Till läraren

Välkommen till Kängurutävlingen – Matematikens hopp 2022
Benjamin

- Tävlingen genomförs under perioden 17 mars – 25 mars. *Uppgifterna får inte användas tidigare.*
- Sista dag för redovisning av antalet deltagare är den *1 april*. 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 *29 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 29 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						
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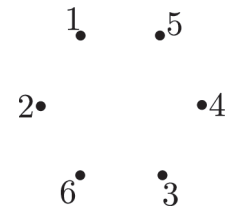
Namn:.....

Klass:.....

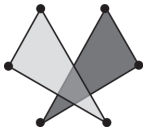
Kängurutävlingen – Matematikens hopp 2022
Benjamin

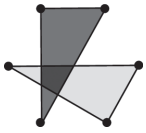
Three points problems

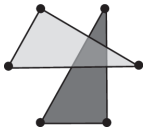
1 Six points are numbered as shown. Kirsten draws two triangles, one by joining the even numbered points and one by joining the odd numbered points, and colours the inside of one of the triangles red and the inside of the other green.

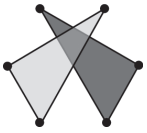


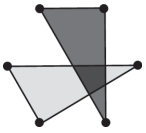
Which of the five options shows the picture Kirsten draws?

A: 

B: 

C: 

D: 

E: 

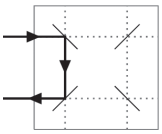
Mexiko

2 Which expression represents the greatest number?

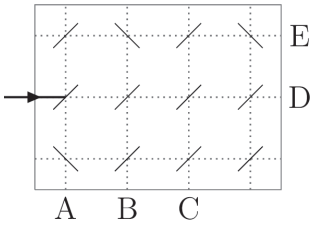
A: $20+22$ B: $202+2$ C: $202/2$ D: $20\cdot22$ E: $202\cdot2$

Sverige

3 Laser beams reflect in mirrors in the way shown in the picture.



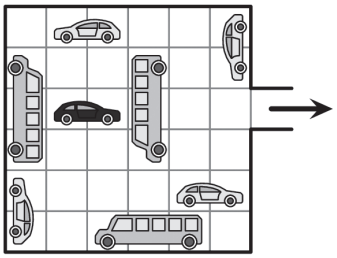
At which letter will this laser beam end?



A: A B: B C: C D: D E: E

Danmark

4 In the garage shown in the picture, vehicles can only move forward or backward but cannot turn.



What is the *smallest* number of vehicles that have to move for the black car to be able to exit the garage?

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

Katalonien

5 Marbles are sold in packages of 5, 10 or 25. Tom buys exactly 95 marbles.

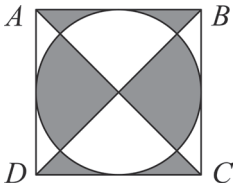
What is the *minimum* number of packages he could buy?

A: 4 B: 5 C: 7 D: 8 E: 10

Irak

6 *ABCD* is a square with side-length 10 cm.

What is the area of the shaded part?



A: 40 cm² B: 45 cm² C: 50 cm² D: 55 cm² E: 60 cm²

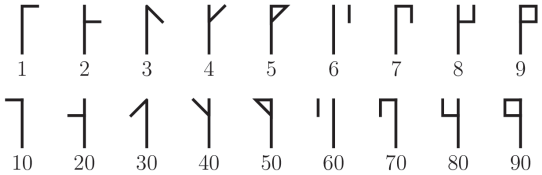
7 Bodil rearranges the 7 pieces shown to get the smallest possible 12 digit number.

What are the last 3 digits of this number?

A: 699 B: 113 C: 551 D: 967 E: 459

Danmark

8 Cistercian numerals were used in the early thirteenth century. Any integer from 1 to 99 can be represented by a single glyph formed by combining two of the glyphs shown below.



The sign for 24 looks like this: 

The sign for 81 looks like this: 

The sign for 93 looks like this: 

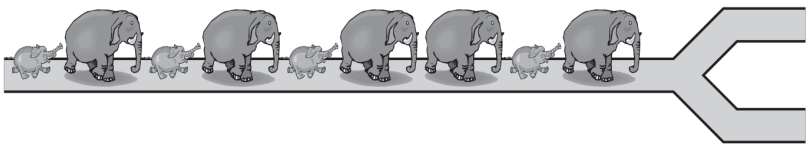
What does the 45 sign look like?

A:  B:  C:  D:  E: 

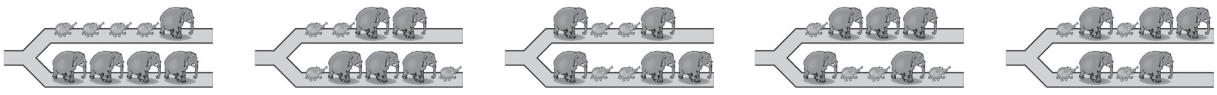
Uzbekistan

Four points problems

9 Five big elephants and four small ones are walking along a path, as shown. When they reach the junction, each elephant turns either to the left or to the right.



Which of the following cannot be the situation after they all pass the junction?

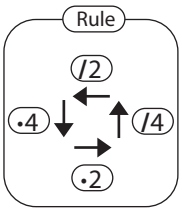


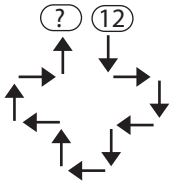
A B C D E

Grekland

10 Klara starts with 12 and follows the arrows using the rules shown in the picture on the left.

What number will she finish with?





A: 3 B: 6 C: 12 D: 24 E: 48

Filippinerna

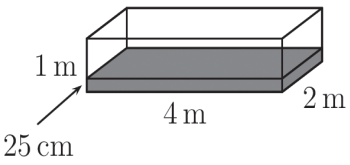
11 60 tiles are in a long line. Adam removes every sixth tile. Beata then removes every fifth tile. Then Calle comes and removes every forth tile. Now Doris removes all the tiles that are left.

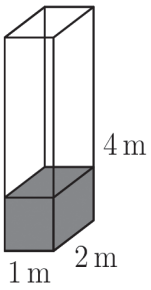
How many tiles does Doris remove?

A: 0 B: 10 C: 30 D: 40 E: 50

12 A rectangular-based water tank has dimensions 1 m x 2 m x 4 m. It contains water to a depth of 25 cm, as shown in the left-hand picture. The tank is turned so that a 1 m x 2 m face becomes the base, as shown in the right-hand picture.

What is the depth of the water now?



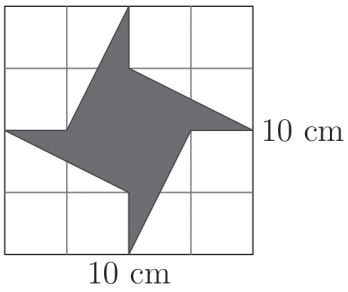


A: 25 cm B: 50 cm C: 75 cm D: 1 m E: 1,25 m

Storbritannien

13 The area of the square is 100 cm^2.

What is the area of the shaded figure?



A: 20 cm^2 B: 25 cm^2 C: 30 cm^2 D: 35 cm^2 E: 40 cm^2

Danmark

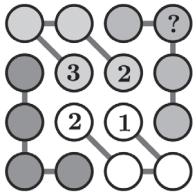
14 The year 2022 is a special year because the digit 2 appears three times. This is the third time Eva the tortoise has lived through such a year with three identical digits.

What is the youngest Eva could be by the end of 2022?

A: 18 år B: 20 år C: 22 år D: 23 år E: 134 år

Österrike

15 Andrew wants to complete the picture so that each row, each column and each set of four circles connected by line segments contains the four numbers 1, 2, 3, and 4.



What number should he write in the circle containing the question mark?

A: 1 B: 2 C: 3 D: 4 E: It is not possible to say for sure.

Katalonien

16 Lisa has 4 dogs. Each of the 4 dogs weighs an integer number of kg. No two of them weigh the same. Their total weight is 60 kg. The second heaviest dog weighs 28 kg.

How heavy is the third heaviest dog?

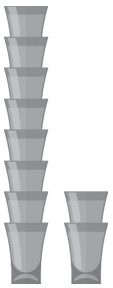
A: 2 kg B: 3 kg C: 4 kg D: 5 kg E: 6 kg

Grekland

Five points problems

17 Some glasses are stacked on top of each other. A stack of 8 glasses is 42 cm high and a stack of 2 glasses is 18 cm high.

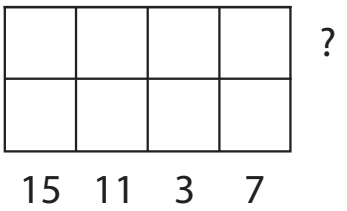
How high is a stack of 6 glasses?



A: 22 cm B: 24 cm C: 28 cm D: 34 cm E: 40 cm

Norge

18 Write a positive integer for each empty box. All boxes should have different numbers and the sum of the numbers in each column should be the number below the column.

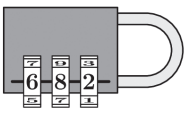


What is the largest possible sum of the four numbers in the top row?

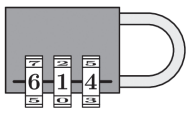
A: 18 B: 19 C: 20 D: 21 E: 22

Hongkong

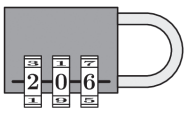
19 To unlock this lock, you get the following four hints.



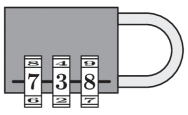
One of these numbers is the right number in the right place.



One of these numbers is the right number but in the wrong place.



Two of these numbers are correct numbers but in the wrong place.



All these numbers are wrong.

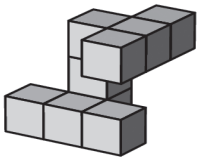
Which code unlocks the lock?

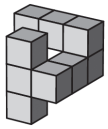
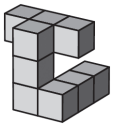
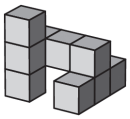
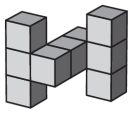
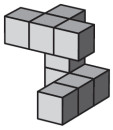
A: 042 B: 082 C: 640 D: 604 E: 046

Iran

20 Anna has the shape shown on the right.

Which of the following shapes is the same as Anna's?



A: 
B: 
C: 
D: 
E: 

Katalonien

21 Werner chooses four of the numbers 2, 3, 4, 5 and 6 and writes one in each box so that the calculation is correct.

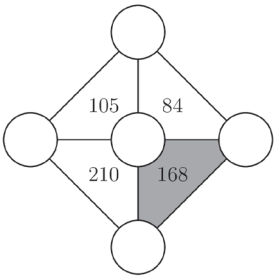
How many of the five numbers could Werner write in the shaded box?

A: 1 B: 2 C: 3 D: 4 E: 5

Storbritannien

22 The numbers 3, 4, 5, 6 and 7 are to be placed in the five circles below so that the number inside each triangle is the product of the three numbers on its vertices.

What is the sum of the three numbers on the vertices of the coloured triangle?



A: 12 B: 14 C: 15 D: 17 E: 18

Irland

23 The four villages A, B, C and D lie along a road in that order. The distance between neighbouring villages is 10 km. There are 10 students who live in village A, 20 students who live in village B, 30 students who live in village C and 40 students who live in village D. The villagers want to build a school so that the total distance travelled by the students when going to school is as small as possible.

Where should they build the school?

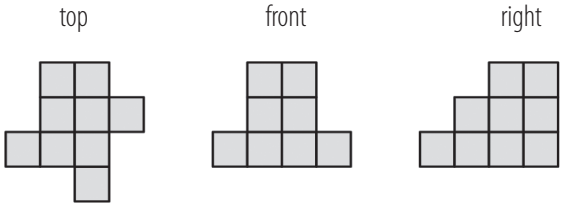
A: in village A B: in village B C: in village C

D: in village D E: midway between B and C

Ukraina

24 The three pictures show a structure made from cubes as seen from the top, from the front and from the right.

What is the maximum number of cubes that could have been used to build the structure?



A: 18 B: 19 C: 20 D: 21 E: 22

Slovakien