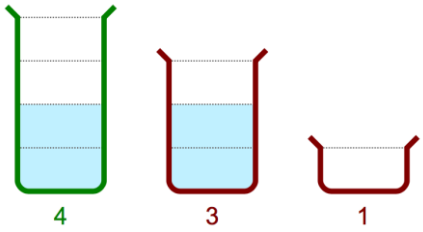


D.



B3 Fair share

ID308 / JC5 / IC2 / SB3



Hamid has a 4 litre beaker full of a hazardous chemical. Kazim has an empty 3 litre beaker and another empty 1 litre beaker.

Hamid and Kazim want to share the chemical between them equally and use a machine to do this safely.

The machine can pour one beaker in to another. It stops pouring when a beaker is completely emptied or filled, whichever happens first.

Question:

Find the sequence of pours that produces equal shares of the chemical for Hamid and Kazim. Pouring from the 4 litre beaker to the 3 litre beaker is shown as 4→3, etc.

Your sequence must use the minimum number of pours possible. Write down the letter of the correct pour in the appropriate block on your answer sheet.

A. 4→1, 4→3, 1→4, 3→1, 1→4
B. 4→1, 1→3, 4→1, 1→3
C. 4→1, 4→3, 1→4,
D. 4→3, 3→1, 1→4

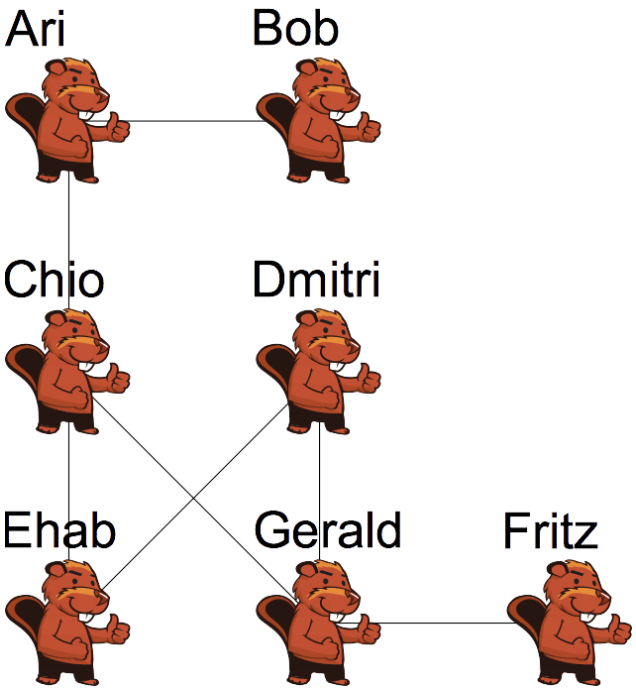
B4 Popularity

ID394 / SB4 / EB3

Seven beavers are in an online social network called Instadam.

Instadam only allows them to see the photos on their own, their friends' and the friends' of friends' pages. However, it does not allow friends of friends of friends to see the photos.

In this diagram, if two beavers are friends they are joined by a line.



After the summer holidays everybody posts a picture of themselves on all of their friends' pages.

Question:

Whose picture will be seen the most? Write down the name in the appropriate block on your answer sheet.

B5 Theatre

ID378 / IC4 / SB5

Three spotlights are used to light the theatre stage in the beavers' forest -- a red one, a green one and a blue one.

The colour of the stage depends on which of the three spotlights are turned on.

This table shows the possible combinations of colours.

Red light	Green light	Blue light	Stage colour
off	off	off	Black
off	off	on	Blue
off	on	off	Green
off	on	on	Cyan
on	off	off	Red
on	off	on	Magenta
on	on	off	Yellow
on	on	on	White

From the beginning of the show, the lights will be switched on and off in this pattern:

- The red light repeats the sequence: two minutes off, two minutes on.
- The green light repeats the sequence: one minute off, one minute on.
- The blue light repeats the sequence: four minutes on, four minutes off.

Question:

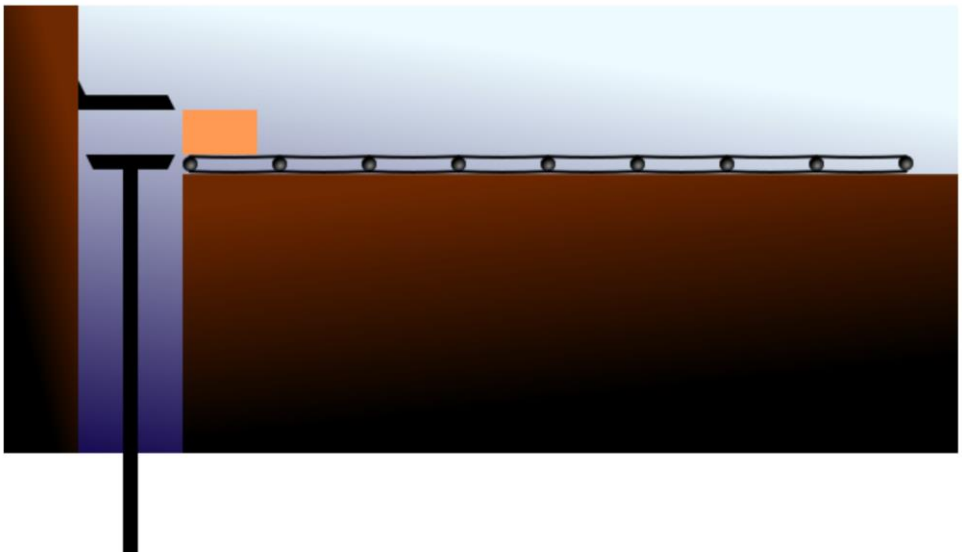
What will the colour of the stage be in the first 4 minutes of the show?
Write down the minute and the colour in the appropriate block on your answer sheet.

Eg. 1. Blue 2. White 3. Green 4. Cyan

You need all the answers correct to get marks. No part marks are allocated. You get 7 marks or 0.

C1 Stack Computer

ID339 / SC1 / EB2



The Stack Computer is loaded with boxes from a conveyer belt. The boxes are marked with a Number or an Operator (+, -, * or /).

The computer is loaded until the top box is a box marked with an operator. This operator is then used on the two boxes below it. The three boxes are then fused into one single box and marked with the outcome of the calculation.

In the Stack Computer, calculations are entered in a different way to a normal calculator.

Examples:

- **2+3** must be entered as **2 3 +**
- **10-2** must be entered as **10 2 -**
- **5*2+3** must be entered as **5 2 * 3 +**
- **5+2*3** must be entered as **5 2 3 * +**
- **(8-2)*(3+4)** must be entered as **8 2 - 3 4 + ***

Question:

How should the following computation be entered: **4*(8+3)-2**? Enter the letter of your answer in the appropriate block on your answer sheet.

A. 8 3 + 4 * 2 –
B. 4 8 * 3 + 2 –
C. 4 8 3 2 * + -
D. 8 3 + 4 2 - *

C2 Fireworks

ID335 / SC2

Two beavers live in lodges separated by a large forest.
They decide to send messages to each other by shooting fireworks into the sky above the trees.

Each message is a sequence of words, though the beavers only know five different words.
The beavers can shoot two types of fireworks, one after the other, and know the following codes:

Word	Code
Log	
Tree	
Rock	
River	
Food	

For example, to send the (rather strange) message "food, log, food", a beaver would shoot:

This can also have the meaning “Tree, Food”.

Question:

How many **different** meanings can the following sequence of fireworks have? Write down the number in the appropriate block on your answer sheet.

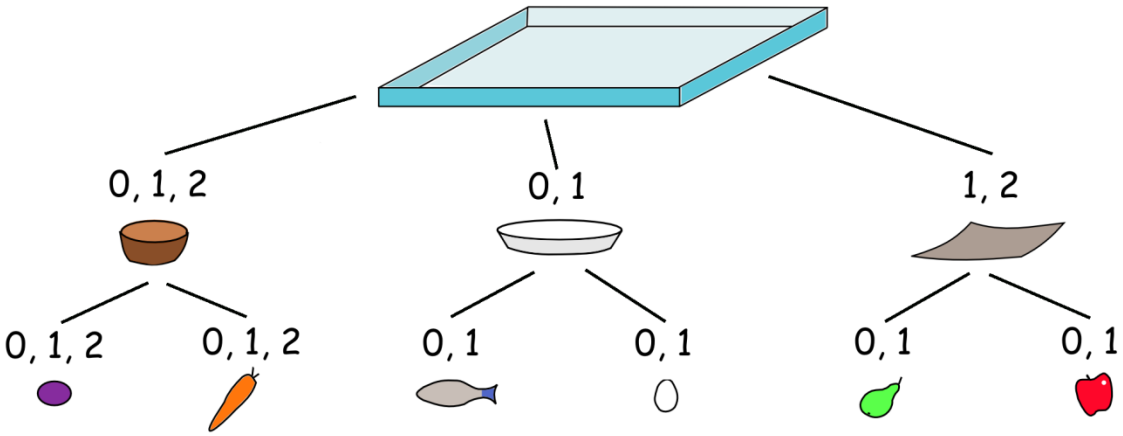
C3 Beaver Lunch

ID381 / IC3 / SC3

Hm, what to take for lunch today?

The cafeteria gives instructions on how to choose a good lunch.

This is shown as a diagram:



Below the tray you see different types of food containers.

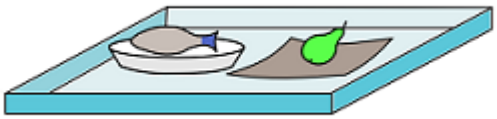
The numbers above the containers indicate how many containers of this type can be added to a tray.

Each container can only have food items put in it that are shown below it.

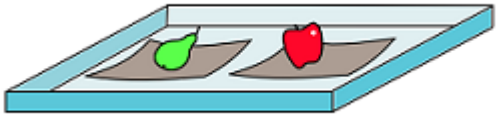
The numbers above the food items indicate how many food items of this type can be added to the containers.

Question:

Which of the following lunches is **NOT** a proper lunch? Write down the letter of the correct solution in the appropriate block on your answer sheet.



A



B

C

D

C4 Mobiles

ID354 / SC4

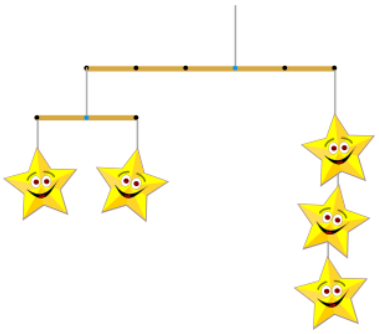
A mobile is a piece of art that usually hangs from a ceiling. You may remember one hanging from the ceiling in your bedroom.

A mobiles consist of sticks and figures. Each stick has a few points to which figures or other sticks may be attached.

Also, each stick has a hanging point, from which it is attached to a stick further above (or to the ceiling).

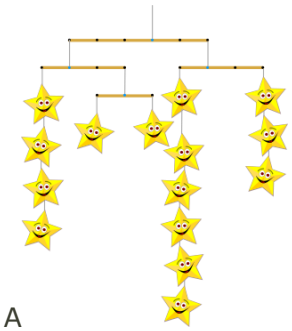
The following example of a mobile can be described using these numbers and brackets:

`(-3 (-1 1) (1 1)) (2 3)`

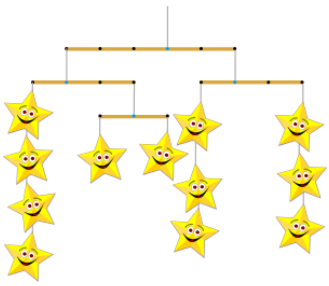


Question:

Which of the following mobiles is described by the following instructions: `(-3 (-1 4) (2 (-1 1) (1 1))) (2 (-1 6) (2 3))`. Write the letter of the correct answer in the appropriate block on your answer sheet.



A



B

C

D

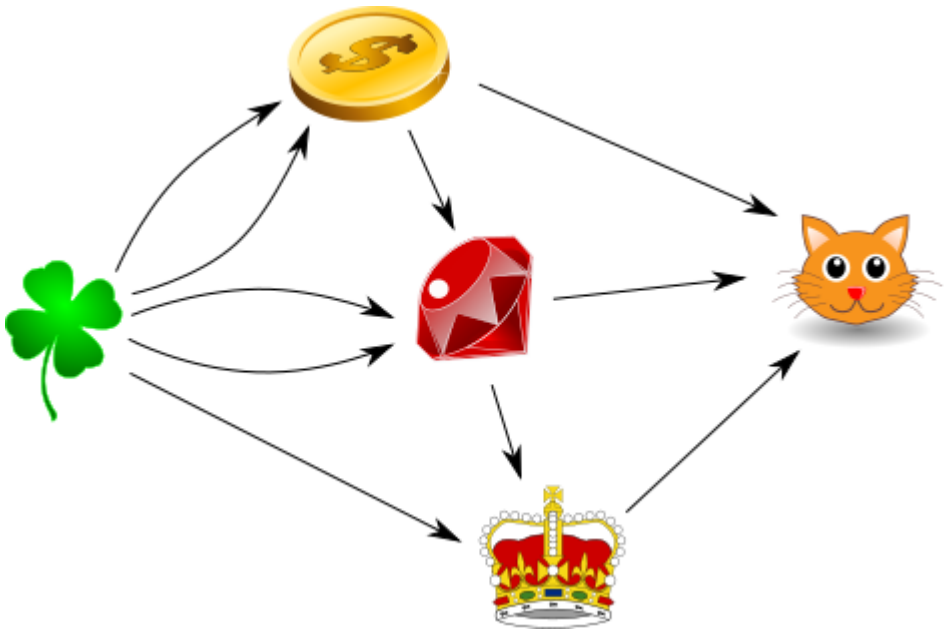
C5 Beaver the Alchemist

ID352 / SC5 / EB4

Beaver the Alchemist can convert objects into new objects. He can convert:

- Two clovers into a coin
- A coin and two clovers into a ruby
- A ruby and a clover into a crown
- A coin, a ruby, and a crown into a kitten.

After an object has been converted into another object, it disappears immediately.



Question:

How many clovers does Beaver the Alchemist need to create one kitten?

Write down the correct answer in the appropriate block on your answer sheet