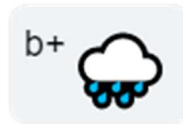
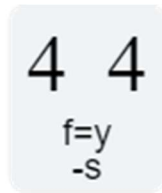


Parents day activity questions & answers

1. To get started, a tip:



Answer: Use your brain

To understand programming a little bit better we present to you this small code below.

```
public class PC {  
  
    public static void main(String[] args) {  
        int x = 7;  
        int y = 0;  
        if(x < 3){  
            y = 2*4-x;  
        } else {  
            y = 2*4+x;  
        }  
        System.out.println(y);  
    }  
}
```

2. What number will be printed by this code?

Answer: 15

3. If we change the value of x to 3, what will the code print?

Answer: 11

4. What will be printed if the value of x is -2?

Answer: 10

For the next few questions look at this piece of code:

```
public class PC2 {  
  
    public static void main(String[] args) {  
        int x = 7;  
        int y = 0;  
        for(int i = 0; i < x; i++){  
            y += 2;  
            System.out.println(y);  
        }  
        System.out.println("End of output");  
    }  
}
```

5. How many times will y be printed?

Answer: 7

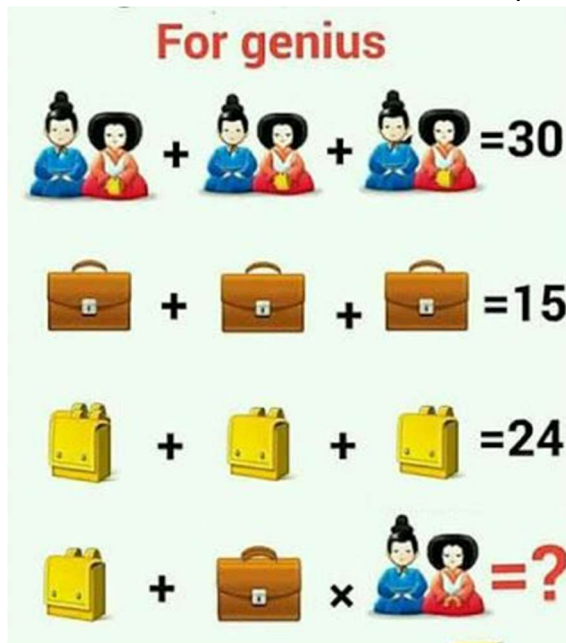
6. What is the final output of this code?

Answer: 2 4 6 8 10 12 14 End of output

7. What does CognAC mean, aka what is it an abbreviation of?

Answer: Cognitiewetenschappen Activiteiten Commissie / Cognitive Sciences Activity Committee

8. What number should be at the question mark?



Answer: 18

Formal Reasoning is a course which treats multiple sections of logic. Propositional logic is one of those sections. Below is a short explanation of how propositional logic works.

There are multiple connectives which are used in the normal English language. English connectives are for example “and”, “or”, “not” and “if”. Below is a table of how we define these connectives in propositional logic.

$\neg A$	not A
$A \wedge B$	A and B
$A \vee B$	A or B
$A \rightarrow B$	if A , then B

For this assignment we use the following dictionary, which contains the meaning of multiple symbols:

R	it's raining
S	the sun is shining

U	I'm holding an umbrella
W	I'm getting wet
O	I'm outside
RB	there is a rainbow

An example: $R \vee S$ means "It rains or the sun is shining"

9. Translate the following sentence to a normal English sentence:

$$(\neg R \wedge \neg S) \vee RB$$

Answer: Either it doesn't rain and the sun isn't shining or there is a rainbow

10. Translate the following English sentence to propositional logic using the dictionary and the connectives given above:

"If it rains and I'm outside, and I'm not holding an umbrella, then I get wet"

$$\text{Answer: } (R \wedge O \wedge \neg U) \rightarrow W$$

11. Translate the following English sentence to propositional logic using the dictionary and the connectives given above:

"Either the sun shines or it rains. (But not both simultaneously)"

$$(S \vee R) \wedge \neg(S \wedge R) \text{ (antwoord)}$$

12. What number should be in place of the question mark?

$$\begin{array}{l}
 2 + \text{red dinosaur} \times \text{red dinosaur} = 83 \\
 \text{red dinosaur} \times \text{green monster} \times \text{green monster} = 36 \\
 \text{green monster} - \text{red dinosaur} \times \text{blue blob} = 4 \\
 \text{red dinosaur} \times \text{green monster} + \text{blue blob} = ?
 \end{array}$$

BrainFans.com

Answer: 18

13. How old is CognAC? (Hint: we have a lustrum this year)

Answer: 30 years old

Artificial Intelligence does not only require skills in programming and logic, but we also need some understanding of the human brain.

14. The brain and spinal cord together make up the ...a... . All of the nerve fibers radiating out beyond the brain and spinal cord as well as all of the neurons outside the brain and spinal cord form the ...b... .

Answer: a = central nervous system, b = peripheral nervous system

15. The left and right cerebral hemispheres are each divided into four lobes. Name all four

Answer: frontal, temporal, parietal, occipital

16. How many pairs of chromosomes do humans have?

Answer: 23 pairs

17. Of the following two statements which one(s) are correct?

I. Cones are more numerous than rods

II. Cones allow us to see fine details

- a. Only statement I is correct
- b. Only statement II is correct ←
- c. Statement I and statement II are correct
- d. Neither statement is correct

18. The four major techniques for tracking the brain's electrical activity are ...

Answer: single-cell recording, electro-encephalography (EEG), event-related potentials (ERP), magnetoencephalography (MEG)

19. How many members does CognAC have?

- a. 498 members and 28 benefactors
- b. 362 members and 24 benefactors
- c. 749 members and 35 benefactors
- d. 600 members and 40 benefactors ←

20. There are three children. These children need a reward for good behavior. I have six gifts.

- I have three chocolate bars
- I have three giant lollipops

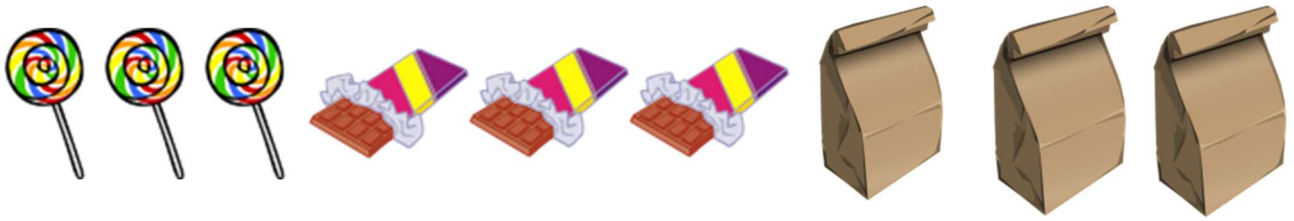
Each child is going to receive two presents and, so they don't know who is getting what, I put each pair of presents inside a brown bag and seal them. Only I know the distribution of the treats, but all the children know there are three of each treat and two treats in each bag.

The first child collects her bag and looks inside to see what presents she received. A

curious neutral third party asks this first child a question to determine the breakdown of presents in her bag. The catch is that the child can only respond with the answers: "Yes", "No", or "I don't know". The child is a perfect logician, and always answers



truthfully. What question can the outsider ask to determine the contents of the first bag?



Answer: Does anyone have more chocolate bars/lolly's than you?

Another common subject in Artificial Intelligence is mathematics. In the course Linear Algebra students have learned about matrix multiplication. We provide you with some explanation below.

$$\begin{pmatrix} A1 & B1 \\ A2 & B2 \end{pmatrix} \cdot \begin{pmatrix} X1 & Y1 \\ X2 & Y2 \end{pmatrix} = \begin{pmatrix} A1 \cdot X1 + B1 \cdot X2 & A1 \cdot Y1 + B1 \cdot Y2 \\ A2 \cdot X1 + B2 \cdot X2 & A2 \cdot Y1 + B2 \cdot Y2 \end{pmatrix}$$

With matrix multiplication we will multiply each row of matrix 1 with each column of matrix 2. In the explanation above you see that row 1 from matrix 1 will be multiplied with column 1 from matrix 2. The final value from this multiplication will be filled into the new matrix at the left upper corner.

Here is an example of multiplication with real numbers:

$$\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix} \cdot \begin{pmatrix} 3 & 2 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 1 \cdot 3 + 2 \cdot 1 & 1 \cdot 2 + 2 \cdot 2 \\ 0 \cdot 3 + 1 \cdot 1 & 0 \cdot 2 + 1 \cdot 2 \end{pmatrix} = \begin{pmatrix} 5 & 6 \\ 1 & 2 \end{pmatrix}$$

21. Now it is your turn to apply matrix multiplication:

$$\begin{pmatrix} 1 & -2 & 3 \\ 6 & 0 & -1 \\ 2 & 4 & 1 \end{pmatrix} * \begin{pmatrix} -2 & 1 & 2 \\ -2 & 3 & 0 \\ 5 & 7 & -4 \end{pmatrix}$$

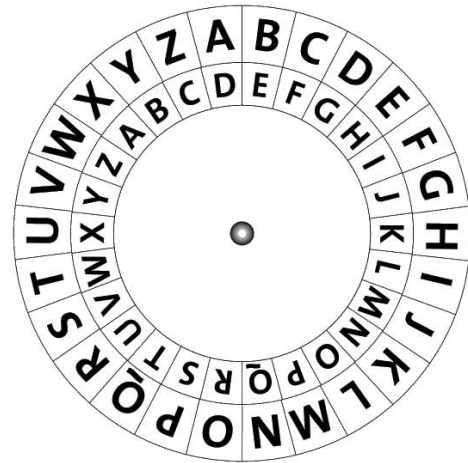
Answer:

17	16	-10
-17	-1	16
-7	21	0

22. Using the cypher on the right, decrypt the following message:

*Wkh Wxulqj whvw, ruljlqdoob fdoohg wkh
lplwdwlrq jdph lv d whvw ri d pdfklqh'v delolwb
wr haklelw lqwhooljhqw ehkdylrxu htilydohqw
wr, ru lqglvwlqjxlvkdeoh iurp, wkdw ri d kxpdq.*

Answer: The Turing test, originally called the imitation game is a test of a machine's ability to exhibit intelligent behaviour equivalent to, or indistinguishable from, that of a human.

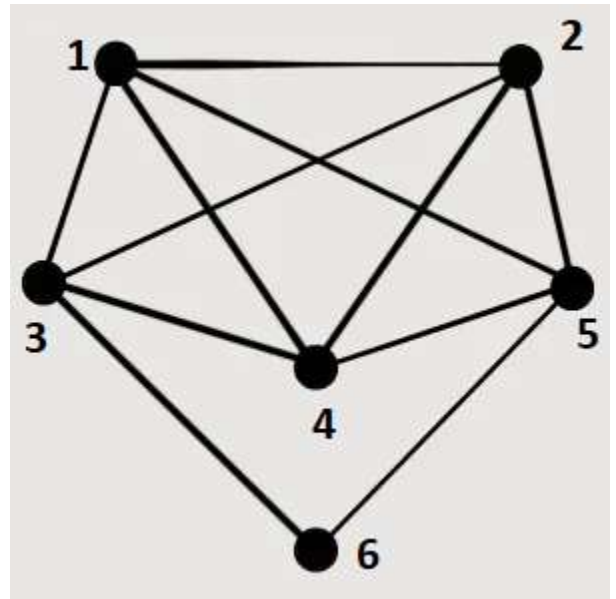


23. Now translate the next sentence:

*Lw lv hashfwhg wkdw lq wkh qhaw wzhqwb wr wkluwb bhduv, zh zlloo kdyh
Duwliifldo Jhqhudo Lqwhooljhqfh. Wklv lv dq djhqw wkdw lv mxvw dv lqwhooljhqw dv
d kxpdq.*

Answer: It is expected that in the next 20 to 30 years, we will have Artificial General Intelligence. This is an agent that is just as intelligent as a human.

The course Formal Reasoning also includes graph theory. The picture on the right is an example of one of these graphs. This graph represents a small village where the streets are indicated by the lines. Also, on each corner is a bar. These bars are indicated by the points numbered from 1 to 6.



24. Does there exist a route that contains each bar exactly once? If so, give an example.

Answer: Yes, example 1>2>3>4>5>6

25. Is it possible to walk a route which contains each street exactly once? If so, give an example.

Answer: Yes, example 4>1>5>4>3>2>5>6>3>1>2>4.