Junior 1

MC:	+12 for the correct answer,	−3 for a wrong answer,	0 for unanswered
T/F:	+3 for each correct answer,	−3 for each wrong answer,	0 for unanswered
NUM:	+12 for the correct answer,	0 for wrong or unanswered	

Question 1 (MC):

Which of the following computations yields the largest result?

A: $202 + 2$ B: $20 \times 2 \times 2$ C: 20×22 D: $20 + 22$ E: 202×2

Question 2 (INT):

What is the smallest square number whose digits are all prime numbers?
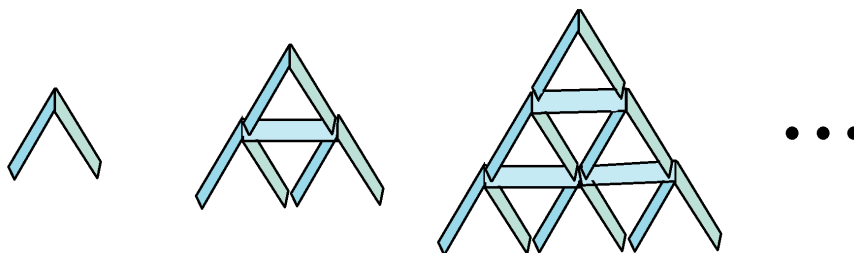
Question 3 (MC):

Two of the numbers
$$-9, -8, -5, 0, 3, 6, 7$$
are multiplied together. What is the smallest possible result we can get?

A: -72 B: -63 C: -15 D: 0 E: 9

Question 4 (INT):

Matthew wants to build a house of cards. In the first step, it puts two cards together to get a house of height 1. In every subsequent step, it adds some cards to increase the height by one, as shown in the picture. How many cards does it need for a house of height 4?

Question 5 (MC):

Which of the following numbers is the product of two distinct prime numbers?

A: 29   B: 30   C: 31   D: 32   E: 33

Question 6 (INT):

Raphael's 4 cats can catch 8 mice in an hour. How many cats does he need to catch 36 mice in a quarter of an hour?

Question 7 (MC):

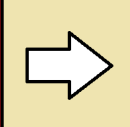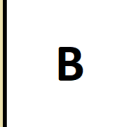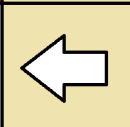Which one of the following numbers is not the sum of two perfect squares?
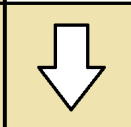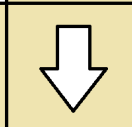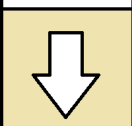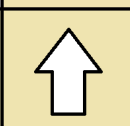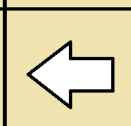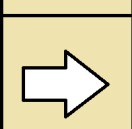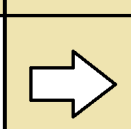
A: 10   B: 20   C: 30   D: 40   E: 50
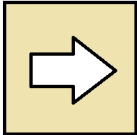
Question 8 (INT):

What is the third-largest number that contains each of the digits $1, 2, 3, 4, 5$ exactly once?

Question 9 (MTF):

A mouse starts at the top left red square of this board, always goes in the direction of the arrows and ends up on the bottom right tile with a green star. Which of the unknown squares could have an arrow pointing rightwards?

A: A
B: B
C: C
D: D

Question 10 (MTF):

Laura takes three different positive integers strictly greater than 1 and multiplies them together. Which of the following could be the product?

A: 30   B: 32   C: 64   D: 77

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Question 11 (MC):

Arnaud, Luna and Rada have invented a system in which every letter in the alphabet has a whole number value and every word is worth the sum of its letters. ARNAUD is worth 15 and LUNA is worth 17. Given that A is worth 1 and L is worth 10, how much is RADA worth?

A: 5 B: 6 C: 7 D: 8 E: 9

Question 12 (INT):

What is the minimal number of cookies that can be evenly split (so that everyone receives an equal whole number of cookies) among 3, 4, 5 or 6 people?

Question 13 (MC):

Viviane wants to paint the square tiles of her bathroom. She already coloured four of the tiles blue and would like to proceed painting the remaining tiles with other colours, such that every colour is used for exactly four tiles and these four tiles make the same shape as the blue tiles (the shape may be rotated and mirrored). What is the smallest possible number of tiles that have to remain uncoloured?
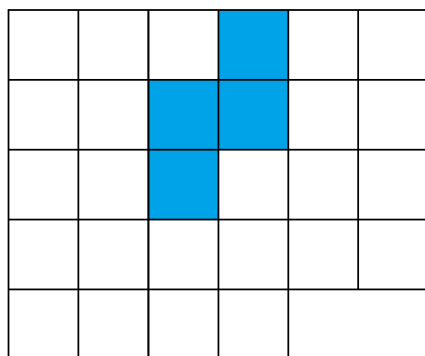

A: 0
B: 2
C: 4
D: 6
E: 8

Question 14 (INT):

Jana thinks of a five digit number and Tim wants to guess it. The first time he guesses 20489 and Jana tells him that exactly two digits are correct and in their right place. The next time he guesses 15673 and Jana says that exactly three digits are correct and in their right place. Given this information, what is the largest possible number that Jana could have thought of?

Question 15 (MC):

Iman draws a triangle on a piece of paper. She then measures the side lengths in centimeters and writes down the three numbers. One of the following triples she could not possibly obtain. Which one is it?

A: $1, 2, 2$ B: $1, 1, 3$ C: $2, 3, 3$ D: $3, 4, 5$ E: $2, 4, 5$

Question 16 (INT):

1000 inhabitants of Moutier filled out a survey. 625 said that they like to drink coffee. 462 said that they like to drink tea. 333 said they don't like either of the two.
How many of them like to drink both coffee and tea?

Question 17 (MC):

Quirin writes a single-digit number. Lia sees him and smiles. He then adds a second digit to the left of it, and Lia says "Wow! That's your previous number squared." He then adds a third digit to the left of it, and Lia exclaims "Amazing! That's your previous number squared again!". What number did Quirin write down originally?

A: 4   B: 5   C: 6   D: 7   E: 8

Question 18 (INT):

For his art project, Ivan subdivided a 30×60 canvas into parallel rectangles and painted a black triangle in each rectangle, as shown in the image. Given that the leftmost side of each triangle has length 15, what is the area of the canvas that remained white?
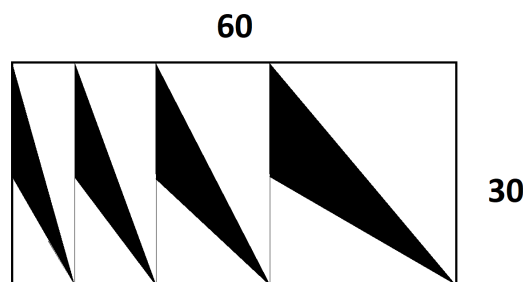
Question 19 (MTF):

Let a and b be positive integers. Which of the following statements are possible?

A: $a + b = 100$ and $a - b = 4$

B: $a \times b = 100$ and $a - b = 4$

C: $a + b = 100$ and $a/b = 4$

D: $a \times b = 100$ and $a/b = 4$

Question 20 (MTF):

There are four doors in a row, labelled A, B, C and D in this order. A door may lead to a room full of strawberries, but otherwise it leads to an empty room. Through his scientific investigations, Roger figured out four facts about the doors:

- At least one of the doors A, B and C leads to strawberries.
- There are two doors next to each other that both don't lead to strawberries.
- If A leads to strawberries, C leads to strawberries as well.
- B and D lead to the same room.

Behind which doors will Roger certainly find strawberries?

A: A   B: B   C: C   D: D

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Question 21 (MC):

Anaëlle, Bibin, Cyril, David and Ema play a ping pong tournament. Two players play exactly once against each other. If Anaëlle and Bibin both won three times, what is the biggest possible number of wins that David and Ema can have combined?

A: 3   B: 4   C: 5   D: 6   E: 7

Question 22 (INT):

Each second, Barbara's broken clock randomly either jumps forward by 2 seconds or backwards by 1 second. If the clock initially shows the correct time, how many possible times could it show 1 minute later?

Question 23 (MC):

Viola, Alain, Ueli, Simonetta and Guy sit on a bench. Alain sits in the middle. How many seating arrangements are there so that Viola sits next to Simonetta?

A: 2   B: 4   C: 8   D: 12   E: 16

Question 24 (INT):

On a blackboard there are 10 different positive integers. Exactly six of them are divisible by 9 and exactly seven of them are divisible by 7. How big must the biggest of those numbers be at least?

Question 25 (MC):

Beat proposed some alternative Logos for the Swiss Mathematical Olympiad. One of them has a bigger coloured area than the rest. Which one is it?
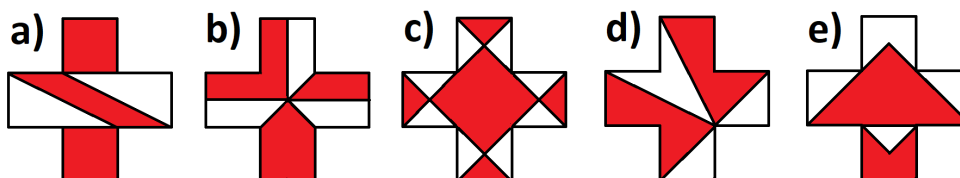
A: a)   B: b)   C: c)   D: d)   E: e)

Question 26 (INT):

On a blackboard there are multiple positive integers and no number appears twice. Romina computes the product of the two smallest numbers and gets 49. She then computes the product of the two largest numbers and gets 2550. What is the sum of all the numbers on the blackboard?

Question 27 (MC):

David gives Julia a riddle about his birthday. He says: "If I add the number of the day and the number of the month, I get a third power. And if I add 1 to the number of the day, I get exactly three times the number of the month". When is David's birthday?

A: winter   B: spring   C: summer   D: autumn   E: not enough information

Question 28 (INT):

There are 5 light bulbs arranged in a circle. Touching one of them changes its and both its neighbours states, from off to on and vice versa. If all bulbs are initially off, what is the minimal number of times you have to touch a bulb to end up with all bulbs on?

Question 29 (MTF):

Let a, b and c be distinct positive integers. Which of the following are possible?

A: $a + b$, $b + c$ and $c + a$ are all prime numbers.

B: $a \times b$, $b \times c$ and $c \times a$ are all square numbers.

C: a/b, b/c and c/a are all integers.

D: $|a - b|$, $|b - c|$ and $|c - a|$ are all equal.

Question 30 (MTF):

Yann the goalkeeper is playing a football match every day from Monday to Friday. Yann made at least 10 saves every match and on each day, he made a different number of saves. On Monday, Yann made two more saves than on Tuesday and Wednesday combined. On Thursday, Yann made twice as many saves as on Monday and on Friday, Yann made 23 saves. Which of the following statements have to be true?

A: On Monday, Yann made more saves than on Friday.

B: Yann made the most saves on Thursday.

C: Yann made more than 110 saves during the whole week.

D: Yann made an odd number of saves in total.