Year 7 and 8 (ENGLISH VERSION)

Thursday, 17th March 2022 Time allowed: 75 minutes

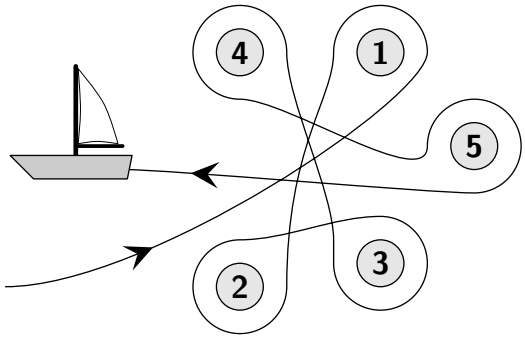
1. For each question exactly one of the 5 options is correct.
2. Each participant is given 30 points at the beginning. For each correct answer 3, 4 or 5 points are added. No answer means 0 points are added. If a wrong answer is given, one quarter of the points is subtracted, i. e. 0.75 points, 1 point 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 $\dfrac{20+22}{20-22} =$

(**A**) -21 (**B**) -10 (**C**) -2 (**D**) 22 (**E**) 42

A2 Annabelle sailed around five buoys as shown.
Which buoys did she sail around in a clockwise direction?

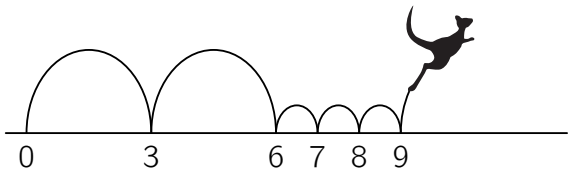


(**A**) 2, 3 and 4 (**B**) 1, 2 and 3 (**C**) 1, 3 and 5
(**D**) 2, 4 and 5 (**E**) 2, 3 and 5

A3 Beate wants to put the five number cards shown below in a row. The resulting 9-digit number should be the smallest possible. Which card must she put in the middle?

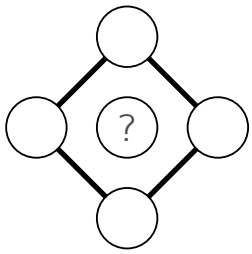
(**A**) 4 (**B**) 8 (**C**) 31 (**D**) 59 (**E**) 107

A4 Kangaroo Konrad jumps on the number line. He starts at 0 and always makes two long jumps and then three short jumps, as in the picture. On which of the following numbers does Konrad land?



(**A**) 46 (**B**) 47 (**C**) 48 (**D**) 49 (**E**) 50

A5 Emily wants to write the five numbers 2, 3, 4, 5, 6 in the five circles on the right. The product of the four numbers in the outer square must be equal to 144. Which number must Emily write in the circle in the middle?

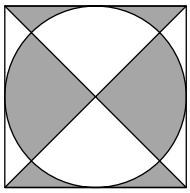


(**A**) 2 (**B**) 3 (**C**) 4 (**D**) 5 (**E**) 6

A6 The number plate of Alain's tractor fell off. He put it back on, but accidentally upside down, but this didn't make any difference. Which number plate could Alain's tractor have?

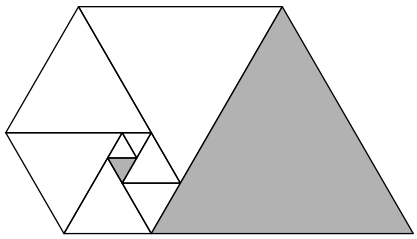
(**A**) 04 NSN 40 (**B**) 60 HOH 09 (**C**) 80 BNB 08 (**D**) 03 HNH 30 (**E**) 08 XBX 80

A7 The square shown has side-length 10 cm. What is the total area of the grey part?



(**A**) 40 cm^2 (**B**) 45 cm^2 (**C**) 50 cm^2 (**D**) 55 cm^2 (**E**) 60 cm^2

A8 The figure on the right is made up of equilateral triangles. The small grey triangle has side-length 1 cm. What is the side-length of the large grey triangle?

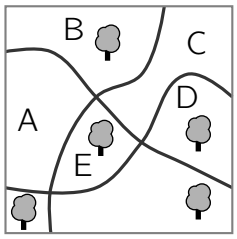


(**A**) 8 cm (**B**) 9 cm (**C**) 10 cm (**D**) 11 cm (**E**) 12 cm

A9 During the diving training, each girl from Tina's training group shows 7 dives from the 3-metre board. The coach counted that 22 dives have already been shown. She knows that there are still 34 dives to be shown. How many girls are there in Tina's training group in total?

(**A**) 8 (**B**) 9 (**C**) 10 (**D**) 11 (**E**) 12

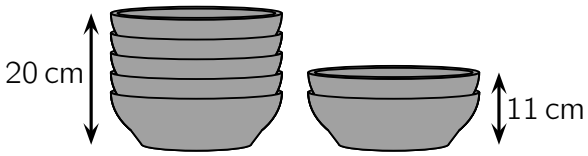
A10 There are five trees in a small park. We want to plant a new tree in such a way that there is the same number of trees on each side of each of the three paths. In which part do we have to plant the new tree?



(**A**) A (**B**) B (**C**) C (**D**) D (**E**) E

4 point problems

B1 A stack of 5 bowls is 20 cm high, and a stack of 2 of these bowls is 11 cm high. In my cupboard, the distance between two shelves is 30 cm. What is the largest number of such bowls that I can stack so that the whole stack fits in the cupboard?



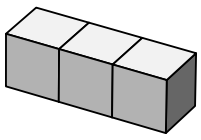
(**A**) 7 (**B**) 8 (**C**) 9 (**D**) 10 (**E**) 11

B2 Elisa wants to write four plus signs and one minus sign in the boxes on the right so that the calculation is correct. Where does the minus sign go?

$2\square 3\square 4\square 5\square 6\square 7 = 15$

(**A**) between 2 and 3 (**B**) between 3 and 4 (**C**) between 4 and 5
(**D**) between 5 and 6 (**E**) between 6 and 7

B3 On a standard die, the total number of dots on two opposite faces is always 7. Three standard dice have been glued together, as shown. What is the <u>smallest</u> possible number of dots that can lie on the entire surface?



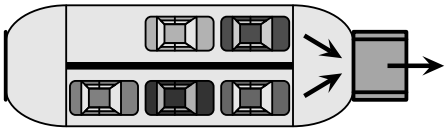
(**A**) 40 (**B**) 41 (**C**) 42 (**D**) 43 (**E**) 44

B4 Leroy wants to write a natural number in each box of the 3×3 field shown. The middle number in each row and in each column must be the average (i.e. the arithmetic mean) of the two outer numbers. Three numbers are given. Which number must Leroy write in the grey box at the bottom right?

11		
		3
	5	

(**A**) 7 (**B**) 5 (**C**) 3 (**D**) 2 (**E**) 1

B5 There are five cars on a ferry, as shown. They want to leave the ferry one by one. How many different orders are there to do this?

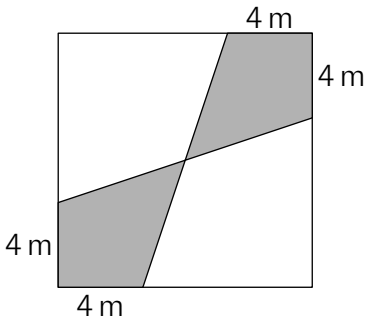


(**A**) 4 (**B**) 6 (**C**) 8 (**D**) 10 (**E**) 12

B6 The average age of the three brothers Jon, Matt and Simon is 10. The average age of Jon and Simon is 11, and the average age of Jon and Matt is 12. How old is the oldest of the three brothers?

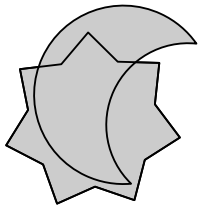
(**A**) 13 years (**B**) 14 years (**C**) 15 years (**D**) 16 years (**E**) 17 years

B7 The square shown has side-length 12 m. What is the total area of the grey part?



(**A**) 48 m^2 (**B**) 46 m^2 (**C**) 44 m^2 (**D**) 40 m^2 (**E**) 36 m^2

B8 In the picture on the right, 45 % of the grey area belong to both the star and the moon. 40 % of the grey area belong to the star but not to the moon. What percentage of the moon's area is outside the star?

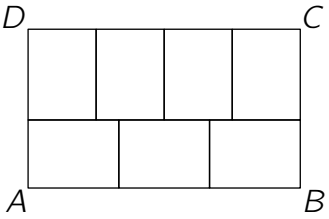


(**A**) 20 % (**B**) 25 % (**C**) 30 % (**D**) 35 % (**E**) 50 %

B9 Anton and Marja report about a bicycle tour from Stendal to Lüneburg: "The bicycle path leads through the villages of Viehle, Wahrenberg, Cumlosen and Hohenwulsch. On the bicycle path, the distance between Wahrenberg and Hohenwulsch is 45 km, between Viehle and Cumlosen 75 km and between Wahrenberg and Cumlosen 20 km." They did not mention in which order these villages are located along the bicycle path. What is certainly <u>not</u> the distance on the bicycle path between Viehle and Hohenwulsch?

(**A**) 140 km (**B**) 100 km (**C**) 80 km (**D**) 50 km (**E**) 10 km

B10 The rectangle $ABCD$ is divided into seven identical rectangles, as shown. The side $\overline{BC}$ is 42 cm long. What is the length of the side $\overline{AB}$?



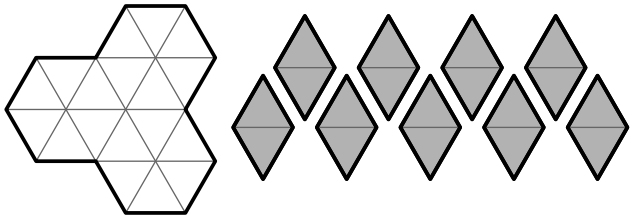
(**A**) 56 cm (**B**) 60 cm (**C**) 66 cm (**D**) 68 cm (**E**) 72 cm

5 point problems

C1 The church clocks in Fastville and Slowtown are very old. The clock in Fastville gains one minute every hour. The clock in Slowtown loses two minutes every hour. Yesterday, they were both set to the correct time at the same instant. Today, when the clock in Fastville showed 13:00, the clock in Slowtown showed 12:00. What time yesterday was it when the two clocks were set?

(**A**) at 23:00 (**B**) at 20:40 (**C**) at 18:30 (**D**) at 16:40 (**E**) at 15:20

C2 In how many ways can the shape on the left be completely covered by the nine tiles on the right?



(**A**) 2 (**B**) 6 (**C**) 8 (**D**) 9 (**E**) 12

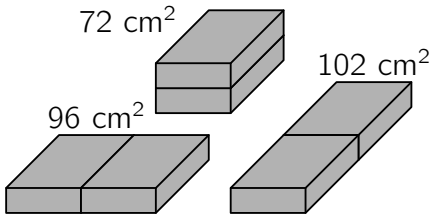
C3 Fritzi always cycles at the same speed and she always walks at the same speed. She can get from her home to her school in 10 minutes when she cycles and in 30 minutes when she walks. Yesterday, Fritzi cycled to her friend Eva's house, left her bike there and walked the rest of the way to school with Eva. Her journey to school took her 26 minutes. What fraction of her journey did Fritzi make by bike?

(**A**) $\frac{1}{6}$ (**B**) $\frac{1}{5}$ (**C**) $\frac{1}{4}$ (**D**) $\frac{1}{3}$ (**E**) $\frac{1}{2}$

C4 Some points are marked on a straight line. Fatih marks another point between every two neighbouring points. Then he marks another point between every two neighbouring points of the now existing points. Fatih does this a total of four times. Now, there are 225 points on the straight line marked in total. How many points were marked on the straight line at the beginning?

(**A**) 10 (**B**) 12 (**C**) 15 (**D**) 16 (**E**) 19

C5 Two identical bricks in the shape of cuboid with the same dimensions can be put together in three different ways to form a larger cuboid. The surface areas of these three larger cuboids are $72\,\text{cm}^2$, $96\,\text{cm}^2$ and $102\,\text{cm}^2$. What is the surface area of a single brick?

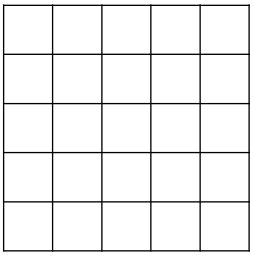


(**A**) $36\,\text{cm}^2$ (**B**) $48\,\text{cm}^2$ (**C**) $52\,\text{cm}^2$ (**D**) $54\,\text{cm}^2$ (**E**) $60\,\text{cm}^2$

C6 Mermaid Mariella is lost, she has been swimming around for days. When she meets a purple crab and a starfish, she asks them what day of the week it is. Mariella knows well that purple crabs always lie on Mondays, Tuesdays and Wednesdays, and that starfish always lie on Thursdays, Fridays and Saturdays – on the other days they speak the truth. The two answers are puzzling and, on top of that, they are completely identical: "Yesterday was one of my lying days." Mariella thinks for a moment, then everything is clear. Now she just has to find her way home. Which day of the week is it?

(**A**) Thursday (**B**) Friday (**C**) Saturday (**D**) Sunday (**E**) Monday

C7 What is the smallest number of cells that need to be coloured in a 5×5 square so that any 1×4 or 4×1 rectangle lying inside the square has at least one cell coloured?

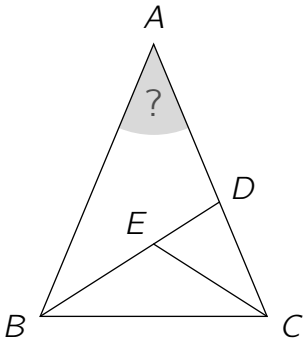


(**A**) 5 (**B**) 6 (**C**) 7 (**D**) 8 (**E**) 9

C8 Aunt Carin wants to paint her hallway green. She has blue and yellow paint and wants to mix 5 litres of green paint from 2 litres of blue and 3 litres of yellow paint. Already while stirring she notices that something is wrong. Carin has accidentally taken 3 litres of blue paint and 2 litres of yellow paint. How much green paint from the mixture must Carin replace with yellow paint so that she has 5 litres of paint in the desired shade of green?

(**A**) $\frac{6}{5}$ litres (**B**) $\frac{3}{2}$ litres (**C**) $\frac{7}{3}$ litres (**D**) $\frac{9}{5}$ litres (**E**) $\frac{5}{3}$ litres

C9 The isosceles triangle ABC can be decomposed into three smaller isosceles triangles, as shown, thereby $|\overline{AB}| = |\overline{AC}|$, $|\overline{AD}| = |\overline{BD}|$, $|\overline{CD}| = |\overline{CE}|$ and $|\overline{BE}| = |\overline{CE}|$ (*diagram not to scale*).
What is the size of the interior angle at A?



(**A**) 24° (**B**) 28° (**C**) 30° (**D**) 32° (**E**) 36°

C10 Gregor grows primroses and cyclamen in 7 greenhouses. In each greenhouse, the number of primroses is the same as the total number of cyclamen in all the other greenhouses. Gregor has a total of 2022 primroses. How many cyclamen does he have in total?

(**A**) 288 (**B**) 337 (**C**) 576 (**D**) 674 (**E**) 1011