wizPROF 2019

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 31th

solutions will be posted on the website about April 22th

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

1. $20 \cdot 19 + 20 + 19 =$

A. 389 **B.** 399 **C.** 409 **D.** 419 **E.** 429

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2. A model train takes 1 minute and 11 seconds to go around.

How long does it take the train to complete 6 rounds?

A. 6 minutes and 56 seconds
B. 7 minutes and 6 seconds
C. 7 minutes and 16 seconds
D. 7 minutes and 26 seconds
E. 7 minutes and 36 seconds

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3. In a barber shop, clients should be able to read the word **SHAVE** correctly in a mirror.
There is an advertisement board on the wall behind the client.

How should the barber write the word **SHAVE** on the board?

A. SHAVE **B.** SHAVƎ **C.** ƎVAHS **D.** EVAHS **E.** ƎVAHS

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4. Throw three dice and count the number of dots.

How many different answers can you get?

A. 14 **B.** 15 **C.** 16 **D.** 17 **E.** 18

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5. A park has five entrance gates.
Monica wants to enter through one gate and exit through another gate.

In how many different ways can she enter and exit the park?

A. 10 **B.** 15 **C.** 16 **D.** 20 **E.** 25

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6. A race has three parts: swimming, running and biking. Three-quarters of the total distance is done biking, one fifth of the total distance by running, and 2 km is done swimming.

What is the total length of the race, in km?

A. 10 **B.** 20 **C.** 38 **D.** 40 **E.** 60

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7. The weights in kg of three kangaroos are three different whole numbers.
Together the three kangaroos weigh 97 kg.

What is the maximum possible weight in kg of the lightest kangaroo?

A. 1 **B.** 30 **C.** 31 **D.** 32 **E.** 33

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8. Five equal squares have been partly coloured black.

In which square is the black area the largest?

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

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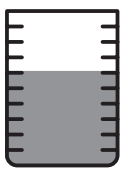
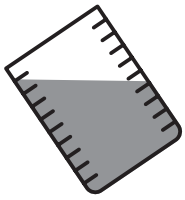
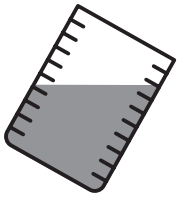
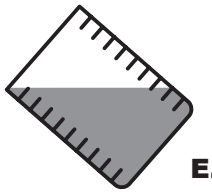
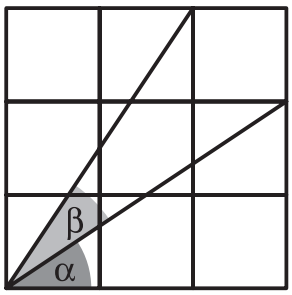
9. Five equal glasses are filled with water.
Four of the glasses contain the same amount of water, one has a different content.

For which glass does the content differ?

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

10. In the figure with nine squares, two angles are marked.



Which statement does certainly hold for these angles?

A. $\alpha = \beta$ **B.** $\alpha + \beta = 45°$ **C.** $\alpha + \beta = 60°$ **D.** $2\beta + \alpha = 90°$ **E.** $2\alpha + \beta = 90°$

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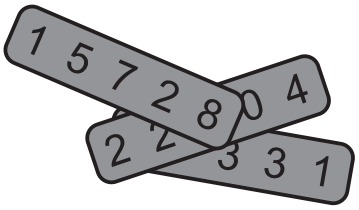
11. On each of three strips of paper a five-digit number is written.
The strips are partly covered, and therefore three digits cannot be seen.
The numbers on the strips add up to 57263.



Which three digits cannot be seen?

A. 0, 2 and 2 **B.** 1, 2 and 9 **C.** 2, 4 and 9 **D.** 2, 7 and 8 **E.** 5, 7 and 8

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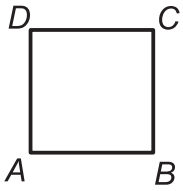
12. Through square *ABCD* an equilateral triangle *AEC* is drawn, in such a way that *E* and *B* are on the same side of line *AC*.



How many degrees is angle *CBE*?

A. 30 **B.** 45 **C.** 135 **D.** 145 **E.** 150

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13. We choose four different whole numbers *a*, *b*, *c* and *d* from the collection 1, 2, 3, …, 10.
Out of these we make the number $\frac{a}{b}+\frac{c}{d}$.

What is the least possible number we can make?

A. $\frac{3}{19}$ **B.** $\frac{2}{10}$ **C.** $\frac{14}{45}$ **D.** $\frac{29}{90}$ **E.** $\frac{25}{72}$

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14. The flag of Kangaroo Country is a rectangle, with side lengths in the ratio 5:3.
The flag consists of four rectangles of the same area, see figure.

What is the ratio of length to height of the white rectangle?

A. 3:1 **B.** 10:3 **C.** 7:2 **D.** 15:4 **E.** 4:1

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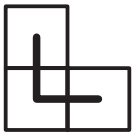
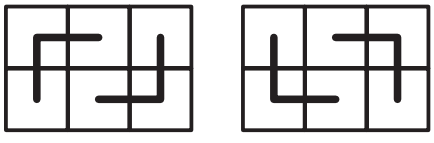
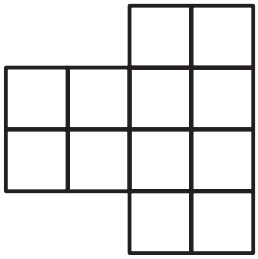
15. A 3 x 2 rectangle can be covered exactly by two of these L-shaped figures



in two ways, see figure:





In how many ways can the figure alongside be covered by L-shaped figures?

A. 0 **B.** 1 **C.** 2 **D.** 3 **E.** 4

16. Some juice is to be diluted in the ratio 1:7.
Juice concentrate comes in 1 litre bottles.

Which part of a bottle that is still half full should you take to obtain 2 litres of diluted juice?

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

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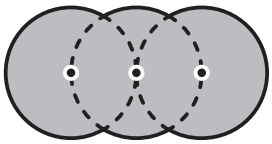
17. The shape is made out of three overlapping circles, each of perimeter 12.
Their centres lie on the circles and on one straight line.



What is the perimeter of the shape?

A. $4\sqrt{3}$ **B.** 10 **C.** 20 **D.** $12\sqrt{3}$ **E.** 24

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18. Some number is of the form *aaabbbb* with digits *a* and *b*.
When you add all digits of the number, you will get the two-digit number *ab*.

What do you get when you add *a* and *b*?

A. 8 **B.** 9 **C.** 10 **D.** 11 **E.** 12

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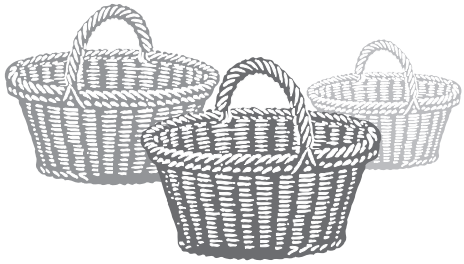
19. 60 apples and 60 pears are divided over a number of baskets.
Each basket will contain the same number of apples.
But all baskets have different numbers of pears.



What is the largest number of baskets you can use for this?

A. 6 **B.** 10 **C.** 11 **D.** 12 **E.** 15

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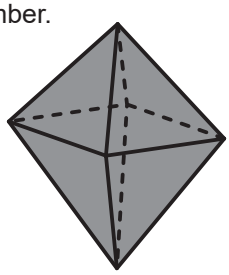
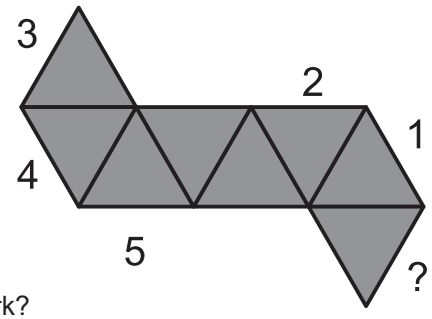
20. The figure shows a regular octahedron with a net of such an octahedron alongside.
When you fold this net into an octahedron, the line segment marked with a question mark will be joined with a segment with a number.





Which number will be joined with the question mark?

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

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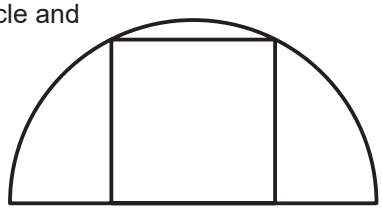
21. A square is drawn inside a semicircle, with two vertices on the semicircle and two vertices on the diameter of the semicircle, see figure.
The radius of the circle is 1 cm.



What is the area of the square in cm²?

A. $\frac{1}{5}$ **B.** $\frac{1}{5}\sqrt{5}$ **C.** $\frac{\pi}{4}$ **D.** $\frac{4}{5}$ **E.** 1

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22. A disc rotates around its centre. There are two dots on the disc.
One dot is 3 cm further from the centre of the disc than the other and it moves 2.5 times as fast.

What is the distance in cm to the centre of the dot that is the furthest away?

A. 5 **B.** 6 **C.** 8 **D.** 9 **E.** 10

23. *Silke* writes down the integers from 1 to 99. She then divides the sequence of digits 123456789101112...979899 into triplets: (123)(456)(789)(101)(112)...(979)(899).

Which of the following triplets will *Silke* not obtain?

A. (222) **B.** (444) **C.** (464) **D.** (646) **E.** (888)

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24. There are a number of planes passing through exactly three of the eight vertices of a cube.

How many of these planes exist?

A. 1 **B.** 2 **C.** 4 **D.** 8 **E.** 12

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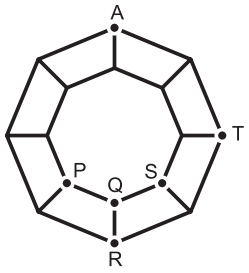
25. The shape alongside consists of 16 vertices and a number of line segments.
A pawn is located at vertex A and will be moved.
With each move the pawn follows a line segment to the next vertex.



At which of the vertices P, Q, R, S and T can the pawn be after 2019 moves?

A. only at Q
B. only at T
C. at P, R or S, not at Q and T
D. at P, R, S or T, not at Q
E. at each of these vertices

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26. The three numbers a, b and c each have three digits of which the first and last are the same (e.g., 121). Furthermore, $b = 2a + 1$ and $c = 2b + 1$.

How many such numbers a exist?

A. 0 **B.** 1 **C.** 2 **D.** 3 **E.** more than 3

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27. At the vertices of some square, positive whole numbers are written. For each pair of numbers joined by an edge of the square, one number should be a multiple of the other number. But for two numbers that are diagonally opposite on the square, one is not allowed to be a multiple of the other.

What is the least possible sum of the four numbers?

A. 12 **B.** 24 **C.** 30 **D.** 35 **E.** 60

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28. When we remove some numbers from the collection 10, 20, 30, 40, 50, 60, 70, 80 and 90, the product of the remaining numbers will be a square of an integer.

How many numbers do we have to remove at least?

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

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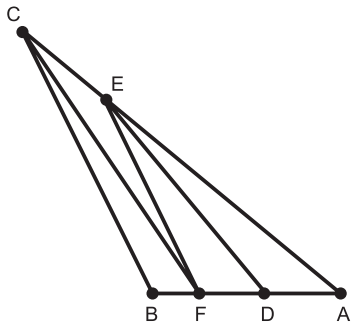
29. Triangle ABC is divided into four triangles of equal area by the line segments DE, EF and CF.



What is the ratio AF:BD?

A. 1:1 **B.** 6:5 **C.** 7:6 **D.** 8:7 **E.** 9:8

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30. There are four-digit numbers with the property that deleting any of the four digits results in a three-digit number that is a divisor of the original number.

How many four-digit numbers have this property?

A. 5 **B.** 9 **C.** 14 **D.** 19 **E.** 23