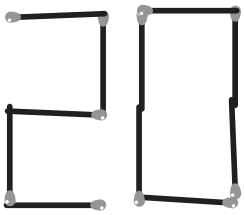
wizPROF 2022

Good luck and most of all have fun.!

- calculators are not allowed
- you may use 75 minutes
- only a pencil, an eraser and scribbling paper are allowed
- results and prizes will arrive at school at the end of May
- answers will be posted on the website about March 29th
- solutions will be posted on the website about April 20th

wizPROF
havo 4 & 5
vwo 3, 4, 5 & 6

1. *Carola* has a box with 30 matches.
She is going to form the number 2022.
Here you can see how she wants to form the numbers 0 and 2.



How many matches will *Carola* have left when she forms 2022?

A. 5 **B.** 9 **C.** 10 **D.** 19 **E.** 21

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2. A square and an equilateral triangle have the same perimeter. The triangle has sides of length 12.

What are the sides of the square?

A. 6 **B.** 9 **C.** 12 **D.** 16 **E.** 36

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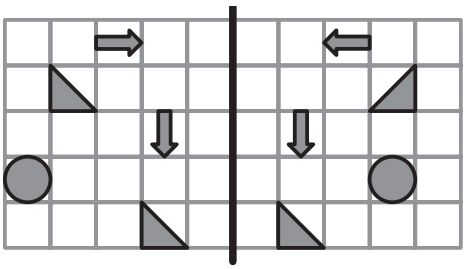
3. Some arrows, triangles and circles are drawn on a sheet of paper.
The paper is folded in half along the bold black line.



How many of the shapes on the left cover exactly a shape on the right?

A. 1 **B.** 2 **C.** 3 **D.** 4 **E.** 5

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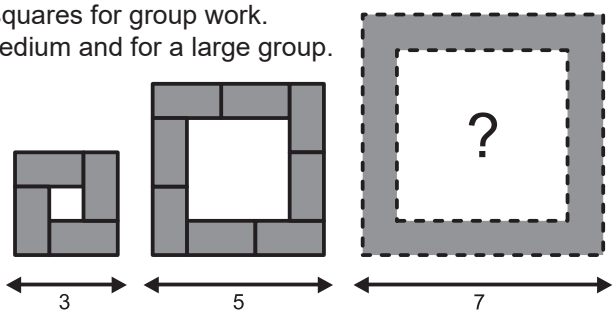
4. In a classroom, a number of tables are arranged in squares for group work.
On the right you see the squares for a small, for a medium and for a large group.



How many tables are needed for the large group?

A. 10 **B.** 11 **C.** 12 **D.** 14 **E.** 16

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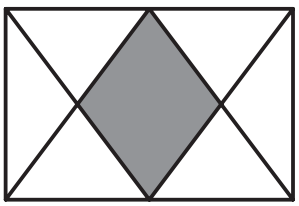
5. In the rectangle shown in the picture, line segments are drawn from the centers of the long sides to all vertices



What fraction of the rectangle is colored gray?

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

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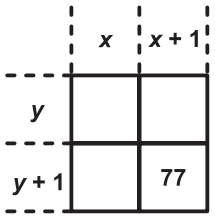
6. The table shown is a multiplication table.
One number has already been written down.
The numbers x and y are both positive integers.
x is the larger of the two.



What is the value of x?

A. 6 **B.** 7 **C.** 8 **D.** 10 **E.** 11

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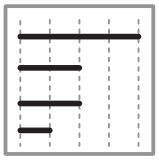
7. "I am a number: I am smaller than my half and larger than my double.
If you add me to my square, the answer is 0."

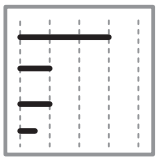
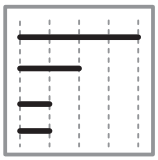
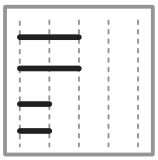
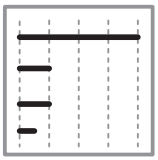
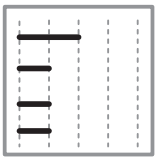
Who am I?

A. -2 **B.** -1 **C.** 0 **D.** 1 **E.** 2

8. In the diagram on the right you can see how much time *Jos* spent on his four apps last week.
This week he spent on two apps half the time compared to last week and on two others apps the same time as last week.



Which of the following could be the diagram of *Jos* for this week?

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

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9. A student council president is elected. 90% of the votes have been counted.
The preliminary results are as follows: *Alicia* 14, *Bert* 11, *Colin* 10, *Dima* 8 and *Els* 2 votes.

How many of the five candidates can still win?

A. 1 **B.** 2 **C.** 3 **D.** 4 **E.** 5

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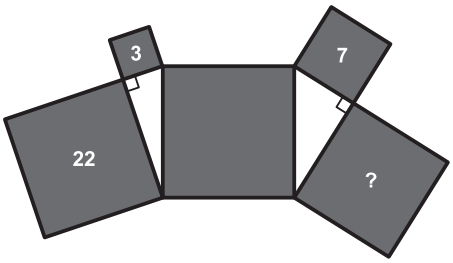
10. Five squares are arranged around two right angled triangles, as shown in the figure.
The area is written in three of the squares.



What is the area of the square with the question mark?

A. 15 **B.** 16 **C.** 17 **D.** 18 **E.** 19

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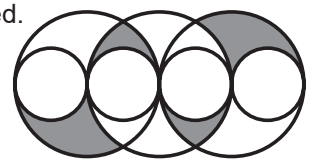
11. With three large, equal circles and four small, equal circles, this figure is created.
The small circles have radius 1.



What is the area of the grey colored sections?

A. π **B.** 2π **C.** 3π **D.** 4π **E.** 6π

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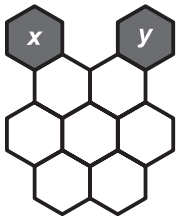
12. *Laura* has to go from hexagon *x* to hexagon *y*, as shown in the figure.
She can move from one hexagon to a neighboring hexagon if they have a common side. She has to get into each hexagon exactly once.



In how many different ways can she go from *x* to *y*?

A. 2 **B.** 3 **C.** 4 **D.** 5 **E.** 6

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13. The ages of six sisters form a sequence of six consecutive integers.
They all get the question “How old is your oldest sister?” Their answers are added up.

Which of the following numbers **cannot** be the sum?

A. 95 **B.** 125 **C.** 167 **D.** 205 **E.** 233

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14. 2022 candies lie in a row. *Ahmed* takes every sixth candy. Then *Bilal* takes every fifth candy. Then *Chris* takes every fourth candy. Finally, *Doris* takes the rest of the candies.

How many candies does *Doris* take?

A. 0 **B.** 337 **C.** 674 **D.** 1011 **E.** 1348

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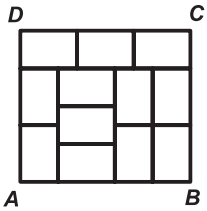
15. A grandmother asks her three grandchildren to guess how old she is. Their answers are 75, 78 and 81 years. One of them was 1 year off, another 2 years and the third 4 years.

How old was their grandmother?

A. 76 years **B.** 77 years **C.** 79 years
D. 80 years **E.** there are several options

16. The rectangle *ABCD* on the right consists of 12 identical smaller rectangles.



What is the result of the division $\frac{AD}{DC}$?

A. $\frac{2}{3}$ **B.** $\frac{5}{6}$ **C.** $\frac{7}{8}$ **D.** $\frac{8}{9}$ **E.** $\frac{9}{8}$

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17. A rabbit and a hedgehog run against each other. The race is one lap on a track of 550 meters.
The speed of the rabbit is 10 m/s, that of the hedgehog is 1 m/s. They start at the same time at a red flag.
The hedgehog goes the wrong way.
When they meet, the hedgehog turns and follows the rabbit.

How many seconds after the rabbit does the hedgehog reach the red flag?

A. 45 **B.** 50 **C.** 55 **D.** 100 **E.** 505

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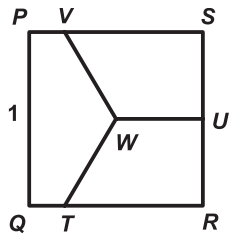
18. *PQRS* is a square of length 1. U is the centre of the side *RS*,
W is the centre of the square.
The line segments *TW*, *UW* and *VW* divide the square into three pieces of equal area.



How long is the line segment *SV*?

A. $\frac{1}{2}$ **B.** $\frac{2}{3}$ **C.** $\frac{3}{4}$ **D.** $\frac{4}{5}$ **E.** $\frac{5}{6}$

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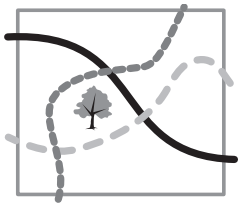
19. There are three hiking trails in a park. There is one tree planted in the middle of the park, as shown in the diagram. The community wants to plant some extra trees in the park in such a way that there is the same number of trees on the left and right sides of each path.



What is the minimum number of trees that the community must plant?

A. 1 **B.** 2 **C.** 3 **D.** 4 **E.** 5

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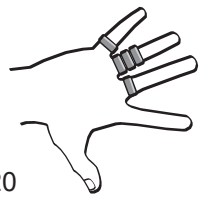
20. *Kenza* has five rings on her hand, as shown in the picture.



In how many different ways can she take them all off, one by one?

A. 10 **B.** 20 **C.** 45 **D.** 54 **E.** 120

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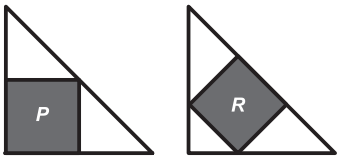
21. In two congruent isosceles right angled triangles,
the squares *P* and *R* are drawn, as shown in the figure.
The area of *P* is 45.



What is the area of *R*?

A. 35 **B.** 40 **C.** 45 **D.** 50 **E.** 60

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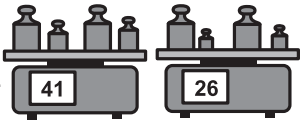
22. A grocer splits twelve weights of respectively 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 kg into three groups of four weights.
The first group weighs a total of 41 kg, the second group weighs a total of 26 kg.



Which of the following weights is in the same group as the weight of 9 kg?

A. 3 kg **B.** 5 kg **C.** 7 kg **D.** 8 kg **E.** 10 kg

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23. Eight teams participate in a sports tournament. Each team plays against every other team once.
In each match, the winner gets 3 points, the loser 0.
In case of a tie, both teams get 1 point.
At the end of the tournament, the eight teams appear to have achieved 61 points together.

What is the maximum number of points the winner can have?

A. 16 **B.** 17 **C.** 18 **D.** 19 **E.** 21

24. A group of pirates distributes a treasure of 200 gold and 600 silver pieces.
Each officer gets 5 gold and 10 silver pieces.
Each sailor gets 3 gold and 8 silver pieces. Each servant gets 1 gold piece and 6 silver pieces.

How many pirates (officers, sailors and servants) are there in the group?

A. 50 **B.** 60 **C.** 72 **D.** 80 **E.** 90

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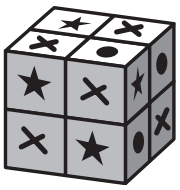
25. In each of the four squares on each face of a 2 × 2 × 2 cube, one of the following shapes is drawn: a circle, star or cross. Two squares with a common side never contain the same shape. The picture shows an example of such a cube.



How many circles, stars and crosses are there on a 2 × 2 × 2 cube?

A. 5 circles, 8 stars and the rest are crosses
B. 6 circles, 8 stars and the rest are crosses
C. 7 circles, 7 stars and the rest are crosses
D. 7 circles, 8 stars and the rest are crosses
E. none of the answers above

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26. The inhabitants of a particular city speak by asking questions.
Some residents are positive; they always ask questions to which the answer is "yes".
The other inhabitants are negative; to their questions the answer is always "no".
Bertha asks the question, "Are my husband *Albert* and I both negative?"

What is true for this couple?

A. both are positive
B. both are negative
C. *Albert* is positive, *Bertha* negative
D. *Albert* is negative, *Bertha* positive
E. you cannot know

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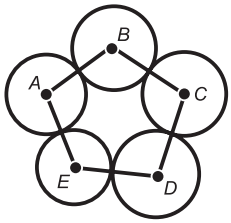
27. The circles with centres *A*, *B*, *C*, *D* and *E* touch each other.
It is given that *AB* = 16, *BC* = 14, *CD* = 17, *DE* = 13 and *AE* = 14.



What is the centre of the circle with the greatest radius?

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

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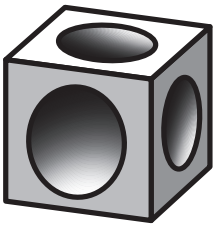
28. Identical hemispheres are drilled into each of the faces of a cube.
The centers of the hemispheres are the centers of the side faces.
The hemispheres are made as large as possible and touch their neighboring spheres at only one point. The side of the cube is 2.



What is the diameter of the hemispheres?

A. 1 **B.** $\sqrt{\frac{3}{2}}$ **C.** $\sqrt{2}$ **D.** $\frac{3}{2}$ **E.** 2

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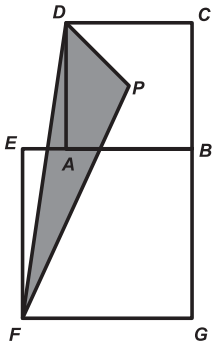
29. The diagonals of the squares *ABCD* and *EFGB* are 7 and 10 cm long respectively.
The diagonals of *ABCD* intersect at point *P*.



How many cm² is the area of triangle *FPD*?

A. 14,5 **B.** 15 **C.** 15,75 **D.** 16,5 **E.** 17,5

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30. The product of the digits of a positive integer N is 20.

What **cannot** be the product of the digits of N + 1?

A. 24 **B.** 25 **C.** 30 **D.** 35 **E.** 40