Till läraren

Välkommen till Kängurutävlingen – Matematikens hopp 2022
Cadet

- 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						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
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15						
16						
17						
18						
19						
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21						
22						
23						
24						
					SUMMA	

Namn:.....

Klass:.....

Kängurutävlingen – Matematikens hopp 2022
Cadet

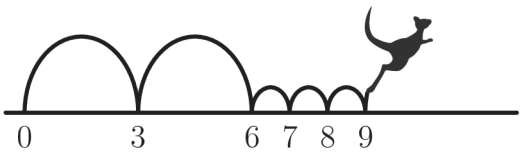
Three points problem

1 Beate rearranges the five numbered pieces shown to display the smallest possible nine- digit number. Which piece does she place at the right-hand end?

A 8 B 4 C 31 D 59 E 107

[Denmark]

2 Kengu enjoys jumping on the number line. He always makes two large jumps followed by three small jumps, as shown, and then repeats this process over and over again. Kengu starts his jumping routine on 0. On which of these numbers will Kengu land during his routine?



A 82 B 83 C 84 D 85 E 86

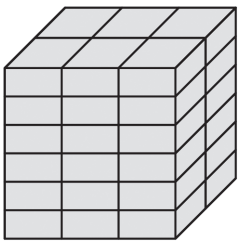
[Norway]

3 The number plate of Kangy's car fell off. He put it back upside down but luckily this didn't make any difference. Which one of the following could be Kangy's number plate?

A 04 NSN 40 B 60 SOS 09 C 80 BNB 08 D 06 HNH 60 E 08 NBN 80

[France]

4 Rob the Builder has a brick whose shortest side is 4 cm. He uses several such bricks to build the cube shown.
What are the dimensions, in cm, of his brick?

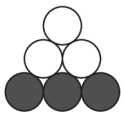
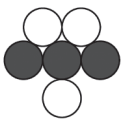


A 4 × 6 × 12 cm B 4 × 6 × 16 cm C 4 × 8 × 12 cm

D 4 × 8 × 16 cm E 4 × 12 × 16 cm

[Greece]

5 The black and white caterpillar shown in the picture curls up to sleep. Which of the following could be seen?

A  B  C  D  E 

[Germany]

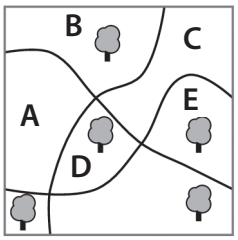
6 In the statement below there are five empty spaces. Sanja wants to fill four of them with plus signs and one with a minus sign so that the statement is correct.
Where should she place the minus sign?

$$6\square 9\square 12\square 15\square 18\square 21=45$$

A Between 6 and 9 B Between 9 and 12 C Between 12 and 15
D Between 15 and 18 E Between 18 and 21

[Ireland]

7 There are five big trees and three paths in a park. A new tree is planted so that for each path, there are the same number of trees on both sides. In which region of the park is the new tree planted?



A **A** B **B** C **C** D **D** E **E**

[Germany]

8 How many positive integers between 100 and 300 have only odd digits?

A 25 B 50 C 75 D 100 E 150

[France]

Four points problem

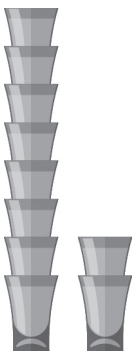
9 Gerard wrote down the sum of squares of two numbers, as shown. Unfortunately some of the digits cannot be seen because they are covered in ink. What is the last digit of the first number?

$$(23\blacksquare)^2 + (1\blacksquare 2)^2 = 7133029$$

A 3 B 4 C 5 D 6 E 7

[Greece]

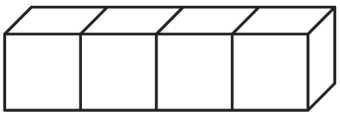
10 The distance between two shelves in the cupboard in Monica's kitchen is 36 cm. She knows that a stack of 8 of her favourite glasses is 42 cm tall and that a stack of 2 glasses is 18 cm tall. What is the largest number of glasses that can be stacked and still fit onto the lower shelf?



A 3 B 4 C 5 D 6 E 7

[Norway]

11 On a standard die, the sum of the numbers of dots on opposite faces is always 7. Four standard dice are glued together as shown. What is the minimum number of dots that could lie on the whole surface?



A 52 B 54 C 56 D 58 E 60

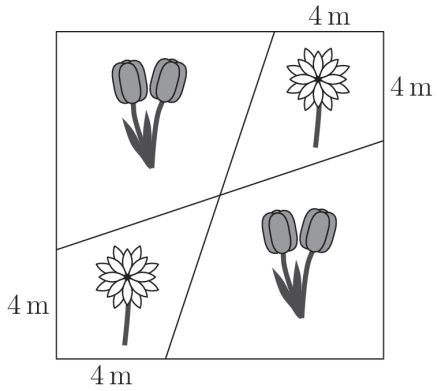
[Sweden]

12 Three sisters, whose average age is 10, each have different ages. When they get together in pairs, the average ages of two such pairs are 11 and 12.
What is the age of the eldest sister?

A 10 B 11 C 12 D 14 E 16

[Chile]

13 Tony the Gardener planted tulips and daisies in a square flowerbed with side-length 12 m, arranged as shown. What is the total area of the regions in which he planted daisies?



A 36 m^2 B 40 m^2 C 44 m^2 D 46 m^2 E 48 m^2

[Slovakia]

14 In my office, there are two clocks. One clock gains one minute every hour and the other loses two minutes every hour. Yesterday I set them both to the correct time but when I looked at them today, I saw that the time shown on one was 11:00 and the time shown on the other was 12:00. What time was it when I set the two clocks?

A 23:00 B 19:40 C 15:40 D 14:00 E 11:20

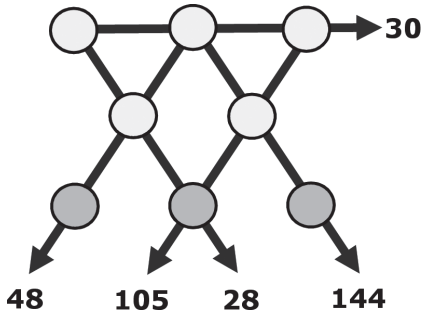
[Catalonia]

15 Werner wrote a list of numbers with a sum of 22 on a piece of paper. Ria then subtracted each of Werner's numbers from 7 and wrote her answers down. The sum of Ria's numbers is 34. How many numbers did Werner write down?

A 7 B 8 C 9 D 10 E 11

[Greece]

16 The numbers 1 to 8 are placed, once each, in the circles shown. The numbers by the arrows show the products of the three numbers in the circles on that straight line. What is the sum of the numbers in the three circles at the bottom of the figure?



A 11 B 12 C 15 D 17 E 19

[Greece]

Five points problem

17 Jenny decided to enter numbers into the cells of a 3x3 table so that the sum of the numbers in all four possible 2x2 squares will be the same. The numbers in three of the corner cells have already been written, as shown. Which number should she write in the fourth corner cell?

2		4
?		3

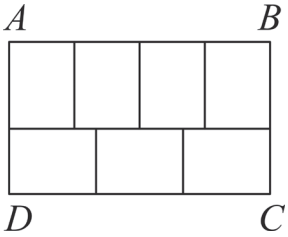
A 0 B 1 C 4 D 5 E 6

18 The villages A, B, C and D are situated, not necessarily in that order, on a long straight road. The distance from A to C is 75 km, the distance from B to D is 45 km and the distance from B to C is 20 km.
Which of the following could not be the distance from A to D?

A 10 km B 50 km C 80 km D 100 km E 140 km

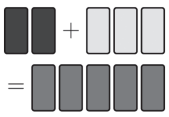
[Poland]

19 The large rectangle $ABCD$ is divided into seven identical rectangles.
What is the ratio $\frac{AB}{BC}$?



A $\frac{1}{2}$ B $\frac{4}{3}$ C $\frac{8}{5}$ D $\frac{12}{7}$ E $\frac{7}{3}$

20 A painter wanted to mix 2 litres of blue paint with 3 litres of yellow paint to make 5 litres of green paint. However, by mistake he used 3 litres of blue and 2 litres of yellow so that he made the wrong shade of green. What is the smallest amount of this green paint that he must throw away so that, using the rest of his green paint and some extra blue and/or yellow paint, he could make 5 litres of paint of the correct shade of green?



A $\frac{5}{3}$ litres B $\frac{3}{2}$ litres C $\frac{2}{3}$ litres D $\frac{3}{5}$ litres E $\frac{5}{9}$ litres

[Greece]

21 Mowgli asks a zebra and a panther what day it is. The zebra always lies on Monday, Tuesday and Wednesday. The panther always lies on Thursday, Friday and Saturday. All other days they tell the truth.

The zebra says, "Yesterday was one of my lying days."
The panther says "Yesterday was also one of my lying days."

What day is it?

A Thursday B Friday C Saturday D Sunday E Monday

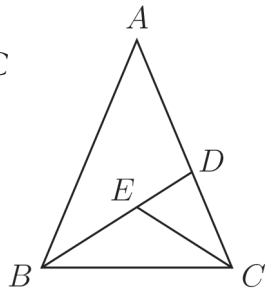
[Kuwait]

22 Several points are marked on a line. Renard then marked another point between each two adjacent points on the line. He repeated this process a further three times. There are now 225 points marked on the line.
How many points were marked on the line initially?

A 10 B 12 C 15 D 16 E 25

[Tajikistan]

23 An isosceles triangle ABC, with $AB = AC$, is split into three smaller isosceles triangles, as shown, so that $AD = DB$, $CE = CD$ och $BE = EC$
What is the size, in degrees, of angle BAC?



A 24° B 28° C 30° D 35° E 36°

[Australia]

24 There are 2022 kangaroos and some koalas living across seven parks. In each park the number of kangaroos is equal to the total number of koalas in all the other parks.
How many koalas live in the seven parks in total?

A 288 B 337 C 576 D 674 E 2022

[Estonia]