


By following the corresponding tutorial an exercise will be created, where the student must answer to questions about lotto. Must be noted that we can ask question in the way that the words in the list (car, doll, ball) would suit with the syntax in the sentence. If the student gets the right answer, a text will appear which shows the label of the prize. In the given example there is possible to win three different prizes, each of total five. Because there will be shown 1 - 5 items of each, the pool of showed prizes will be between 3 and 15.

If the student gets the right answer then the background of the answer will light up as green, giving instant feedback to the student. Student may use any of the following: a fraction, a decimal, percentage. There is also a button called *New data*, that enables the feature to practice over and over again.

1. Add the picture of the shelf to *Graphics-view*. *Pic1* and points *A* and *B* will appear. It is recommended to delete the points.

2. We will add the prizes in *Graphics-view* as pictures . Two points will appear with each picture added, they may be deleted. It is recommended to pre-handedly save the pictures in the right measurements.

- a. Let's add car pictures. Now you have Images *pic2*, *pic3*, *pic4*, *pic5* and *pic6*.
- b. Let's add dolls pictures. Now you have Images *pic7*, *pic8*, *pic9*, *pic10* and *pic11*.
- c. Let's add balls pictures. Now you have Images *pic12*, *pic13*, *pic14*, *pic15* and *pic16*.

3. Let's create random integers. We use the *Input line* to print the code.

RandomBetween(<Minimum Integer>, <Maximum Integer>)

- a. Initial number of cars on the shelf.
RandomBetween(1, 5) : Now you have the number *a*.
- b. Initial number of dolls on the shelf.
RandomBetween(1, 5) : Now you have the number *b*.
- c. Initial number of balls on the shelf.
RandomBetween(1, 5) : Now you have the number *c*.


4. We create lists where number 1 denotes cars, 2 dolls and 3 balls.

Sequence(<Expression>, <Variable>, <Start Value>, <End Value>)

- a. List of cars on the shelf.
Sequence(1, x, 1, a) : You now have a list called *l1*.
- b. List of dolls on the shelf.
Sequence(2, x, 1, b) : You now have a list called *l2*.
- c. List of balls on the shelf.
Sequence(3, x, 1, c) : You now have a list called *l3*.
- d. We will create a list of all the items on the shelf.
Join(<List>, <List>, ...)
Join(l1, l2, l3) : You now have a list called *l4*.

5. We create a list of item names.

Type {"car", "doll", "ball"} in the *Input line* and hit enter. You now have a list called *l5*.

6. We add the exercise's text to the *Graphics 2* view .

Juss walks with his dad at the fair. The fair absolutely has a lottery. The prizes are all on the selves. : Now you have *text1*.

7. The following numbers and boolean values are created to verify the student's answer. We will print the following lines on the *Input line*. The resulting numbers *answer1* - *answer4*. Total 4 numbers.

a. *answer1* = 1

b. ...

c. *answer4* = 1

Let's create Boolean Values. 8 Boolean Values will be made. The first 4 of them we will use to check if there is any answer at all and the last ones will be used to check correctness of the answer.

d. *in1* = true

e. ...

f. *in4* = true

g. *rightness1* = true

h. ...


i. *rightness4* = true

8. For the first question, we create a random integer to determine what Jussi's friend wants.

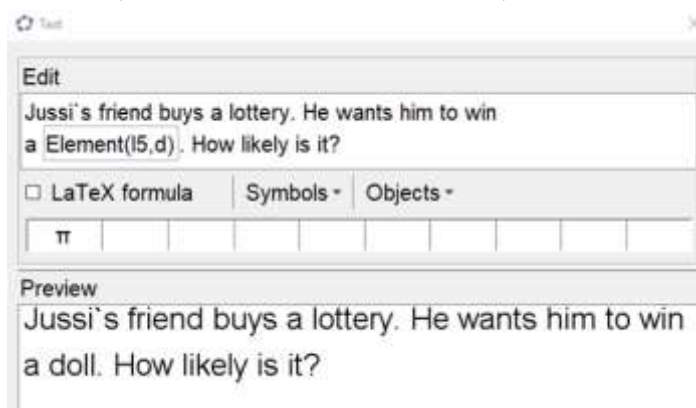
RandomBetween(<Minimum Integer>, <Maximum Integer>)

RandomBetween(1, 3) : Now you have the number *d*.

9. The first question. We ask about the probability of taking one item.


a. Text for the first question .

Element(<List>, <Position of Element>)



Now you have the *text2*.

If necessary, you can change the text in the *Object Properties*.

b. The student has the option to answer the question using the *Input Box* .

Caption Answer: .

Choose *answer1* as the linked object. *InputBox1* will be made.

Object Properties → Style → Input Box Length - enter a value 5.

Object Properties → Advanced → Dynamic Colours → Red $in1 \stackrel{?}{=} true \wedge$
rightness1 $\stackrel{?}{=} false$.

Object Properties → Advanced → Dynamic Colours → Green $in1 \stackrel{?}{=} true \wedge$
rightness1 $\stackrel{?}{=} true$.

Object Properties → Scripting → On Click


SetValue(in1, true)

SetValue(rightness1, If(answer1 $\stackrel{?}{=} Count(x \stackrel{?}{=} d, l4) / Length(l4)$, true, false)).

- c. We'll set the prize for friend.

RandomElement(<List>)

RandomElement(l4) : Now you have the number e .

- d. We will add text which shows what Jussi's friend actually won .

The prize `Element(l5,e)` is handed to Jussi's friend.: *Tekst3* will appear.

Object Properties → Advanced → Condition to Show Object rightness1 $\stackrel{?}{=} true$.

10. Let's add three numbers which show us how many prizes are left after the first win.

- a. Insert $car = 1$ in the *Input line*. The number *car* appears.

Object Properties → Basic → Definition If(rightness1 $\stackrel{?}{=} false$, a, If($e \stackrel{?}{=} 1$, a - 1, a)).

- b. Insert $doll = 1$ in the *Input line*. The number *doll* appears.

Object Properties → Basic → Definition If(rightness1 $\stackrel{?}{=} false$, b, If($e \stackrel{?}{=} 2$, b - 1, b)).

- c. Insert $ball = 1$ in the *Input line*. The number *ball* appears.

Object Properties → Basic → Definition If(rightness1 $\stackrel{?}{=} false$, c, If($e \stackrel{?}{=} 3$, c - 1, c)).

11. Let's remove the prize won from the list *l4*.

Remove(<List>, <List>)

Remove(l4, {e}) : A new list called *l6* will be made.

12. The second question.

- a. We'll set the unsuitable object for Juss.



RandomBetween(<Minimum Integer>, <Maximum Integer>)

RandomBetween(1, 3) : Number f will be made.

- b. Text for the second question .

Juss is the next one to buy lottery. He is sure that in case of winning the

`Element(l5,f)` he'll give it to his little sister. How big is the possibility that Juss will keep the prize? *Text6* will be made.

- c. Let's add the option to answer the question by using the *Input Box* .
Caption Answer: .
Choose *answer2* as the linked object. *InputBox2* will be made.
Object Properties → Style → Input Box Length - enter a value 5.
Object Properties → Advanced → Dynamic Colours → Red in2 $\stackrel{?}{=} \text{true} \wedge$
rightness2 $\stackrel{?}{=} \text{false}$.
Object Properties → Advanced → Dynamic Colours → Green in2 $\stackrel{?}{=} \text{true} \wedge$
rightness2 $\stackrel{?}{=} \text{true}$.
Object Properties → Scripting → On Click
SetValue(in2, true)
SetValue(rightness2, If(answer2 $\stackrel{?}{=} 1 - \text{Count}(x \stackrel{?}{=} f, l6) / \text{Length}(l6), \text{true}, \text{false})$)).
- d. We'll set the prize for Juss.
RandomElement(<List>)
RandomElement(l6) : Now you have the number *g*.
- e. We will add text which shows what Juss actually won .
Jussi`s actual prize is `Element(l5,g)`: *Text5* will appear.
Object Properties → Advanced → Condition to Show Object rightness2 $\stackrel{?}{=} \text{true}$.

13. Let's remove the prize won from the list *l6*.

Remove(<List>, <List>)

Remove(l6, {g}) : A new list called *l7* will be made.

14. Let's add three numbers which show us how many prizes are left after the second win.

- a. Insert *car1 = 1* in the *Input line*. The number *car1* appears.
Object Properties → Basic → Definition If(rightness2 $\stackrel{?}{=} \text{true}$, If(g $\stackrel{?}{=} 1$, If(e $\stackrel{?}{=} 1$, a - 2, If(e $\neq 1$, a - 1, a)), If(e $\stackrel{?}{=} 1$, a - 1, a))).
- b. Insert *doll1 = 1* in the *Input line*. The number *doll1* appears.
Object Properties → Basic → Definition If(rightness2 $\stackrel{?}{=} \text{true}$, If(g $\stackrel{?}{=} 2$, If(e $\stackrel{?}{=} 2$, b - 2, If(e $\neq 2$, b - 1, b)), If(e $\stackrel{?}{=} 2$, b - 1, b))).
- c. Insert *ball1 = 1* in the *Input line*. The number *ball1* appears.
Object Properties → Basic → Definition If(rightness2 $\stackrel{?}{=} \text{true}$, If(g $\stackrel{?}{=} 3$, If(e $\stackrel{?}{=} 3$, c - 2, If(e $\neq 3$, c - 1, c)), If(e $\stackrel{?}{=} 3$, c - 1, c))).

15. Now we will set the conditions when and which image to show.

Object Properties → Advanced → Condition to Show Object.

- a. Images with cars.

Conditions for Image *pic2* is If(rightness2 $\stackrel{?}{=} \text{true}$, car1 ≥ 1 , car ≥ 1), conditions for *pic3* is If(rightness2 $\stackrel{?}{=} \text{true}$, car1 > 1 , car > 1), conditions for *pic4* is If(rightness2 $\stackrel{?}{=} \text{true}$, car1 > 2 , car > 2), conditions for *pic5* is If(rightness2 $\stackrel{?}{=} \text{true}$, car1 > 3 , car > 3), conditions for *pic6* is If(rightness2 $\stackrel{?}{=} \text{true}$, car1 > 4 , car > 4).

b. Images with dolls.

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Condition for Image *pic7* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{doll1} \geq 1, \text{doll} \geq 1)$, condition for *pic8* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{doll1} > 1, \text{doll} > 1)$, condition for *pic9* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{doll1} > 2, \text{doll} > 2)$, condition for *pic10* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{doll1} > 3, \text{doll} > 3)$, condition for *pic11* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{doll1} > 4, \text{doll} > 4)$.

c. Images with balls.

Condition for Image *pic12* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{ball1} \geq 1, \text{ball} \geq 1)$, condition for *pic13* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{ball1} > 1, \text{ball} > 1)$, condition for *pic14* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{ball1} > 2, \text{ball} > 2)$, condition for *pic15* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{ball1} > 3, \text{ball} > 3)$, condition for *pic16* is $\text{If}(\text{rightness2} \stackrel{?}{=} \text{true}, \text{ball1} > 4, \text{ball} > 4)$.

16. Let's set a cost for the lottery

`RandomBetween(<Minimum Integer>, <Maximum Integer>)`


`RandomBetween(1, 5) : The number h appears.`

17. The third question.


a. Let's lock in the prize dad wishes for. But this time we will choose an item which is 100% available.

`RandomElement(<List>)`

`RandomElement(l7) : Now you have the number i.`

b. Text for the third question .

Even dad gets excited and he dreams about `Element(l5, i)`. He is watching the shelf whilst being deep in his thoughts. What is the least number of tickets dad should buy for his dream to come true for sure?: *Text6* will appear.

c. Let's add the option to answer the question by using the *Input Box* .

Caption Answer: .

Choose *answer3* as the linked object. *InputBox3* will be made.

Object Properties → Style → Input Box Length - enter a value 3.

Object Properties → Advanced → Dynamic Colours → Red $\text{in3} \stackrel{?}{=} \text{true} \wedge \text{rightness3} \stackrel{?}{=} \text{false}$.


Object Properties → Advanced → Dynamic Colours → Green $\text{in3} \stackrel{?}{=} \text{true} \wedge \text{rightness3} \stackrel{?}{=} \text{true}$.


Object Properties → Scripting → On Click

`SetValue(in3, true)`

`SetValue(rightness3, If(answer3 $\stackrel{?}{=} \text{Length}(l7) - \text{Count}(x \stackrel{?}{=} i, l7) + 1, \text{true}, \text{false}))$` .

18. The fourth question.

- a. Text for the fourth question .
The cost of one lottery ticket is h euros. How many euros dad should sacrifice in order to complete his wish.: *Text7* will appear.

- b. Let's add the option to answer the question by using the *Input Box* .

Caption Answer: .

Choose *answer4* as the linked object. *InputBox4* will be made.

Object Properties → **Style** → **Input Box Length** - enter a value 5.


Object Properties → **Advanced** → **Dynamic Colours** → **Red** in4 $\stackrel{?}{=} \text{true}$ \wedge rightness4 $\stackrel{?}{=} \text{false}$.

Object Properties → **Advanced** → **Dynamic Colours** → **Green** in4 $\stackrel{?}{=} \text{true}$ \wedge rightness4 $\stackrel{?}{=} \text{true}$.

Object Properties → **Scripting** → **On Click**

SetValue(in4, true)

SetValue(rightness4, If(answer4 $\stackrel{?}{=} (\text{Length}(l7) - \text{Count}(x \stackrel{?}{=} i, l7) + 1) h$, true, false)).

19. Let's add a button for the student to generate new exercises repeatedly .

Caption should be named: New data.

In GeoGebra's Script we will write:

UpdateConstruction()

SetValue(answer1, ?)

SetValue(answer2, ?)

SetValue(answer3, ?)

SetValue(answer4, ?)

SetValue(in1, false)

SetValue(in2, false)

SetValue(in3, false)

SetValue(in4, false)

SetValue(rightness1, false)

SetValue(rightness2, false)

SetValue(rightness3, false)

SetValue(rightness4, false). *Button1* should appear.

20. Illustration is about lottery machine added as an Image .