Year 7 and 8 (ENGLISH VERSION)

Thursday, 17th March 2016   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 are not allowed.

3 point problems

A1 How many integers are there between 3.17 and 20.16 ?

(**A**) 15   (**B**) 16   (**C**) 17   (**D**) 18   (**E**) 19

A2 Which of the following traffic signs has the largest number of axes of symmetry?

(**A**)   (**B**)   (**C**)   (**D**)   (**E**)
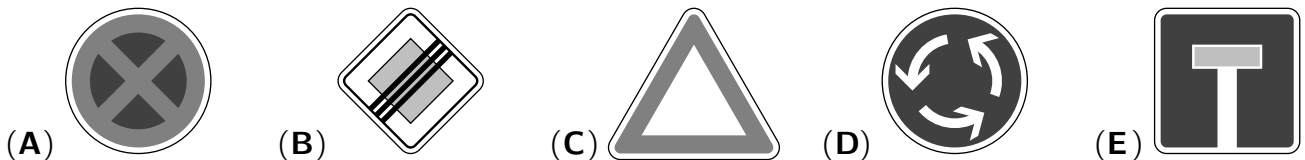
A3 Jenny had to add 26 to a certain number. Instead she subtracted 26 and obtained -14. What number should Jenny have obtained?

(**A**) 28   (**B**) 32   (**C**) 36   (**D**) 38   (**E**) 42

A4 $\dfrac{1}{10} + \dfrac{2}{100} + \dfrac{3}{1000} =$

(**A**) $\dfrac{123}{1000}$ (**B**) $\dfrac{632}{1110}$ (**C**) $\dfrac{321}{1000}$ (**D**) $\dfrac{123}{1110}$ (**E**) $\dfrac{321}{1110}$

A5 Which of the following tiles fits in the middle of the puzzle such that black lines meet black lines, grey lines meet grey lines and white lines meet white lines?

(**A**)   (**B**)   (**C**)   (**D**)   (**E**)
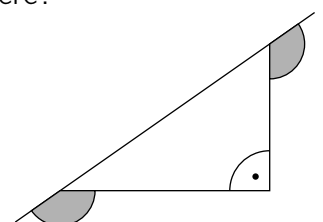
A6 Yesterday, for the early morning exercise in an anthill the ants formed 999 groups of 6 ants each. Today, these ants form groups of 9 ants each. How many such groups are there?
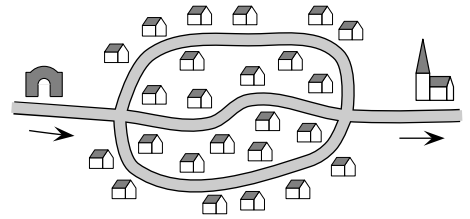
(**A**) 666   (**B**) 669   (**C**) 696   (**D**) 699   (**E**) 969

A7 What is the sum of the two angles marked in grey in the diagram on the right?

(**A**) 210°   (**B**) 240°   (**C**) 270°   (**D**) 320°   (**E**) 330°

A8 When Mr Young walks his dog, he starts at the city gate and walks towards the church. On his way he walks through the Weaver's Quarter where he uses each of the three roads exactly once. How many possible routes are there?
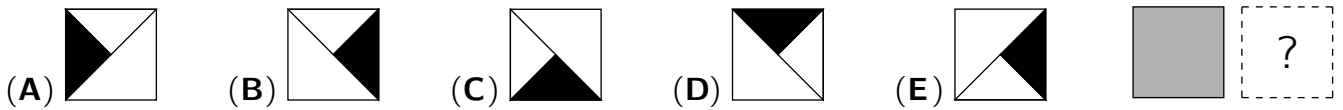
(**A**) 10   (**B**) 8   (**C**) 6   (**D**) 4   (**E**) 2

A9 Two pieces of rope have lengths 1 m and 2 m. Alex cuts these pieces into several parts. All the parts have the same length. Which of the following *cannot* be the total number of parts he obtains?

(**A**) 6   (**B**) 8   (**C**) 9   (**D**) 12   (**E**) 15

A10 John turns over a card about its lower edge and then about its right-hand edge, as indicated on the right. What does he see now?

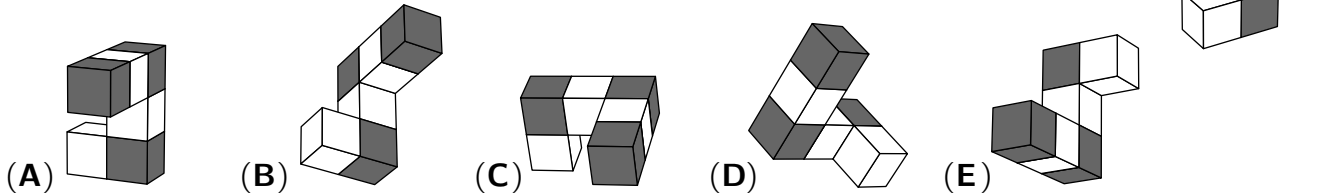(**A**)   (**B**)   (**C**)   (**D**)   (**E**)

4 point problems

B1 In my school, 60 % of the teachers come to school by bike. These are 45 teachers. Only 12 % of the teachers come to school by car. How many teachers come to school by car?

(**A**) 4   (**B**) 6   (**C**) 9   (**D**) 10   (**E**) 12

B2 Finja has glued six cubes together, as shown. She rotates the solid to look at it from different angles. Which of the following can she *not* see?

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

B3 Sally uses four of the five digits 1, 3, 5, 7, 9 to make two two-digit numbers. The sum is these two two-digit numbers is 112. Which of the five digits did Sally not use?

(**A**) 1   (**B**) 3   (**C**) 5   (**D**) 7   (**E**) 9

B4 Cricket Cal and grashopper Gary start to jump at the same time, from the same point, in the same direction. They make one jump per second. Each of Cal's jumps is 6 m in length. Gary's first jump is 1 m in length, his second is 2 m, his third is 3 m, and so on. After how many jumps does grashopper Gary catch cricket Cal?
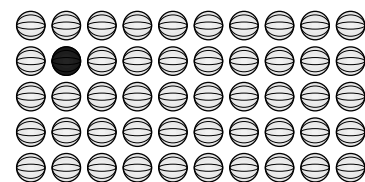
(**A**) 10   (**B**) 11   (**C**) 12   (**D**) 13   (**E**) 14

B5 The diagram on the right shows four identical rectangles placed inside a square. The perimeter of each rectangle is 16 cm. What is the perimeter of the outer square?

(**A**) 20 cm   (**B**) 24 cm   (**C**) 25 cm   (**D**) 28 cm   (**E**) 32 cm
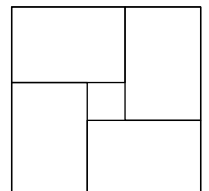
**B6** How many of the light beads shown must be removed such that 90 % of the remaining beads are light?

(**A**) 4　　　(**B**) 10　　　(**C**) 29　　　(**D**) 39　　　(**E**) 40

B7 Which of the following fractions has a value closest to $\frac{1}{2}$?

(**A**) $\frac{29}{57}$　　　(**B**) $\frac{25}{79}$　　　(**C**) $\frac{57}{92}$　　　(**D**) $\frac{27}{59}$　　　(**E**) $\frac{52}{97}$

B8 Seven standard dice (each with 1, 2, 3, 4, 5 or 6 dots on their faces) are glued together to make the solid shown on the right. The faces of the dice that are glued together have the same number of dots on them. How many dots in total are on the surface of the solid?
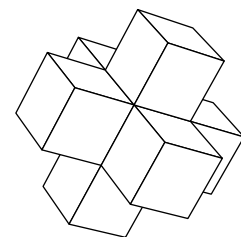
(**A**) 84　　　(**B**) 90　　　(**C**) 95　　　(**D**) 105　　　(**E**) 126

B9 Kia, Lea and Mia are riding bicycles. Kia starts behind Lea and Lea starts behind Mia. During the ride, each of the girls passes exactly once exactly one of the other girls. In how many different orders can they finish the ride?

(**A**) only one　　　(**B**) two　　　(**C**) three　　　(**D**) four　　　(**E**) five

B10 A 3 cm wide rectangular strip of paper is grey on one side and white on the other. Maria folds the strip, as shown. The grey trapeziums are identical. What is the length of the original strip?
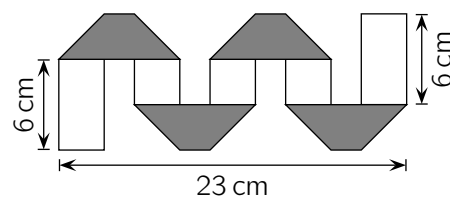
(**A**) 32 cm　(**B**) 44 cm　(**C**) 50 cm　(**D**) 53 cm　(**E**) 77 cm

⟨ **5 point problems** ⟩

C1 There are 30 students in our class. In the Spanish lessons we sit in pairs so that exactly one third of the boys sits with a girl, and exactly one half of the girls sits with a boy. How many boys are there in our class?

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

C2 Last year in Carina's café on average 1.5 cups per month got broken. There was no month with more than 2 broken cups, but May and August were the only months with no broken cup at all. In how many months did exactly 2 cups get broken?

(**A**) 4　　　(**B**) 5　　　(**C**) 6　　　(**D**) 7　　　(**E**) 8

C3 Ivor writes down the results of the quarter-finals, the semi-finals and the final of a knock-out tournament. The results are (not necessarily in this order): Glen beat Antony, Carl beat Bart, Damien beat Henry, Carl beat Glen, Eric beat Fred, Damien beat Carl and Damien beat Eric. Which pair played in the final?

(**A**) Carl and Bart　　　　　(**B**) Damien and Carl　　　　　(**C**) Eric and Fred
(**D**) Damien and Eric　　　　(**E**) Carl and Glen

C4 Inside a square of area $36\,\text{cm}^2$, there are shaded regions as shown. The total shaded area is $27\,\text{cm}^2$ (*diagram not to scale*). What is the sum $p + q + r + s$ of the lengths of the four bold line segments?
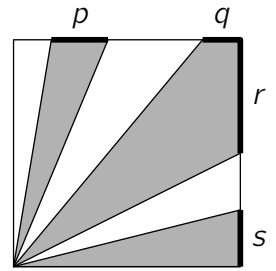
(**A**) 4 cm   (**B**) 6 cm   (**C**) 8 cm   (**D**) 9 cm   (**E**) 10 cm

C5 Theo's watch is 10 minutes slow, but he believes it is 5 minutes fast. Galina's watch is 5 minutes fast, but she believes it is 10 minutes slow. At the same moment, each of them looks at their own watch. Theo thinks it is 12:00. What time does Galina think it is?

(**A**) 11:30   (**B**) 11:45   (**C**) 12:00   (**D**) 12:30   (**E**) 12:45

C6 Silvio has a computer program that sorts numbers by size. In the four sums shown on the right, x, y and z are three different rational numbers. The four sums are already sorted. Where does the sum $x + y + z$ belong?

1.	$z + z + y$
2.	$x + x + y$
3.	$y + y + z$
4.	$y + y + x$

(**A**) above the 1st sum   (**B**) between the 1st and the 2nd sum
(**C**) between the 2nd and the 3rd sum   (**D**) between the 3rd and the 4th sum
(**E**) behind the 4th sum

C7 The diagram shows a pentagon $ABCDE$. The lengths of its sides are given in the diagram. Sepideh draws five circles with centres A, B, C, D, E such that the two circles around neighbouring vertices touch in a point on the corresponding side. Which point is the centre of the largest circle that Sepideh draws?
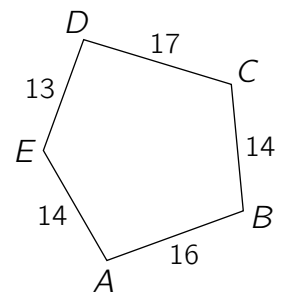
(**A**) A (**B**) B (**C**) C (**D**) D (**E**) E

C8 Several different positive integers are written on a blackboard. The product of the smallest two of them is 16. The product of the largest two of them is 225. What is the sum of all the integers written on the blackboard?
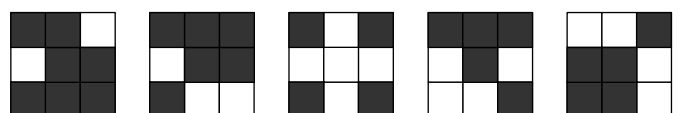
(**A**) 38   (**B**) 42   (**C**) 44   (**D**) 58   (**E**) 59

C9 Katie writes a different positive integer on the top face of each of the 14 cubes in the pyramid shown. The sum of the 9 integers written on the cubes in the bottom layer is equal to 50. The integer written on each cube in the middle and top layers of the pyramid is equal to the sum of the integers on the four cubes underneath it. What is the greatest possible integer that Katie can write on the top cube?
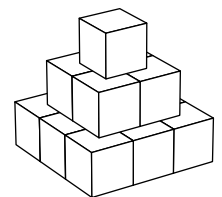
(**A**) 80   (**B**) 98   (**C**) 104   (**D**) 110   (**E**) 118

C10 A $3 \times 3 \times 3$ cube is built from 27 small cubes, 15 black ones and 12 white ones. Five faces of the large cube are shown on the right. Which of the following is the sixth face of the large cube?

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