

## Year 7 and 8 (ENGLISH VERSION)

Thursday, 15th March 2018

Time allowed: 75 minutes

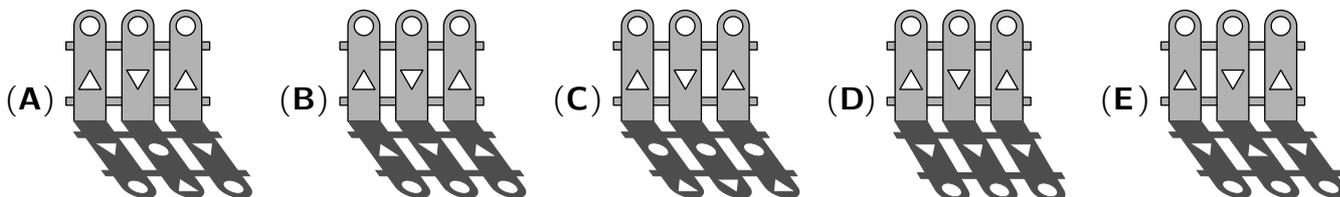
1. For each question exactly one of the 5 options is correct.
2. Each participant is given 30 points at the beginning. For each correct answer 3, 4 or 5 points are added. No answer means 0 points are added. If a wrong answer is given, one quarter of the points is subtracted, i. e. 0.75 points, 1 point or 1.25 points, respectively. At the end, the maximum number of points is 150, the minimum is 0.
3. Calculators and other electronic devices are not allowed.

### 3 point problems

**A1**  $(20 + 18) \div (20 - 18) =$

- (A) 18                      (B) 19                      (C) 20                      (D) 21                      (E) 22

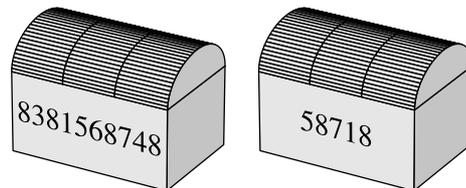
**A2** Which of the following pictures shows a piece of fence and its shadow?



**A3** The bamboo in the botanical garden grows 15 cm per day. How many days does it take the bamboo to grow 3 m in total?

- (A) 8                      (B) 10                      (C) 15                      (D) 20                      (E) 25

**A4** Kapitän Grimmbart stores his property sorted in chests. He encoded all inscriptions in such a way that identical numbers stand for the same letters. On the left chest the word EDELSTEINE is encoded. What is encoded on the right chest?



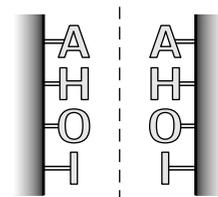
- (A) SEILE    (B) EISEN    (C) SIEBE    (D) LEDER    (E) SEIFE

**A5** The day before yesterday I thought in the evening: "Two more days of school until the weekend starts and my aunt is coming to visit." The day after tomorrow is my birthday. On what day of the week is my birthday?

- (A) Tuesday              (B) Wednesday              (C) Thursday              (D) Saturday              (E) Sunday

**A6** The "AHOI" rowing club installed its name above the entrance with large letters vertically above one another, *readable from both sides*. Soon a pet hotel is going to open next door, which also wants to install its name vertically above one another, *readable from both sides*. Which word is not suitable for the name of the pet hotel?

- (A) WAU              (B) UHU              (C) QUAK              (D) MIAU              (E) MUH



**A7** Four of the following calculations have the same result. Which calculation has a different result?

- (A)  $\frac{2}{3} \times \frac{5}{7}$               (B)  $\frac{2}{7} \times \frac{5}{3}$               (C)  $\frac{1}{3} \times \frac{10}{7}$               (D)  $\frac{5}{2} \times \frac{3}{7}$               (E)  $\frac{5}{21} \times \frac{2}{1}$

**A8** Mr. Lang brought 24 doughnuts to the carnival party. Some are filled with plum jam, some with strawberry jam and the rest (as a joke) with mustard. Exactly 9 doughnuts are *not* filled with plum jam, and exactly 7 are filled with strawberry jam. How many doughnuts are filled with mustard?

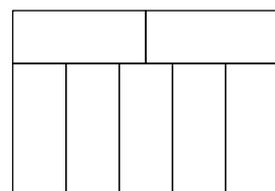
- (A) 2                      (B) 3                      (C) 4                      (D) 5                      (E) 6

**A9** Which number should replace ★ in the equation  $2 \times 18 \times 14 = 6 \times \star \times 7$  to make it correct?

- (A) 6                      (B) 8                      (C) 9                      (D) 10                      (E) 12

**A10** The large rectangle shown is made from 7 identical rectangles whose longer sides are 10 cm long. What is the perimeter of the large rectangle?

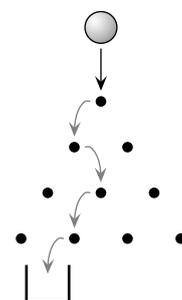
- (A) 60 cm      (B) 62 cm      (C) 68 cm      (D) 70 cm      (E) 84 cm



**4 point problems**

**B1** In the set-up shown, a ball is dropped from above onto the top pin. Each time the ball hits a pin, it bounces either to the right or to the left onto the next pin. One possible route for the ball to end up in the bin at the bottom is shown in the diagram. How many different routes could the ball take to reach this bin?

- (A) 4                      (B) 6                      (C) 9                      (D) 10                      (E) 15

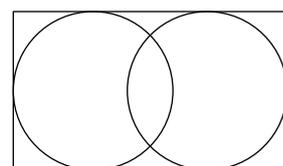


**B2** Last Sunday it rained all day, according to the news 24 litres per square meter. Our flower bed in front of the house is 3 m long and 1.50 m wide. How many litres of rain have fallen on our flower bed last Sunday?

- (A) 108 litres      (B) 120 litres      (C) 132 litres      (D) 144 litres      (E) 156 litres

**B3** The diagram shows a rectangle which is 11 cm long and 7 cm wide (*diagram not to scale*). It contains two circles. Each of them touches three of the sides of the rectangle. What is the distance between the centres of the two circles?

- (A) 1 cm      (B) 2 cm      (C) 3 cm      (D) 4 cm      (E) 5 cm

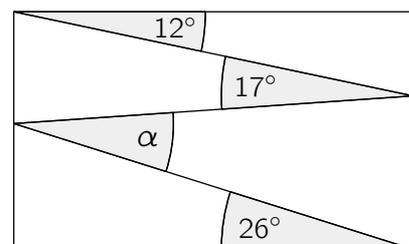


**B4** Lilly, Mark and Claas spin their fidget spinners and record the times. Lilly spins half as long as Mark. Mark spins three times as long as Claas. How long does Lilly spin compared to Claas?

- (A) half as long                      (B) one and a half times as long      (C) twice as long  
(D) two and a half times as long      (E) six times as long

**B5** Valeriu drew a zig-zag line inside a rectangle, creating angles of  $12^\circ$ ,  $17^\circ$  and  $26^\circ$ , as shown. What is the size of the angle marked  $\alpha$ ? (*diagram not to scale*)

- (A)  $30^\circ$       (B)  $31^\circ$       (C)  $32^\circ$       (D)  $33^\circ$       (E)  $34^\circ$



**B6** Three digits must be written on the three blank cards so that the equation is correct. What is the sum of these three digits?

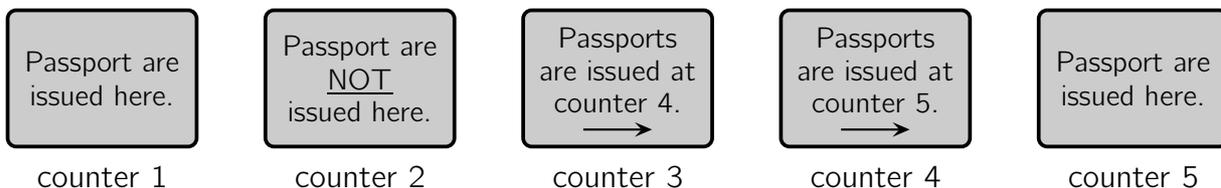


- (A) 5                      (B) 14                      (C) 9                      (D) 12                      (E) 6

**B7** Alice wants to write down three prime numbers less than 100, using each of the digits 1, 2, 3, 4 and 5 exactly once and no other digits. She has more than one possibility for the choice of these three prime numbers. Which prime number must she definitely write?

- (A) 2                      (B) 5                      (C) 31                      (D) 41                      (E) 53

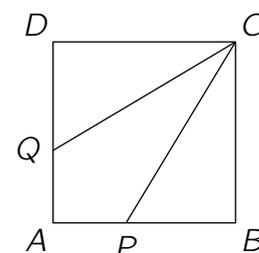
**B8** A jester wants to pick up his new passport at the jest authority. Passports are issued at one counter only. The signs are confusing, but, as usual in the jest authority, only one sign tells the truth.



At which counter will the jester receive his new passport?

- (A) at counter 1    (B) at counter 2    (C) at counter 3    (D) at counter 4    (E) at counter 5

**B9** The square  $ABCD$  has sides of length 30 cm. The points  $P$  and  $Q$  lie on the sides  $\overline{AB}$  and  $\overline{AD}$ , respectively, so that  $\overline{CP}$  and  $\overline{CQ}$  split the square into three pieces of the same area (*diagram not to scale*). What is the length of  $\overline{PB}$ ?



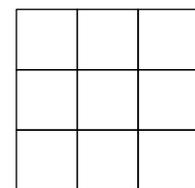
- (A) 16 cm    (B) 18 cm    (C) 20 cm    (D) 21 cm    (E) 24 cm

**B10** A hotel on an island in the Caribbean advertises using the slogan “350 days of sun every year!”. Petru decides to spend his holidays there in 2019. According to the advert, what is the smallest number of days Petru has to stay at this hotel to be certain of having two consecutive days of sun?

- (A) 17                      (B) 21                      (C) 31                      (D) 32                      (E) 35

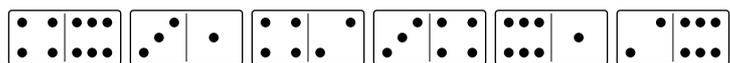
**5 point problems**

**C1** Oliana wrote a different integer from 1 to 9 in each cell of a  $3 \times 3$  table. Then, she calculated the sum of the integers in each of the rows and in each of the columns of the table. Five of the sums are 12, 13, 15, 16 and 17. What is the sixth sum?



- (A) 13                      (B) 14                      (C) 15                      (D) 16                      (E) 17

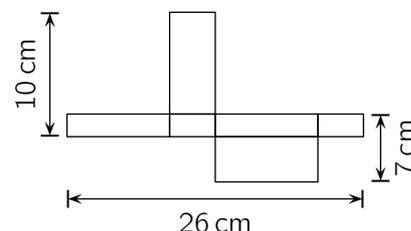
**C2** Dominoes are said to be arranged *correctly* if, for each pair of adjacent dominoes, the numbers of spots on the adjacent ends are equal.



Paulius laid six dominoes in a line, as shown. He can make a move by swapping the position of any two dominoes. During the move, the dominoes may be rotated. What is the smallest number of moves he needs to make to arrange all the dominoes correctly?

- (A) 1                      (B) 2                      (C) 3                      (D) 4                      (E) 5

**C3** The diagram shows a net of a rectangular box (*diagram not to scale*). What is the volume of this box?



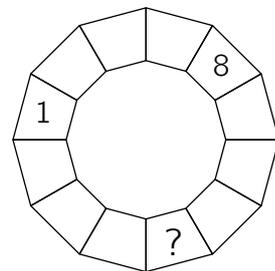
- (A)  $54 \text{ cm}^3$     (B)  $70 \text{ cm}^3$     (C)  $72 \text{ cm}^3$     (D)  $80 \text{ cm}^3$     (E)  $84 \text{ cm}^3$

- C4** In class 8a, there are three candidates standing for one position as class representative: Marie, Levin und Henja. 30 students are voting. Marie has 3 votes so far, while Levin has 5 and Henja has 9. How many more votes does Henja need to be certain she will finish with the most votes?

(A) 2                      (B) 4                      (C) 5                      (D) 7                      (E) 8

- C5** In each cell of the ring in the picture a number should be written such that each number is equal to the sum of the numbers in the two adjacent cells. Two of the numbers are given. What number must be written in the cell with the question mark?

(A)  $-9$                   (B)  $-7$                   (C)  $-1$                   (D) 7                      (E) 8



- C6** During the Kangaroo competition Josip recorded the time he needed for the 3-point, the 4-point and the 5-point questions. He left out a few questions and used the complete time of 75 minutes. On the 3-point questions he spent 15% less time than on the 4-point questions, and on the 5-point questions he spent 90% more time than on the 4-point questions. How much time has Josip spent on the 5-point questions?

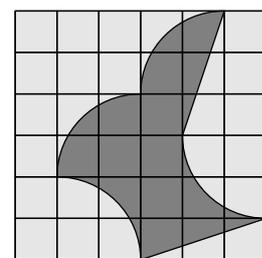
(A) 38 min                  (B) 40 min                  (C) 42 min                  (D) 49 min                  (E) 57 min

- C7** Longstreet only counts 11 houses and these are placed along a single street far apart from one another. Postman Pat remembers that the sum of the distances from the first house to each of the others is approximately 9.7 km. The sum of the distances from the second house to each of the others is approximately 7.9 km. What is the distance between the first and the second house?

(A) approx. 150 m    (B) approx. 180 m    (C) approx. 200 m    (D) approx. 320 m    (E) approx. 400 m

- C8** On a square piece of paper, a logo was designed on a square grid, as shown. All parts of the perimeter of the logo are either quarter-circles or line segments. The area of the logo is  $192 \text{ cm}^2$ . What is the side length of the paper?

(A) 18 cm                  (B) 19.5 cm                  (C) 21 cm                  (D) 24 cm                  (E) 27 cm



- C9** Viola has been practising the long jump. At one point, the average distance she had jumped was 3.80 m. Her next jump was 3.99 m and that increased her average to 3.81 m. After the following jump, her average has become 3.82 m. How long was her final jump?

(A) 3.99 m                  (B) 4.00 m                  (C) 4.01 m                  (D) 4.03 m                  (E) 4.04 m

- C10** In the isosceles triangle  $ABC$  the sides  $\overline{AC}$  and  $\overline{BC}$  have the same length. Two points  $K$  and  $L$  are marked on the sides  $\overline{AC}$  and  $\overline{BC}$ , respectively, so that the segments  $\overline{AK}$ ,  $\overline{KL}$  and  $\overline{LC}$  have the length  $x$  and the segments  $\overline{AB}$  and  $\overline{KC}$  have the length  $y$  (diagram not to scale). What is the size of angle  $ACB$ ?

(A)  $30^\circ$                   (B)  $32^\circ$                   (C)  $36^\circ$                   (D)  $40^\circ$                   (E)  $45^\circ$

