



Till läraren

Välkommen till Kängurutävlingen – Matematikens hopp 2023 *Benjamin*

- Tävlingen genomförs under perioden 16 mars – 24 mars. *Uppgifterna får inte användas tidigare.*
- Sista dag för redovisning av antalet deltagare är den *31 mars*. Du får då tillgång till facit och ett kalkylblad där du matar in elevernas svar och sedan får du en sammanställning av klassens resultat.
- Redovisa resultatet senast *28 april*.
- *Tävlingen är individuell* och eleverna får arbeta i 60 minuter. De tre delarna ska genomföras vid *ett och samma tillfälle*.
- Eleverna behöver ha tillgång till papper för att kunna göra anteckningar och figurer. Linjal behövs inte.
- *Miniräknare eller sax får inte användas. Observera att telefoner, datorplattor och datorer inte heller får användas.*
- Läs igenom problemen själv i förväg så att eventuella oklarheter kan redas ut.
- Kontrollera att kopiorna blir tillräckligt tydliga så att nödvändiga detaljer syns.
- Besök *Kängurusidan* på ncm.gu.se/kanguru där vi publicerar eventuella rättelser och ytterligare information. Där finns också information om hur kalkylbladet fungerar.
- Samla in problemformulären efter tävlingen. Problemen får inte spridas utanför klassrummet förrän efter 28 april, men ni får gärna arbeta med problemen i klassen.

Mikael Passares stipendium

Mikael Passare (1959–2011) var professor i matematik vid Stockholms universitet. Han hade ett stort intresse för matematikundervisning på alla nivåer och var den som tog initiativ till Kängurutävlingen i Sverige. Mikael Passares minnesfond har instiftat ett stipendium för att uppmärksamma elevers goda matematikprestationer. Information om hur du nominerar elever kommer tillsammans med facit och kommentarer.

Lycka till med årets Känguru!

e-post: kanguru@ncm.gu.se

För administrativa frågor, vänd dig till Ann-Charlotte Forslund:
Ann-Charlotte.Forslund@ncm.gu.se
031–786 69 85

För innehållsfrågor, vänd dig till Ulrica Dahlberg eller Johan Häggström:
ulrica.dahlberg@ncm.gu.se
johan.haggstrom@ncm.gu.se



Svarsblankett

Markera ditt svar i rätt ruta

Uppgift	A	B	C	D	E	Poäng
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
SUMMA						

Namn:.....

Klass:.....

Kängurutävlingen – Matematikens hopp 2023

Benjamin



Three points problems

- 1 Holger fills the rest of the table with the numbers from 1 to 40, following the system shown:

1	2	3	4	5	6	7	8
9	10	11	12				

Which of the pieces shown could he cut from the table?

A:

12	
20	21
	29

 B:

12	
20	21
	28

 C:

12	
22	23
	33

 D:

12	
21	22
	30

 E:

12	
21	22
	31

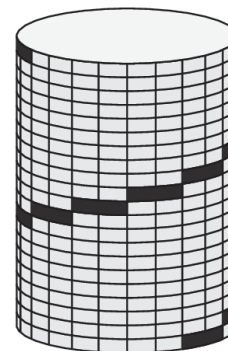
Danmark

- 2 Which of the following shapes *cannot* be divided into two triangles by a single straight line?



Georgien

- 3 Claude climbs from the bottom to the top of the cylindrical tower shown. The steps are all equal sized. Nine steps are visible.

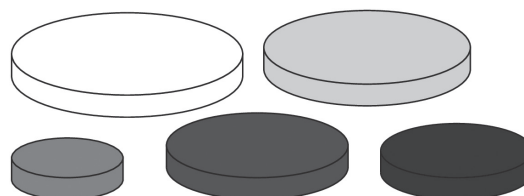


How many steps are not visible?

- A: 9 B: 10 C: 11 D: 12 E: 13

Kanada

- 4 Anna has five circular discs of different sizes. She wants to build a tower of four discs so that each disc in her tower is smaller than the disc immediately below it.



How many different towers could Anna build?

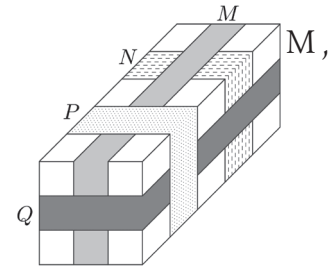
- A: 4 B: 5 C: 9 D: 12 E: 20

Slovenien



- 5 The picture shows a parcel around which four tapes labelled N , P and Q are placed.

In what order, from first to last, were the tapes placed?

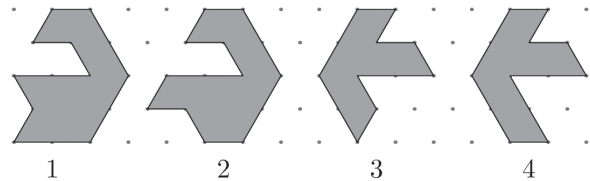
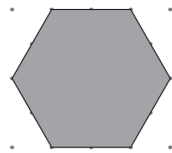


- A: M, N, Q, P B: N, M, P, Q C: N, Q, M, P D: Q, N, M, P E: N, M, Q, P

Katalonien

- 6 Alice has the four puzzle pieces shown.

Which pair can be combined to form this hexagon?



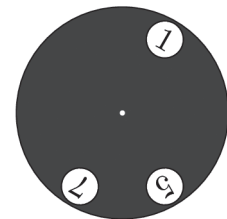
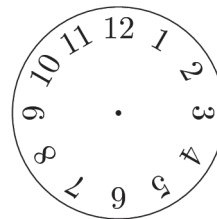
- A: 1 and 2 B: 1 and 3 C: 2 and 3 D: 2 and 4 E: 1 and 4

Danmark

- 7 When the dark circle with three holes is placed on top of the clock-face you can see the numbers 1, 5 and 7.

The dark circle is turned around its center.

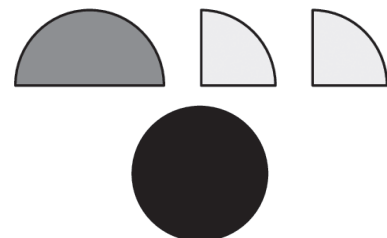
Which three numbers can then become visible at the same time?



- A: 2, 4 and 9 B: 1, 5 and 10 C: 3, 6 and 9 D: 5, 7 and 12 E: 4, 6 and 12

Danmark

- 8 Jonte glued the one grey and two white pieces of paper shown in the picture onto a black circle.



Which of the following patterns could he not obtain?

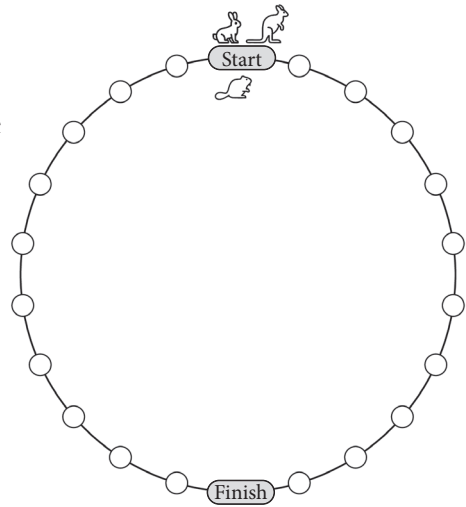
- A: B: C: D: E:

Tyskland



Four points problems

- 9 A rabbit, a beaver and a kangaroo are having a competition. They all start from the point marked Start. The winner is the animal who lands first lands on the point marked Finish. The beaver moves one space at a time, the rabbit moves two spaces at a time and the kangaroo moves three spaces at a time. Who wins the competition?



- A: the beaver B: the hare C: the kangaroo
D: the kangaroo and the hare E: the kangaroo and the beaver

Schweiz

- 10 Francesca wrote down three consecutive 2-digit numbers, but instead of the digits she used symbols: $\blacksquare\blacklozenge, \heartsuit\blacktriangle, \heartsuit\blacksquare$. Which number is next?

- A: $\blacksquare\heartsuit$ B: $\heartsuit\heartsuit$ C: $\blacksquare\blacksquare$ D: $\blacklozenge\blacksquare$ E: $\heartsuit\blacklozenge$

Tyskland

- 11 When I look in a mirror, I can see the image of my digital clock standing on the table behind me, as shown:

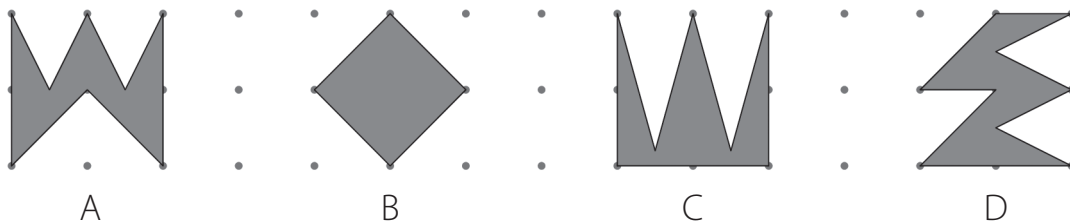


What image will I see when I look in the mirror 30 minutes later?

- A: B: C: D: E:

Iran

- 12 Which of the following four shapes has the greatest area?

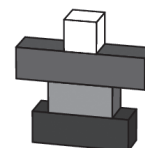
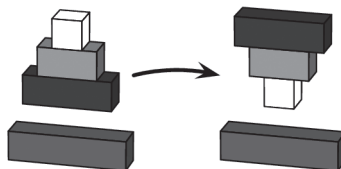


- A: A B: B C: C D: D E: all have the same area

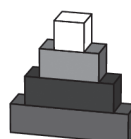
Danmark



- 13 Göran has four blocks, stacked as shown. In a single move, Göran can take some, or all, of the blocks from the top of the stack and place them upside down, as shown.



He wants the blocks to be stacked in this order:



What is the smallest number of moves he needs to make to get to the correct order?

- A: 2 B: 3 C: 4 D: 5 E: 6

Kanada

- 14 The sum of the numbers in the white cells should be equal the sum of the numbers in the grey cells.

3	5	8	11	13
1	2	4	6	7

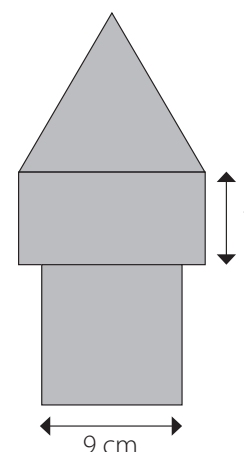
Which two numbers need to swap places?

- A: 1 and 11 B: 2 and 8 C: 3 and 7 D: 4 and 13 E: 7 and 13

Grekland

- 15 The tower in the picture consists of three pieces, a square, a rectangle and an equilateral triangle. The three pieces have the same perimeter.

If each side of the square is 9 cm, what is the length of the marked side of the rectangle?



- A: 2 cm B: 4 cm C: 6 cm D: 8 cm E: 10 cm



- 16 Martin has three cards with numbers written on both sides:
 The card with 1 has 4 on the opposite side.
 The card with 2 has 5 on the opposite side.
 The card with 3 has 6 on the opposite side.

	Front	Back
Card 1	1	4
Card 2	2	5
Card 3	3	6

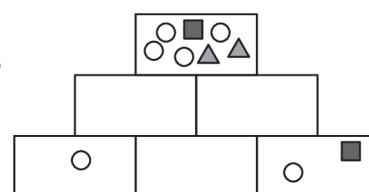
How many different sums can Martin get when he places three cards on the table and adds up the numbers he sees?

- A: 3 B: 4 C: 5 D: 6 E: 10

Norge

Five points problems

- 17 Tian wants to draw figures in the six boxes of the pyramid shown. Each box should contain all of the figures in the two boxes directly below it and nothing more. She has drawn the figures in some of the boxes already.



Which figures should she draw in the box in the middle of the bottom row?

- A: B: C: D: E:

Tyskland

- 18 Maria, Peter, Richard and Tina were playing football in the classroom and broke a window. When the principal asked who did it, she got the following responses:

Maria: "It was Peter."

Peter: "It was Richard."

Richard: "It wasn't me."

Tina: "It wasn't me."

Only one child was telling the truth.

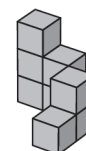
Who broke the window?

- A: Maria B: Tina C: Peter D: Richard
 E: that cannot be known for sure

Slovakien

- 19 If I chose one of the five structures below and combine it with the structure on the right I get a bigger structure. The table shows the number of cubes in each column in the bigger structure when seen from above.

3	2	3
2	1	2
1	0	1



Which of the five structures did I choose?

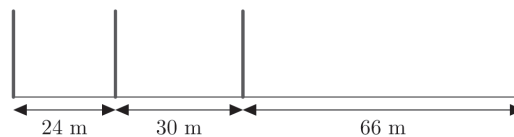
- A: B: C: D: E:

Iran



- 20 Four poles are placed along a 120 meter track, as shown.

What is the smallest number of poles that should be added so that the track is divided into sections of equal length?



- A: 12 B: 15 C: 17 D: 20 E: 37

Polen

- 21 Sonja and Robert are playing a game. They can alternately take 1, 2, 3, 4 or 5 tiles from a pile of tiles. Whoever takes the last tile or tiles *loses*.
When 10 tiles are left in the pile it is Sonja's turn.

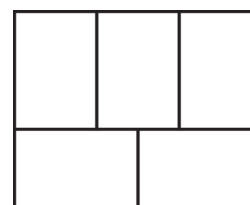
How many tiles should Sonja leave to Robert to be sure that she will *not* lose?

- A: 9 B: 8 C: 7 D: 6 E: 5

Katalonien

- 22 The diagram shows five rectangles. Lukas wants to colour the rectangles red, blue and yellow so that any two adjacent rectangles are coloured different colours.

In how many different ways can he do this?

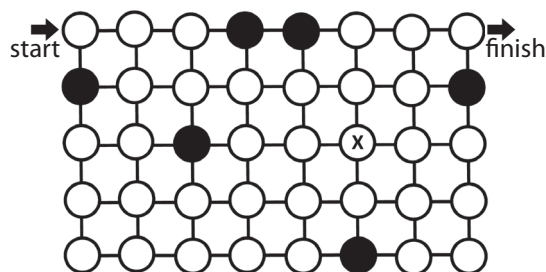


- A: 3 B: 4 C: 5 D: 6 E: 7

USA

- 23 You want to find a path through the maze shown from the point marked 'start' to the point marked 'finish'. You can only move along the lines and she can only pass through white circles. You must pass through all the white circles exactly once.

When you reach the circle marked x, in which direction is your next move?



- A: ↓ B: ↑ C: → D: ← E: there is no such path

Grekland

- 24 In a second hand shop the clothes are cheap.
Two hats are sold for the same price as five skirts.
Three skirts for the same price as eight t-shirts.
Two t-shirts for the same price as three caps.

Which of the following collections will cost the most?

- A: eight skirts and six t-shirts B: a hat, three skirts and a cap
C: a hat and five skirts D: thirty-seven caps E: three skirts and three caps

Iran