

Year 7 and 8 (ENGLISH VERSION)

Thursday, 19th March 2020

Time allowed: 75 minutes

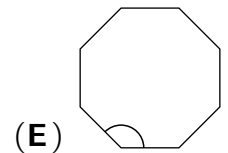
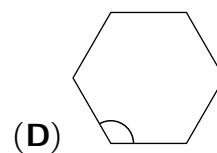
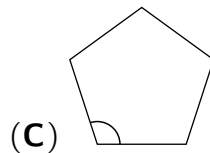
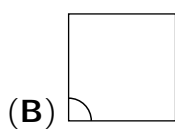
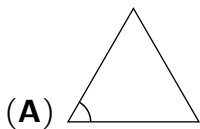
1. For each question exactly one of the 5 options is correct.
2. Each participant is given 30 points at the beginning. For each correct answer 3, 4 or 5 points are added. No answer means 0 points are added. If a wrong answer is given, one quarter of the points is subtracted, i. e. 0.75 points, 1 point 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 $((2020 : 5) : 2) : 2 =$

- (A) 20 (B) 22 (C) 101 (D) 222 (E) 1001

A2 In which of the regular polygons below is the marked angle the largest?



A3 Fritzi walks to school or rides by bike. If she walks both ways, she will travel 40 minutes in total. If she rides both ways by bike, she will travel 12 minutes in total. For the way there and the way back she needs the same amount of time. How long would Fritzi need if she rode to school by bike and walked back?

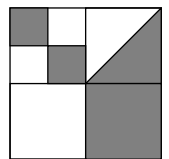
- (A) 26 minutes (B) 28 minutes (C) 30 minutes (D) 32 minutes (E) 34 minutes

A4 Which of the following fractions is the largest?

- (A) $\frac{4+3}{2}$ (B) $\frac{4}{3+2}$ (C) $\frac{3+2}{4}$ (D) $\frac{4+2}{3}$ (E) $\frac{3}{4+2}$

A5 A large square is divided into smaller squares. In one of the squares a diagonal is drawn. What fraction of the large square is shaded?

- (A) $\frac{4}{5}$ (B) $\frac{3}{8}$ (C) $\frac{4}{9}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$



A6 Linus helps to do the inventory in the shoe shop. In total he counts 24 pairs of sneakers, 26 pairs of boots and 40 pairs of sandals. 27 of the pairs of shoes are brown and 20 of the pairs of shoes are black. How many pairs of shoes have a different colour?

- (A) 41 (B) 43 (C) 44 (D) 45 (E) 48

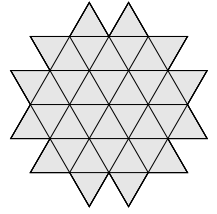
A7 The Pizzeria Roma and the tailor shop next door are open equally long each week. The sign with the opening hours was hit by some snowballs. When does the tailor shop close?

Pizzeria Roma Tuesday to Sunday always from 6 p.m. to 10 p.m.	Tailor shop Monday, Wednesday and Friday always from 10 a.m. to 7 p.m.
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- (A) at 3 p.m. (B) at 4 p.m. (C) at 5 p.m. (D) at 6 p.m. (E) at 7 p.m.

- A8** The game Supertrio can be played alone or in a group of three. In the youth club three game boards are set up. How many youths cannot play at the three boards at the same time?
- (A) 3 (B) 5 (C) 7 (D) 8 (E) 9

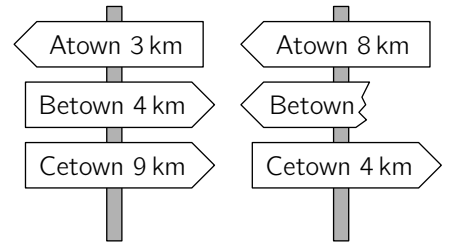
- A9** Frederik put 36 identical small triangles together, as the diagram shows. What is the smallest number of such triangles that he could add to this shape to turn it into a hexagon?
- (A) 10 (B) 12 (C) 15 (D) 18 (E) 24



- A10** Three different numbers from the following list are multiplied: -5 , -3 , -1 , 2 , 4 , 6 . What is the smallest possible product that can be obtained this way?
- (A) -200 (B) -120 (C) -90 (D) -48 (E) -15

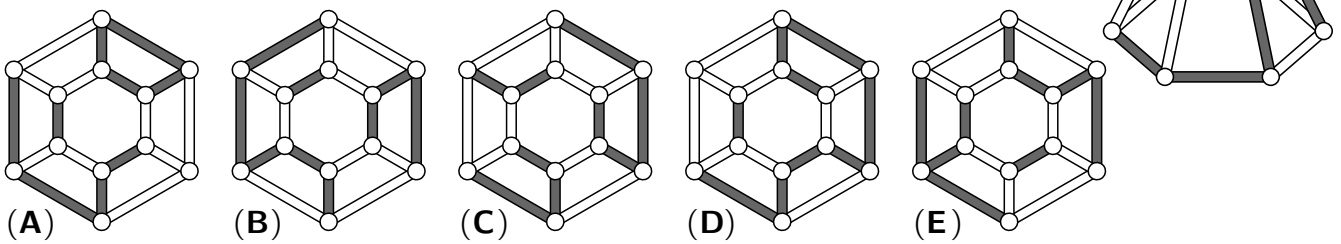
4 point problems

- B1** The shortest path from Atown to Cetown runs through Betown. The two signposts shown are set up along this path. One of the signposts is broken. What distance was written on the broken sign?
- (A) $\{1 \text{ km}$ (B) $\{3 \text{ km}$ (C) $\{4 \text{ km}$ (D) $\{5 \text{ km}$ (E) $\{9 \text{ km}$



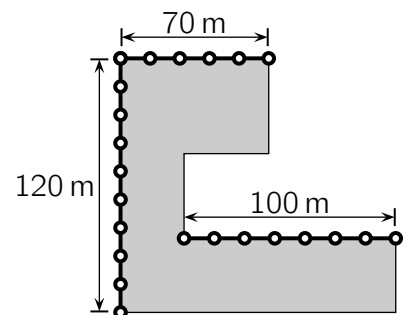
- B2** Miguel's sister must read a bulky book for a seminar at the university. Using the whole month of March to finish this book she would have to read 30 pages on average per day. At bedtime on 16th March, she has already read 570 pages. How many pages does Miguel's sister have to read on average on the remaining days of the month to finish the book?
- (A) 36 pages (B) 30 pages (C) 24 pages (D) 18 pages (E) 12 pages

- B3** Which of the following diagrams shows the object on the right from above?



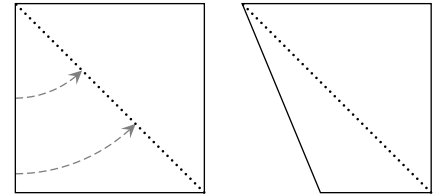
- B4** In the bike repair shop a lot of flat tires have to be fixed. In the morning the meticulous supervisor is surprised: "All bikes in the repair shop have a flat tire. Three fifths of the front wheels have a flat tire and three fifths of the back wheels have a flat tire. There are 5 bikes with flat tires on both wheels." How many bikes are there in the repair shop today?
- (A) 15 (B) 20 (C) 25 (D) 30 (E) 35

- B5** The park "Marie Curie" is getting a new fence all around. Part of the fence is already put up. What will be the total length of the fence?
- (A) 580 m (B) 590 m (C) 600 m (D) 610 m (E) 620 m

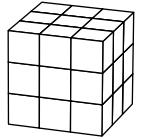


- B6** Werner's salary is 20% of his boss's salary. What percentage of Werner's salary is his boss's salary?
 (A) 80% (B) 120% (C) 180% (D) 320% (E) 500%

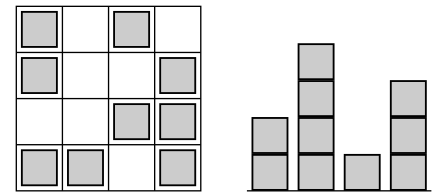
- B7** Romina took a square piece of paper and folded one of its sides onto the diagonal, as shown. She obtains a quadrilateral. What is the size of the largest angle of that quadrilateral?
 (A) 110° (B) 112.5° (C) 115° (D) 117.5° (E) 120°



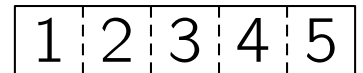
- B8** Henning owns 27 identical small cubes, each with exactly two adjacent faces painted red. He uses all of these cubes to build a large cube. What is the largest number of completely red faces the large cube can have?
 (A) 1 (B) 2 (C) 3 (D) 4 (E) 5



- B9** Anouk built a "city" with identical wooden cubes. One of the diagrams shows the view from above and the other the view from one of the sides. What is the largest number of cubes that Anouk could have used?
 (A) 26 (B) 25 (C) 24 (D) 23 (E) 22



- B10** Merlin has a strip of paper with the numbers 1, 2, 3, 4 and 5 written in five cells, as shown. He folds the strip at the dashed lines so that the cells overlap, forming 5 layers. Which of the following orders, from the top to the bottom, can he not obtain?

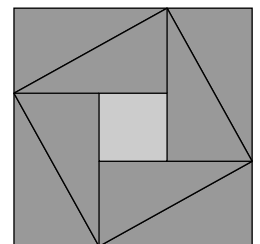


- (A) 3, 5, 4, 2, 1 (B) 3, 4, 5, 1, 2 (C) 3, 2, 1, 4, 5 (D) 3, 1, 2, 4, 5 (E) 3, 4, 2, 1, 5

5 point problems

- C1** Mia goes to the movies with her mother, her brother, her 2 uncles, 3 aunts and 4 cousins. They have a whole row of 12 seats for themselves. Uncle Frank sits at one end and aunt Birgit sits on the other end of the row. The 4 cousins sit next to each other and the 3 aunts sit next to each other. Mia sits on the 3rd seat from the right. Who sits on the 6th seat from the left?
 (A) the mother (B) one of the cousins (C) one of the aunts
 (D) one of the uncles (E) the brother

- C2** A large square consists of eight identical right-angled triangles and a small square. The area of the large square is 49 cm^2 and the largest side of a triangle is 5 cm (*diagram not to scale*). What is the area of the small square?



- (A) 1 cm^2 (B) 4 cm^2 (C) 9 cm^2 (D) 16 cm^2 (E) 25 cm^2

- C3** Each edge of a square is labelled with a positive integer. Each vertex is labelled with the product of the two numbers at the adjacent edges. The sum of the four numbers at the vertices is 15. What is the sum of the four numbers on the edges of the square?

- (A) 6 (B) 7 (C) 8 (D) 10 (E) 15

- C4** How many four-digit numbers are there, such that half of the number is divisible by 2, a third of the number is divisible by 3 and a fifth of the number is divisible by 5?

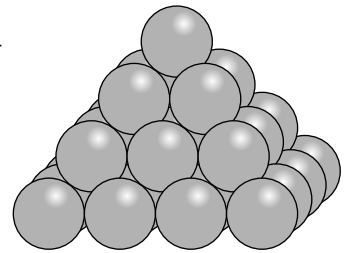
(A) 1 (B) 7 (C) 9 (D) 10 (E) 11

- C5** In the final of the air guitar competition, each of the the judges X, Y and Z gives the five competitors 1, 2, 3, 4 or 5 points. Each judge awards each number of points exactly once. The table lists some of the individual scores and the five totals. How many points did Aaron get from judge Z?

	Aaron	Sonja	Bella	Edwin	Mert
X	3	1			
Y		3	1		
Z					
sum	10	8	6	7	14

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

- C6** Elena builds a pyramid with identical wooden balls. The layers consist of 4×4 , 3×3 and 2×2 balls forming a square as shown. At the top there is a single ball. Some of the balls touch each other. How many contact points are there?



(A) 72 (B) 85 (C) 88 (D) 92 (E) 96

- C7** Sofia has 52 identical right-angled, isosceles triangles. She wants to use some of these triangles to make a square without gaps and without overlaps. How many different possibilities are there for the side length of such a square?

(A) 6 (B) 7 (C) 8 (D) 9 (E) 10

- C8** The small castle Dragoncliff is surrounded by a rectangular wall of size $40 \text{ m} \times 100 \text{ m}$. There is a guard at each of the four corners of the wall. When the lord rings the bell on the wall, three of the guards take the shortest possible route along the wall to meet the lord. Only Alfred is still asleep. The lord takes the shortest possible route along the wall to wake Alfred up. What is the length of the route of the lord?

(A) 40 m (B) 48 m (C) 60 m (D) 80 m (E) 100 m

- C9** The three ants Amanda, Boris und Rosa start at the bottom at the same time and each with constant speed to climb the stalk of a sunflower. When Amanda reaches the blossom, Boris still has 12 cm to climb and Rosa 39 cm. When Boris reaches the blossom, Rosa still has 29 cm more to climb. How long is the stalk of the sunflower?

(A) 144 cm (B) 156 cm (C) 160 cm (D) 174 cm (E) 180 cm

- C10** Luise is thinking of a four-digit number. Pierre tries to guess this number. His previous attempts were all wrong but Luise gave him some hints.

7 6 4 2 — None of the digits are correct.

2 7 4 1 — One digit is correct but it is in the wrong place.

4 1 3 2 — Two digits are correct but both are in the wrong place.

9 8 2 6 — One digit is correct and it is in the right place.

5 0 7 9 — Two digits are correct with one of them being in the right place and the other one in the wrong place.

What is the last digit of Luise's number?

(A) 0 (B) 1 (C) 3 (D) 5 (E) 9