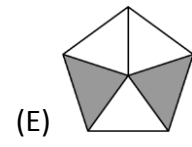
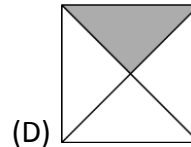
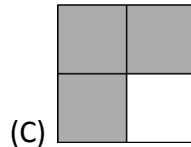
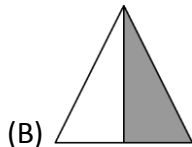
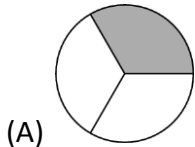


3 points

1.

Which figure has exactly one half shaded?



2.

Which of the following numbers is closest to $20,15 \cdot 51,02$?

(A) 10

(B) 100

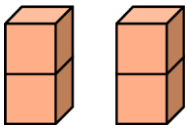
(C) 1 000

(D) 10 000

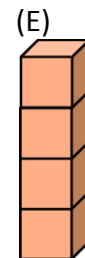
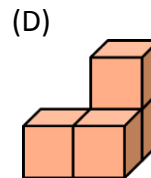
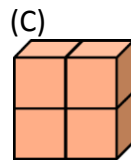
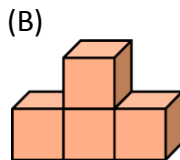
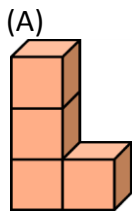
(E) 100 000

3.

Don made two towers by gluing cubes together.

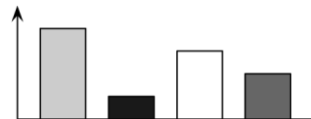


Then he glued the towers together. Which outcome is impossible?

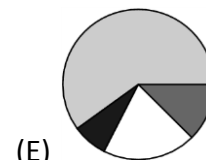
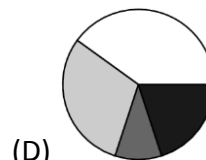
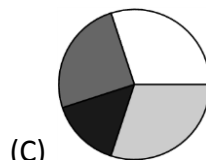
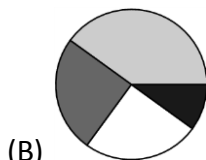
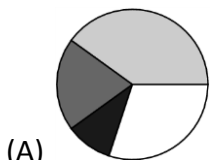


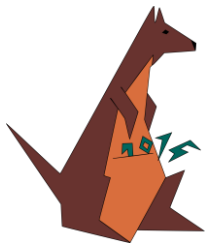
4.

Diana drew a bar chart representing the quantity of the four tree species registered during a biology excursion.



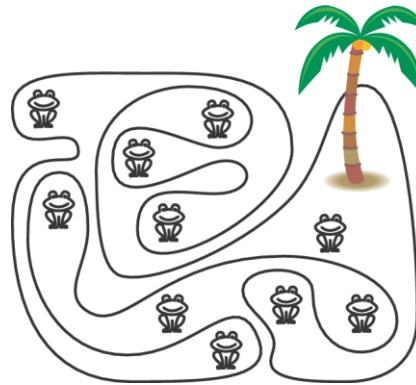
Jasper wants to represent the same data with a circular chart using the same colours. What would the circular chart look like?





5.

In the figure, we see an island with a highly indented coastline and several frogs. How many of these frogs are sitting on the island?



(A) 5

(B) 6

(C) 7

(D) 8

(E) 9

6.

Andrea was born in 1997 and his sister Charlotte in 2001. Their age difference is in any case

(A) less than 4 years

(B) at least 4 years

(C) exactly 4 years

(D) more than 4 years

(E) not less than 3 years

7.

Jack built a cube using 27 black and white small cubes. The black and the white cubes don't have any common faces. How many white cubes did Jack use?

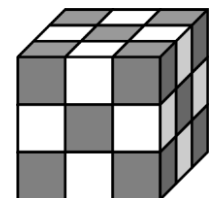
(A) 10

(B) 12

(C) 13

(D) 14

(E) 15



8.

All the 31 integers from 2001 to 2031 are added and the sum is divided by 31. What is the result?

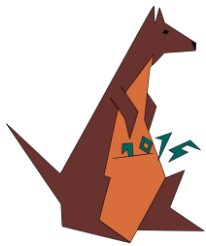
(A) 2012

(B) 2013

(C) 2015

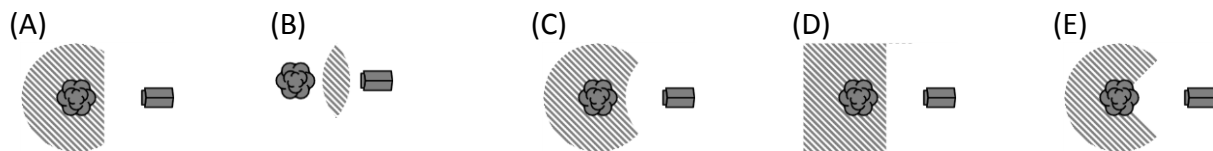
(D) 2016

(E) 2496



9.

When a little squirrel is on the ground, it never goes further than 5 m from its home tree. It also never goes closer than 5 m to the doghouse. Which of the figures best describes the area the little squirrel walks on?

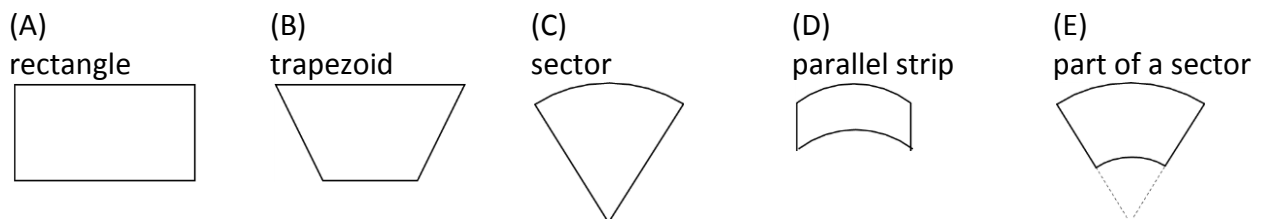


10.

A drinking glass is shaped like a truncated cone.



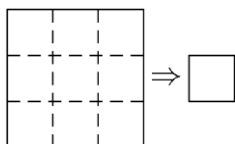
The outside of the glass (without the base) is covered with a colourful paper. What shape does the paper need to be?



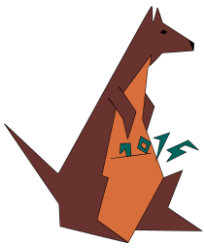
4 points

11.

A square paper is folded along the dashed lines one after another in any order of direction. From the resulting square a corner is cut off. Then the paper is unfolded. How many holes are there in the paper?

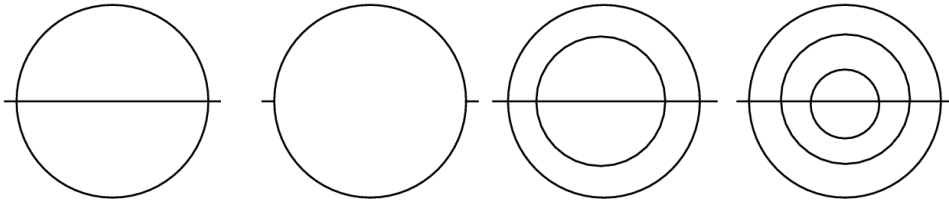


- (A) 0 (B) 1 (C) 2 (D) 4 (E) 9



12.

How many of the four figures can be drawn with one continuous line without drawing a segment twice?



(A) 0

(B) 1

(C) 2

(D) 3

(E) 4

13.

$$(a - b)^3 + (b - a)^3 =$$

(A) 0

(B) $2(a - b)^3$

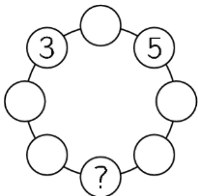
(C) $2a^3 - 2b^3$

(D) $2a^3 + 2b^3$

(E) $2a^3 + 6a^2b + 6ab^2 + 2b^3$

14.

Ella wants to write a number in each circle in the picture such that each number is the sum of its two neighbours. Which number must Ella write in the circle with the question mark?



(A) -5

(B) -16

(C) -8

(D) -3

(E) this is impossible

15.

The x -axis, the y -axis and the graphs of the functions $f(x) = 2 - x^2$ and $g(x) = x^2 - 1$ split the xy -plane into

(A) 10 regions

(B) 11 regions

(C) 12 regions

(D) 13 regions

(E) 14 regions

16.

Petra has three different dictionaries, and two different novels on a shelf. How many ways are there to arrange the books if she wants to keep the dictionaries together and the novels together?

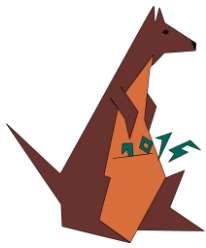
(A) 12

(B) 24

(C) 30

(D) 60

(E) 120



17.

$$\sqrt{(2015 + 2015) + (2015 - 2015) + (2015 \cdot 2015) + (2015 : 2015)} =$$

- (A) $\sqrt{2015}$ (B) 2015 (C) 2016 (D) 2017 (E) 4030

18.

Reading the following statements from left to right, which is the first one to be correct?

- (A) C is true (B) A is true (C) E is false (D) B is false (E) $1 + 1 = 2$

19.

The geometric mean of a set of n positive numbers is defined as the n -th root of the product of those numbers. The geometric mean of a set of three numbers is 3 and the geometric mean of another set of three numbers is 12. What is the geometric mean of the combined set of six numbers?

- (A) 4 (B) 6 (C) $\frac{15}{2}$ (D) $\frac{15}{6}$ (E) 36

20.

Every inhabitant of the Winger planet has at least two ears. Three inhabitants named Imi, Dimi and Trimi met in a crater. Imi said: "I can see 8 ears." Dimi: "I can see 7 ears." Trimi: "That's strange, I can see only five ears." None of them could see their own ears. How many ears does Trimi have?

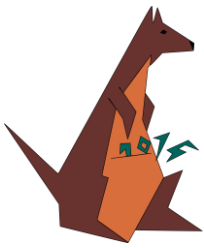
- (A) 4 (B) 5 (C) 6 (D) 7 (E) 12

5 points

21.

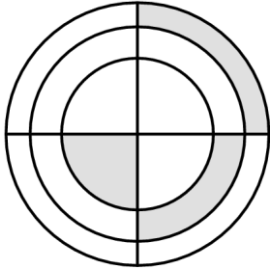
There are 2015 marbles in a cane. The marbles are numbered from 1 to 2015. Marbles with equal digit sums have the same color and marbles with different digit sums have different colours. How many different colours of marbles are there in the cane?

- (A) 10 (B) 27 (C) 28 (D) 29 (E) 2015



22.

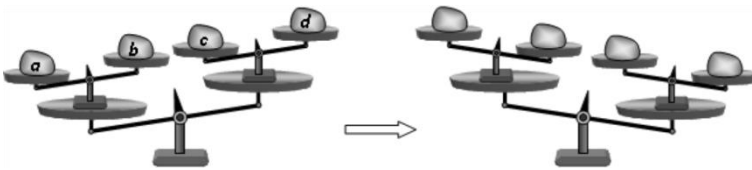
In the figure shown there are three concentric circles and two perpendicular diameters. If the three shaded figures have equal area and the radius of the smallest circle equals one, what is the product of the three radii?



- (A) $\sqrt{6}$ (B) 3 (C) $\frac{3\sqrt{3}}{2}$ (D) $2\sqrt{2}$ (E) 6

23.

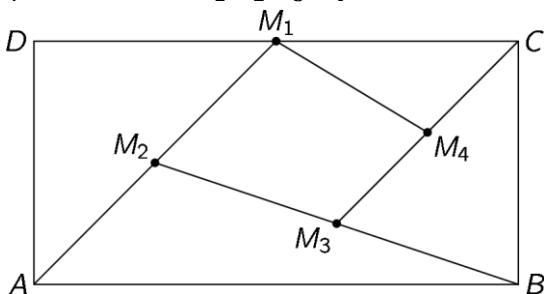
Four loads a , b , c ja d were placed in the scales (see figure). Then two of the loads were interchanged and the scales changed position as shown in the figure. Which loads were interchanged?



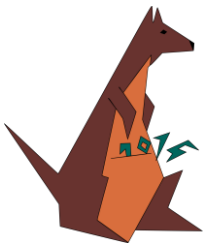
- (A) a and b (B) b and d (C) b and c (D) a and d (E) a and c

24.

In the rectangle $ABCD$ shown in the figure, M_1 is the midpoint of DC , M_2 is the midpoint of AM_1 , M_3 the midpoint of BM_2 , and M_4 the midpoint of CM_3 . What is the ratio of the areas of the quadrilaterals $M_1M_2M_3M_4$ and $ABCD$?



- (A) $\frac{7}{16}$ (B) $\frac{3}{16}$ (C) $\frac{7}{32}$ (D) $\frac{9}{32}$ (E) $\frac{1}{5}$



25.

Blue and red rectangles are drawn on a blackboard. Exactly 7 of the rectangles are squares. There are 3 red rectangles more than blue squares. There are 2 red squares more than blue rectangles. How many blue rectangles are there on the blackboard?

- (A) 1 (B) 3 (C) 5 (D) 6 (E) 10

26.

In a right triangle, the angle bisector of an acute angle divides the opposite side into segments of length 1 and 2. What is the length of the bisector?

- (A) $\sqrt{2}$ (B) $\sqrt{3}$ (C) $\sqrt{4}$ (D) $\sqrt{5}$ (E) $\sqrt{6}$

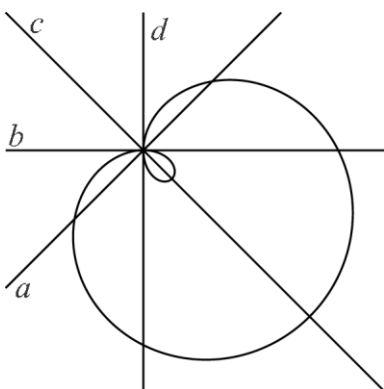
27.

96 members of a counting club are standing in a large circle. They start saying numbers 1, 2, 3, etc. in turn, going around the circle. Every member that says an even number steps out of the circle and the rest continue, starting the second round with 97. They continue in this way until only one member is left. Which number did this member say in the first round?

- (A) 1 (B) 17 (C) 33 (D) 65 (E) 95

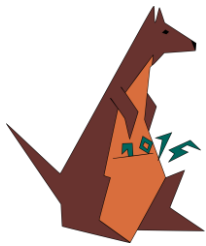
28.

The curve in the figure is described by the equation $(x^2 + y^2 - 2x)^2 = 2(x^2 + y^2)$.



Which of the lines a, b, c, d represents the y -axis?

- (A) a (B) b (C) c (D) d (E) some other line going through the intersection of a, b, c , and d .



29.

Oyla the ant starts on one of the vertices of a cube whose edges have length 1. She wants to walk on the edges, walking through every edge of the cube, and return to her starting point, making the length of her journey as short as possible. What is the length of her journey?

- (A) 12 (B) 14 (C) 15 (D) 16 (E) 20

30.

Ten different numbers are written down. Any number that is equal to the product of the other nine numbers is then underlined. How many numbers can be underlined at most?

- (A) 1 (B) 2 (C) 3 (D) 9 (E) 10