



Till läraren

Välkommen till Kängurutävlingen – Matematikens hopp 2024 *Cadet*

- Tävlingen genomförs under perioden 21 mars – 5 april. *Uppgifterna får inte användas tidigare.*
- Sista dag för redovisning av antalet deltagare är den *12 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 *30 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 30 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:
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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						
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8						
9						
10						
11						
12						
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SUMMA						

Namn:.....

Klass:.....

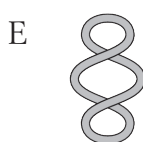


Three points problems

- 1 A string is laid so that it forms a horizontal figure eight.

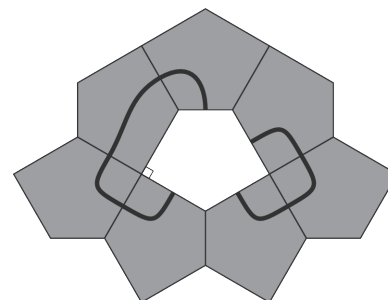


Which of the following strings cannot be transformed into the string on the right without cutting?

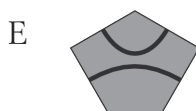
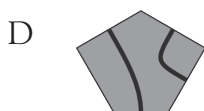
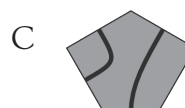
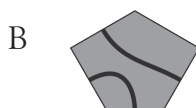
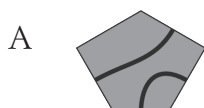


[Germany]

- 2 A shape is made of equal-sized pentagonal tiles.

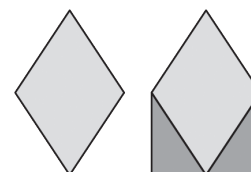


Which of the following tiles can be placed in the space in the shape to produce two closed curves?



[Slovenia]

- 3 The first diagram shows a rhombus. The area of the first diagram is increased by adding two right-angled triangles, as shown.



By what percentage has the area increased?

- A 20% B 25% C 30% D 40% E 50%

[Spain]



4 What is the value of the expression? $\frac{20 \cdot 24}{2 \cdot 0 + 2 \cdot 4}$

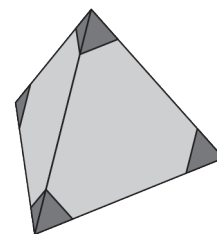
- A 12 B 30 C 48 D 60 E 120

[Uganda]

5 Julio cuts off the four corners of a regular tetrahedron, as shown.

How many corners does the shape that remains have?

- A 8 B 9 C 11 D 12 E 15



[Germany]

6 Ria has three counters marked 1, 5 and 11, as shown. She wants to place them side by side to make a four-digit number.



How many different four-digit numbers can she make?

- A 3 B 4 C 6 D 8 E 9

[Netherlands]

7 A fruit bowl contains five types of fruit: apples, grapes, cherries, strawberries and bananas.

- Alva likes apples
- Bo likes apples, cherries, strawberries and bananas
- Camilla likes grapes, cherries, strawberries and bananas
- Dan likes apples, grapes and cherries
- Eva likes apples and cherries

The fruit is shared so that everyone gets a different type of fruit and everyone gets a type of fruit that they like.

Who gets cherries?

- A Alva B Bo C Camilla D Dan E Eva

[Switzerland]

8 The weight restriction notice for an elevator says it can carry either 12 adults or 20 children. According to the weight restrictions, what is the largest number of children that can ride in the elevator with nine adults?

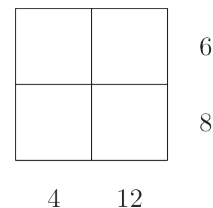
- A 3 B 4 C 5 D 6 E 8

[Ukraine]



Four points problems

- 9 Four different positive integers are placed on a grid and then covered up. The products of the integers in each row and in each column are shown in the diagram.

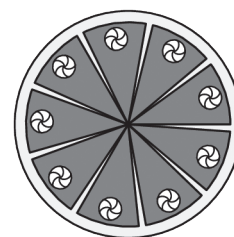


What is the sum of the four integers?

- A 10 B 12 C 13 D 14 E 15

[Australia]

- 10 Carina baked a cake and cut it into ten equal pieces. She ate one piece and then arranged the remaining pieces evenly, as shown.

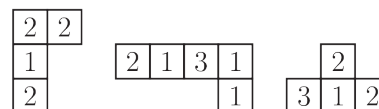


What is the size of the angle between any two pieces?

- A 5° B 4° C 3° D 2° E 1°

[Germany]

- 11 Werner can make a 4×4 square, where the sum of the numbers in all four rows and all four columns is the same, from the three pieces shown and one further piece.



Which of the following pieces is needed to complete his square?

- A

1	1	3
---	---	---

 B

2	1	0
---	---	---

 C

1	2	1
---	---	---
- D

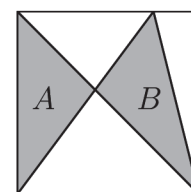
2	2	2
---	---	---

 E

2	2	3
---	---	---

[Germany]

- 12 A square has side-length 10 m. It is divided into parts by three straight line segments, as shown. The areas of the two shaded triangles are A and B .



10 m

What is the value of $A - B$?

- A 0 m^2 B 1 m^2 C 2 m^2 D 5 m^2 E 10 m^2

[Greece]

- 13 Paula the penguin goes fishing every day and always brings back twelve fish for her two chicks. Each day, she gives the first chick she sees seven fish and gives the second chick five fish, which they eat. In the last few days one chick has eaten 44 fish.

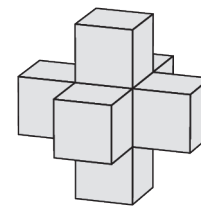
How many has the other chick eaten?

- A 34 B 40 C 46 D 52 E 58

[United Kingdom]



- 14 Johan had a large number of identical cubes. He made the structure on the right by taking a single cube and then sticking another cube to each face. He wants to make an extended structure in the same way so that each face of his original structure will have a cube stuck to it.

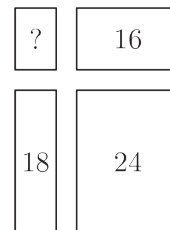


How many extra cubes will he need to complete his extended structure?

- A 18 B 16 C 14 D 12 E 10

[Brazil]

- 15 Gerard cuts a large rectangle into four smaller rectangles. The perimeters of three of these smaller rectangles are 16, 18 and 24, as shown in the diagram.



What is the perimeter of the fourth small rectangle?

- A 8 B 10 C 12 D 14 E 16

[Netherlands]

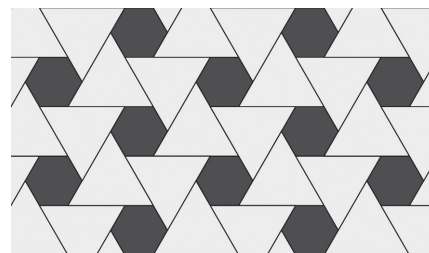
- 16 Water makes up 80 percent of the mass of fresh mushrooms. However, water makes up only 20 percent of the mass of dried mushrooms. By what percentage does the mass of the mushroom decrease during drying?

- A 60% B 70% C 75% D 80% E 85%

[Hungary]

Five points problems

- 17 Teri the tiler is planning to make a large, square mosaic floor with a repeating pattern, using hexagonal and triangular tiles, arranged as shown in the diagram. She thinks she will use 3000 hexagonal tiles to make the whole floor.



Approximately, how many triangular tiles will she need?

- A 1000 B 1500 C 3000 D 6000 E 9000

[Finland]

- 18 Nine cards numbered from 1 to 9 were placed facedown on the table. Aleksa, Bart, Clara and Deindra each picked up two of the cards.
- Aleksa said "My numbers add up to 6".
 - Bart said "The difference between my numbers is 5".
 - Clara said "The product of my numbers is 18".
 - Dennis said "One of my numbers is twice the other one".
- All four made a true statement. Which number was left on the table?

- A 1 B 3 C 6 D 8 E 9

[Vietnam]



- 19 The digits 0–9 can be drawn with horizontal and vertical segments, as shown. Greg chooses three different digits. In total, his digits have 5 horizontal segments and 10 vertical segments.

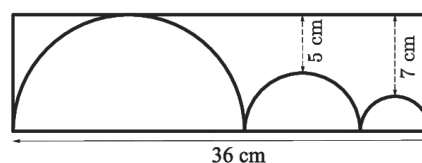


What is the sum of his three digits?

- A 9 B 10 C 14 D 18 E 19

[Finland]

- 20 The diagram shows three semi-circles inside a rectangle. The middle semi-circle touches the other two semi-circles which, in turn, each touch a shorter side of the rectangle. The largest semi-circle also touches one of the longer sides of the rectangle. The shortest distances from that side of the rectangle to the other two semi-circles are 5 cm and 7 cm respectively, as shown

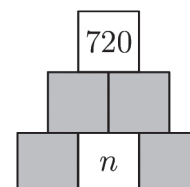


What is the perimeter, in cm, of the rectangle?

- A 82 cm B 92 cm C 96 cm D 108 cm E 120 cm

[Catalonia]

- 21 Donald wants to complete the diagram so that each box in the middle and top rows will contain the product of the values in the two boxes below it and each box contains a positive integer. He wants the value in the top box to be 720.



How many different values can the integer n take?

- A 1 B 4 C 5 D 6 E 8

[Türkiye]

- 22 Farmer Barbro is selling chicken and duck eggs. She has baskets holding 4, 6, 12, 13, 22, and 29 eggs. Her first customer buys all the eggs in one basket. Barbro notices that the number of chicken eggs she has left is twice the number of duck eggs.

How many eggs did the customer buy?

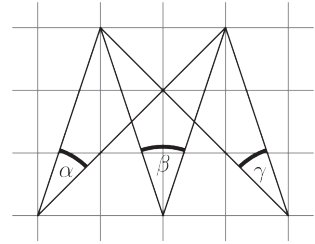
- A 4 B 12 C 13 D 22 E 29

[Hungary]



- 23 Three angles α , β and γ are marked on squared paper, as shown.

What is the value of $\alpha + \beta + \gamma$?



- A 60° B 70° C 75° D 90° E 120°

- 24 Captain Flint asked four of his pirates to write on a piece of paper how many gold, silver and bronze coins were in the treasure chest. Their responses are shown in the diagram but unfortunately part of the paper was damaged. Only one of the four pirates told the truth. The other three lied in all their answers. The total number of coins is 30.

	Gold	Silver	Bronze
Tom		9	11
Al	7		12
Pit	10		10
Jim	9	10	

Who told the truth?

- A Tom B Al C Pit D Jim E We cannot be sure

[Greece]