

Year 7 and 8 (ENGLISH VERSION)

Thursday, 21st March 2019

Time allowed: 75 minutes

- For each question exactly one of the 5 options is correct.
- 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.
- Calculators and other electronic devices are not allowed.

3 point problems

A1 The code for Lena's bicycle lock consists of 4 even digits. Which of the following could be this code?

- (A)  (B)  (C)  (D)  (E) 

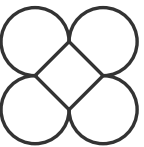


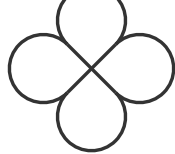
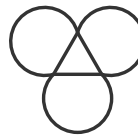
A2 To improve his Spanish, Carl learned vocabulary for 10 days, each day exactly a quarter of an hour. How many hours in total did Carl learn vocabulary in these 10 days?

- (A) two (B) two and a half (C) three (D) three and a half (E) four

A3 $1 - (2 - (3 - (4 - 5))) =$

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

A4 One of the following figures *cannot* be drawn in one move without lifting the pen off the page or drawing a line twice. Which one?

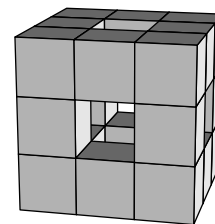
- (A)  (B)  (C)  (D)  (E) 

A5 A standard die whose six faces are labeled with 1 to 6 dots, as usual, is lying on the table. There are 17 dots in total on the five visible faces. How many dots are there on the sixth face that is lying on the table?

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

A6 From a $3 \times 3 \times 3$ cube, the small cubes in the middle of each face and the small cube right in the center were removed. How many small cubes are left?

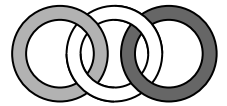
- (A) 17 (B) 18 (C) 20 (D) 21 (E) 22



A7 It really snowed again in March! Immediately after school, some children are having a sledge race: Angelina is faster than Jouke, Maike is slower than Sebastian, Jouke is faster than Sebastian, and Patrick is slower than Maike. Who is the fastest?

- (A) Angelina (B) Jouke (C) Maike (D) Sebastian (E) Patrick

A8 Three rings are linked as shown in the diagram on the right. Which of the following diagrams also shows the three rings linked in the same way?



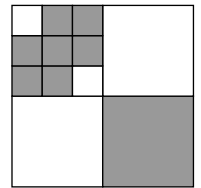
- (A) (B) (C) (D) (E)

A9 The pages of the book Romy is reading are all numbered, i. e. there is a number on the front and on the back of each sheet. The numbering starts with 1. The numbers used on the pages contain the digit 0 exactly five times and the digit 8 exactly six times. How many pages does Romy's book have?

- (A) 50 (B) 56 (C) 58 (D) 60 (E) 68

A10 A large square is divided into smaller squares, as shown in the diagram. What fraction of the area of the large square is shaded?

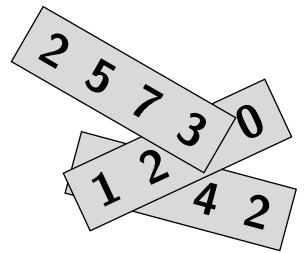
- (A) $\frac{1}{3}$ (B) $\frac{2}{5}$ (C) $\frac{3}{7}$ (D) $\frac{4}{9}$ (E) $\frac{5}{12}$



4 point problems

B1 There is a 4-digit number on each of the three pieces of paper shown. I know that their sum is 7635. What are the three hidden digits?

- (A) 2, 3, 8 (B) 1, 2, 9 (C) 2, 4, 8 (D) 2, 3, 9 (E) 3, 8, 9

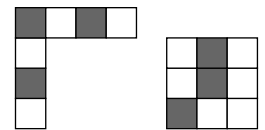


B2 Nicola bought screws in packs of 6 pieces each. The matching nuts are available in packs of 5 pieces each. To have the same number of screws and nuts, Nicola needs 2 packs of nuts more than of screws. How many nuts must Nicola buy in total?

- (A) 60 (B) 66 (C) 70 (D) 84 (E) 90

B3 There are several possibilities to make a 4×4 square from the two pieces shown on the right. Which of the following patterns *cannot* be made in this way?

- (A) (B) (C) (D) (E)

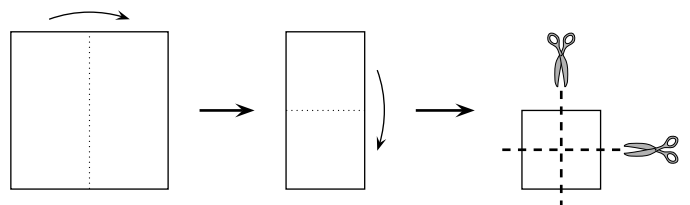


B4 On the basketball court, Finnley is practicing free throws. 55 % of his first 20 shots were successful. After 5 more shots, his success rate increased to 56 %. How many of the last 5 shots were successful?

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

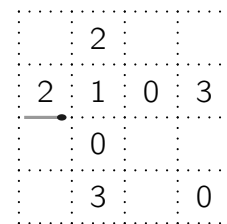
B5 A square sheet of paper is folded twice and then cut twice exactly in the middle, as shown. How many of the resulting pieces are squares?

- (A) 4 (B) 5 (C) 6 (D) 8 (E) 9



B6 Kaan forms a circuit of matches on the piece of paper shown. He places the matches on the dotted lines. The first one is already placed. In some of the small squares there is a number that indicates how many of the edges of this square must be covered by a match. How many matches does Kaan need for the whole circuit?

- (A) 14 (B) 16 (C) 18 (D) 19 (E) 20

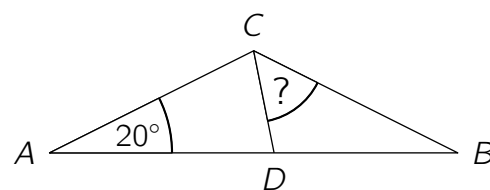


B7 Our neighbours already decorated their garden with Easter eggs: red ones, yellow ones, blue ones and purple ones. There are 36 Easter eggs in total. One sixth of the Easter eggs is red. Three quarters of the Easter eggs are not yellow. Two thirds of the Easter eggs are not blue. How many of the Easter eggs are purple?

- (A) 6 (B) 9 (C) 12 (D) 16 (E) 18

B8 Consider the triangle ABC with a point D on the side \overline{AB} . The line segments \overline{AC} , \overline{AD} and \overline{BC} have the same length, and the angle BAC is 20° (diagram not to scale). What is the size of the angle DCB ?

- (A) 50° (B) 60° (C) 65° (D) 70° (E) 75°

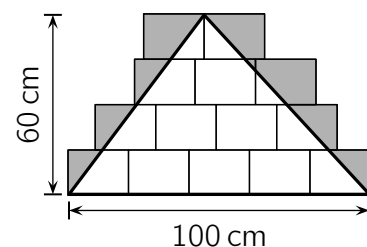


B9 Ella, Josef, Luke, Oana and Tina like reading. Sometimes they exchange their favourite books with each other. Ella has already exchanged books with all four friends, Josef with three, Luke with two and Oana with one. How many of her four friends has Tina already exchanged books with?

- (A) none (B) one (C) two (D) three (E) all four

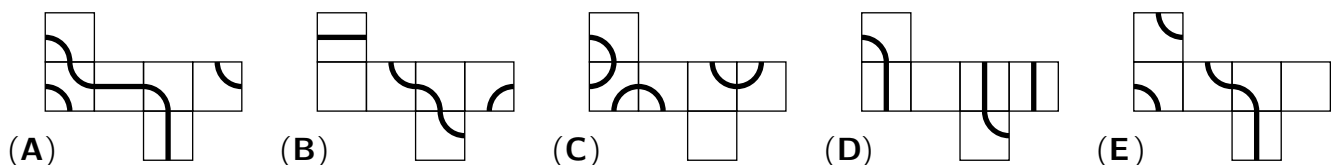
B10 In order to make a large triangle from paper, Valentin puts some identical rectangular sheets closely together at the edges, as shown in the diagram. Then, he draws a triangle on it as large as possible. The bottom side of this triangle is 100 cm long, and the corresponding height is 60 cm. What is the grey area outside the triangle?

- (A) 1200 cm^2 (B) 1400 cm^2 (C) 1500 cm^2 (D) 1600 cm^2 (E) 2100 cm^2



5 point problems

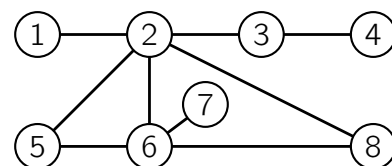
C1 The following nets can be folded to give a cube. For which of these nets does the resulting cube have a closed curve on it?



C2 For the cake sale at the Open Day of our school, 50 bottles of apple juice were bought for 1 euro each. Then, each bottle was offered at the same fixed price. In the end, there were 10 bottles left, but the total money that was earned was 10 euros more than what was paid for the 50 bottles in the beginning. What would have been the profit if all the bottles had been sold?

- (A) 12 euros (B) 17.50 euros (C) 20 euros (D) 22 euros (E) 25 euros

- C3** Yves paints each circle in the diagram either red, yellow or blue such that no two circles that are joined directly are painted the same colour. Which two circles will he necessarily have to paint the same colour?

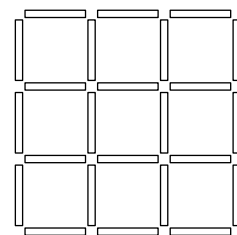


- (A) 5 and 8 (B) 1 and 6 (C) 2 and 7 (D) 4 and 5 (E) 3 and 6

- C4** Two candles are both cylindrical, but have different diameters and heights. The first candle lasts 6 hours, while the second candle lasts 8 hours. The candles are lit at the same time, and 3 hours later both candles are the same height. The height of the first candle before it was lit was 35 cm. What was the height of the second candle before it was lit?

- (A) 10.5 cm (B) 15 cm (C) 17.5 cm (D) 20 cm (E) 28 cm

- C5** Tatjana wants to make a 3×3 grid, as shown, with red, green, blue and black sticks. Each of the small 1×1 squares must have four sides of four different colours. What is the smallest number of black sticks that Tatjana must use?



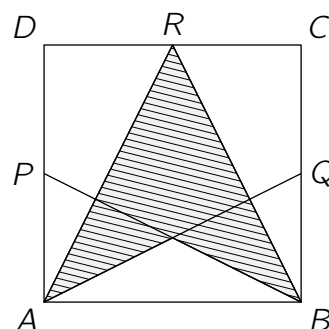
- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7

- C6** Siegfried breeds rabbits. He keeps them all in one large stable. It is known, that only one of the following statements about Siegfried's rabbits is true. Which one?

- (A) Siegfried has more than 40 rabbits. (B) All of Siegfried's rabbits are brownish.
 (C) None of Siegfried's rabbits is entirely white. (D) Siegfried has less than 60 rabbits.
 (E) Siegfried has more than 50 rabbits.

- C7** The diagram shows a square $ABCD$ with P , Q and R the midpoints of the sides \overline{DA} , \overline{BC} and \overline{CD} , respectively. What fraction of the square $ABCD$ is shaded?

- (A) $\frac{3}{8}$ (B) $\frac{1}{3}$ (C) $\frac{7}{16}$ (D) $\frac{1}{2}$ (E) $\frac{5}{12}$



- C8** Selma's and Naomi's savings are in the ratio $5 : 3$. When Selma buys headphones for 32 euros, the ratio turns around. Now it is $3 : 5$. How much of her savings does Selma have left?

- (A) 15 euros (B) 16 euros (C) 18 euros (D) 21 euros (E) 25 euros

- C9** At the "Long Chess Night", chess is played in teams of three. Each player plays exactly once against every player from all the other teams. For organisational reasons, a maximum of 200 games in total can be played. At most, how many teams can participate in this tournament?

- (A) 11 (B) 10 (C) 8 (D) 7 (E) 6

- C10** Europe's heaviest freight train hauls iron ore from the port of Hamburg to the Salzgitter steelworks in Lower Saxony. The 40 wagons weigh about 5700 t in total. They have different weights, but each block of three adjacent wagons weighs about 430 t. What is the total weight of the middle two wagons of this train?

- (A) about 270 t (B) about 280 t (C) about 300 t (D) about 310 t (E) about 320 t