

## Year 7 and 8 (ENGLISH VERSION)

Thursday, 18th March 2021

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** Which of the following symbols for signs of the Zodiac has an axis of symmetry?

-   
**(A)** Scorpio

  
**(B)** Leo

  
**(C)** Sagittarius

  
**(D)** Cancer

  
**(E)** Capricorn

**A2** Benedikt looks at his weather app and notices that the expected maximum temperature is falling day by day over the next three days. What could Benedikt's weather app show?

- |     |      |     |
|-----|------|-----|
|     |      |     |
| 3°C | -1°C | 1°C |
| Fri | Sat  | Sun |

**(A)**

4°C	1°C	3°C
Fri	Sat	Sun

**(B)**

0°C	-2°C	3°C
Fri	Sat	Sun

**(C)**

2°C	-1°C	-3°C
Fri	Sat	Sun

**(D)**

-3°C	1°C	0°C
Fri	Sat	Sun

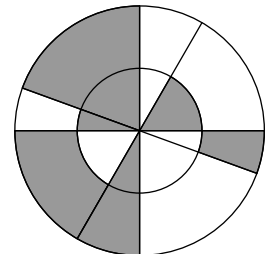
**(E)**

**A3**  $\frac{20 \times 21}{2 + 0 + 2 + 1} =$

- (A)** 42      **(B)** 56      **(C)** 64      **(D)** 80      **(E)** 84

**A4** Two circles with the same centre are divided by four straight lines through the centre. What percentage of the area is grey?

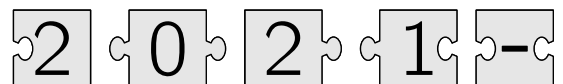
- (A)** 25 %      **(B)** 40 %      **(C)** 50 %      **(D)** 60 %      **(E)** 75 %



**A5** Mona and Remo want to give their mother a bouquet of roses. They want to buy 15 roses, 4 times as many yellow as red. How many red roses must be tied in the bouquet?

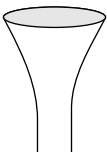
- (A)** 2      **(B)** 3      **(C)** 4      **(D)** 5      **(E)** 6


**A6** When put together correctly, the five pieces of the puzzle form a rectangle with a calculation. What is the result of the calculation?




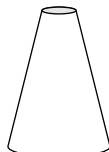
- (A)** -100      **(B)** -8      **(C)** -1      **(D)** 199      **(E)** 208


**A7** Each of the five vases has the same height and can be filled to the brim with 1 litre of water. Vivien fills each vase with half a litre of water. In which vase will the water reach the highest level?

-   
**(A)**

  
**(B)**

  
**(C)**

  
**(D)**

  
**(E)**

- A8** A bicycle lock has four number wheels with the digits from 0 to 9. To get the right combination, each of the number wheels in the setting shown must be turned by  $180^\circ$ . What does the correct combination look like?



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

- A9** A diving competition was held for the penguins in the Southern Ocean. Benno dived 5 s longer than Artur, but 10 s shorter than Curt. Dieter dived 10 s longer than Curt, but 5 s shorter than Egon. Which of the following statements is true?

- (A) Artur and Egon dived for the same amount of time.  
 (B) Artur dived 10 s longer than Egon. (C) Artur dived 10 s shorter than Egon.  
 (D) Artur dived 30 s longer than Egon. (E) Artur dived 30 s shorter than Egon.

- A10** The letters M, E, D and O each stand for the same digit in both calculations. What is the result of the second calculation?

- (A) 14737 (B) 13837 (C) 14747 (D) 23737 (E) 137137

$$\begin{array}{r} \text{M E} \\ + \text{D O} \\ \hline 1\ 3\ 7 \end{array} \qquad \begin{array}{r} \text{M O D E} \\ + \text{D E M O} \\ \hline \end{array}$$

#### 4 point problems

- B1** A rectangular bar of chocolate consists of square pieces of the same size. Nico breaks off a strip of 5 pieces. Then Janina breaks off two strips of the rest with a total of 6 pieces. How many pieces are left?

- (A) 4 (B) 6 (C) 8 (D) 9 (E) 12

- B2** Five friends collect three kinds of astro-pins: planets , moons and stars . Half of Kathryn's pins are planets. Chris has more moons than stars. Philippa has no moons. James has an even number of pins. Jean-Luc has more stars than planets. The following pictures show the pins of the five friends. Which pins belong to Jean-Luc?

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

- B3** If two digits of the number 337337 are deleted, the remaining four digits (in the same order) form a four-digit number. How many different four-digit numbers can be obtained in this way?

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

- B4** Ricarda is building a fence from 25 wooden boards, each 20 cm long. The total length of the fence is 4.40 m. She arranges these planks so that there is the same overlap between each two adjacent planks.

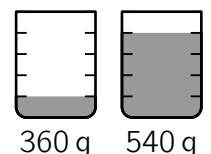


What is the length of the overlap between each two adjacent planks?

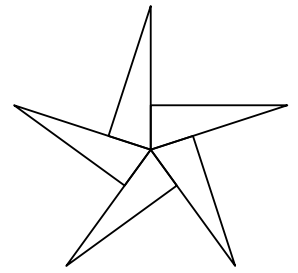
- (A) 2.5 cm (B) 2.8 cm (C) 3 cm (D) 4.7 cm (E) 5 cm

- B5** A glass filled one-fifth with water weighs 360 g. If the same glass is filled four-fifths with water, it weighs 540 g. What is the weight of the empty glass?

- (A) 100 g (B) 120 g (C) 180 g (D) 250 g (E) 300 g



**B6** Five identical right-angled triangles can be arranged so that the larger acute angles adjoin in the centre and form the star shown. It is also possible to arrange a larger number of these triangles so that the smaller acute angles adjoin in the center. How many triangles are needed for this?

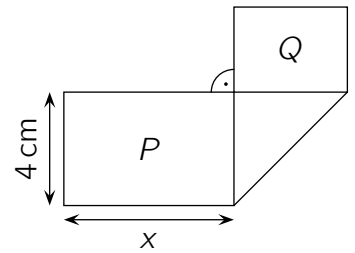


- (A) 10      (B) 12      (C) 18      (D) 20      (E) 24

**B7** There are 20 questions in the Koala competition. For each question answered correctly, 7 points are awarded and for each question answered incorrectly  $-4$  points are awarded. There are 0 points for unanswered questions. Ava has scored exactly 100 points. How many questions did she leave unanswered?

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

**B8** A rectangular strip of paper, 13 cm long and 4 cm wide, was folded once (see picture). The resulting rectangles have the areas  $P$  and  $Q$ , where  $P$  is twice as large as  $Q$ . What is the size of  $x$ ?

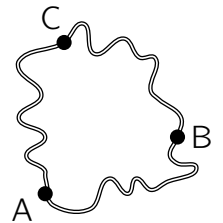


- (A) 5 cm      (B) 5.5 cm      (C) 6 cm      (D) 6.5 cm      (E) 7 cm

**B9** There are 25 professionals and 51 amateurs in our fishing club. For a competition they were divided into pairs. When an amateur and a professional fished together, both anglers were unhappy. In all other pairs, both anglers were happy. After the competition, 58 anglers said they were happy with their partner, the rest were not. How many pairs of two amateurs were there?

- (A) 15      (B) 17      (C) 19      (D) 21      (E) 24

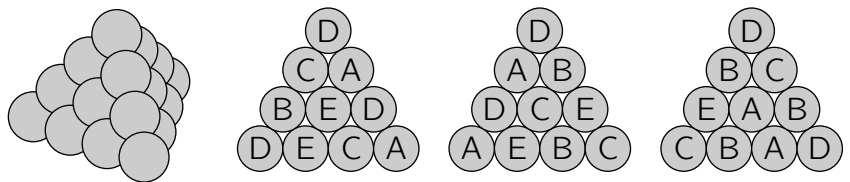
**B10** Three villages are connected by footpaths. The direct route from A to C is 1 km shorter than the detour via B. The direct route from A to B is 5 km shorter than the detour via C. The direct route from B to C is 7 km shorter than the detour via A. What is the length of the shortest of the three direct routes between the villages?



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

**5 point problems**

**C1** In the chocolate shop, a three-sided pyramid is made of 20 round truffles, 4 of each of the 5 varieties. The picture shows for each side of the pyramid which variety the truffles belong to. From which variety is the truffle in the middle of the base that is not visible from the outside?



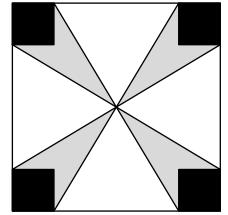
- (A) A      (B) B      (C) C      (D) D      (E) E

**C2** Franziska and Sergej divide 22 apples and 11 pears so that Franziska gets exactly twice as many pieces of fruit as Sergej. Which of the following statements is definitely correct?

- (A) Franziska gets at least one pear.  
 (B) Franziska gets twice as many apples as pears.  
 (C) Franziska gets twice as many apples as Sergej.  
 (D) Franziska gets as many apples as Sergej gets pears.  
 (E) Franziska gets as many pears as Sergej gets apples.

- C3** The area of the large square in the picture is  $25 \text{ cm}^2$ . The area of each the small black squares is  $1 \text{ cm}^2$ . What is the total area of the four grey parts?

(A)  $6 \text{ cm}^2$       (B)  $6.5 \text{ cm}^2$       (C)  $7 \text{ cm}^2$       (D)  $7.5 \text{ cm}^2$       (E)  $8 \text{ cm}^2$



- C4** If we multiply the 6-digit number  $1ABCDE$  by 3, the result is the 6-digit number  $ABCDE1$ . What is the value of  $A + B + C + D + E$ ?

(A) 23      (B) 26      (C) 29      (D) 32      (E) 35

- C5** A box contains only green, red, black and blue chips. If I take 27 chips out of the box, I have at least one green chip. If I take 25 chips out of the box, I have at least one red chip. If I take 22 chips out of the box, I have at least one black chip. If I take 17 chips out of the box, I have at least one blue chip. What is the maximum number of chips in the box?

(A) 27      (B) 29      (C) 51      (D) 87      (E) 91

- C6** The surface of the football shown consists of black pentagons and white hexagons arranged regularly. There are 12 pentagons in total. How many hexagons are there?

(A) 10      (B) 12      (C) 18      (D) 20      (E) 24

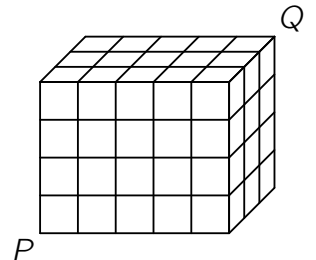


- C7** In a factory, eggs are painted with the colours red, blue and yellow. Among 3 successive eggs, each colour should appear once. During quality control it is noted: "Egg 2 is yellow, egg 20 is yellow, egg 202 is red, egg 1002 is blue and egg 2021 is blue." The boss immediately notices that exactly one of these five eggs is wrongly coloured. What number does the wrongly coloured egg have?

(A) 2      (B) 20      (C) 202      (D) 1002      (E) 2021

- C8** A  $3 \times 4 \times 5$  cuboid consists of 60 identical small wooden cubes. Woodworm Willy eats his way along the diagonal from  $P$  to  $Q$ . This diagonal does not intersect any edge of the small cubes inside the cuboid. Through how many small cubes does the path of woodworm Willy run?

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



- C9** In a tournament, each of the six teams plays against each other team exactly once. On each match day, three matches take place simultaneously. A TV station will broadcast live one match on each match day (see table). On which match day will D play against F?

1	2	3	4	5
C-D	A-E	E-F	A-B	A-C

(A) on the 1st      (B) on the 2nd      (C) on the 3rd      (D) on the 4th      (E) on the 5th

- C10** The sides of the quadrilateral shown were divided into thirds, and one of the division points per side was connected to a point inside as shown. This way the quadrilateral was divided into four smaller quadrilaterals. The numbers inside the quadrilaterals indicate the area of the respective quadrilateral. What is the area of the grey quadrilateral?

(A)  $11 \text{ cm}^2$       (B)  $12 \text{ cm}^2$       (C)  $13 \text{ cm}^2$       (D)  $14 \text{ cm}^2$       (E)  $15 \text{ cm}^2$

