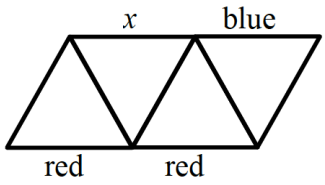
Math Competition - Logic and Reasoning Puzzles

↪ 1) Each of the 9 line segments in the figure is to be coloured either blue, green or red. The three sides of each triangle are to have three different colours. Three of the line segments have already been coloured, as shown. What colour can the line segment marked x have? (3 Points)

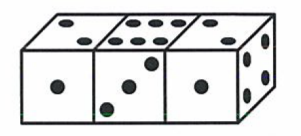


A) only blue B) only green C) only red D) Either blue, green or red E) such colouring is not possible

↪ 2) An old book was missing several consecutive pages. The last number before the missing page was 28 and the first page number after the missing page was 75. How many pages were missing from the old book? (3 Points)

A) 51 B) 23 C) 22 D) 21 E) 50

↪ 3) The figure below shows three identical dice that have been glued together. The sum of the number of dots on opposite faces of every die is always 7. What is the sum of the number of dots on the faces that have been glued together? (3 Points)



A) 12 B) 13 C) 14 D) 15 E) 16

↪ 4) In a bag there are 3 green apples, 5 yellow apples, 7 green pears and 2 yellow pears. Simon randomly is taking fruits out of the bag one by one. Hoe many fruits must he take out in order to be certain that he has at least one apple and one pear of the same colour? (3 Points)

A) 9 B) 10 C) 11 D) 12 E) 13

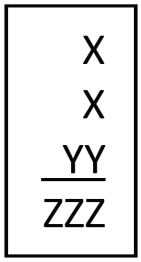
↪ 5) How many five digit numbers in the form 1_82_ are there that are divisible by 12 and all of whose digits are different? (3 Points)

A) 8 B) 6 C) 10 D) 4 E) 2

↪ 6) Vivien and Mike were given some apples and pears by their grandmother. They had 25 pieces of fruit in their basket together. On the way home Vivien ate 1 apple and 3 pears, and Mike ate 3 apples and 2 pears. At home they found out that they had brought home the same number of pears as apples. How many pears were they given by their grandmother? (3 Points)

A) 12 B) 13 C) 16 D) 20 E) 21

↪ 7) The figure shoes an addition where the numbers are coded by letters. Equal letters represent equal digits, and different letters represent different digits. Which digit does the letter x represent? (3 Points)



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

↪ 8) Lucy and her mother werer both born in January. On March 29, 2015, Lucy adds the year of her birth, the year of her mother's birth, her age, and her mother's age. What is the result? (3 Points)

A) 4028 B) 4029 C) 4030 D) 4031 E) 4032

↪ 9) Kangarna discovered someone had eaten her jar of honey. She suspected one of her four neighbors: the antelope Anty, the bear Beary, the fox Foxy or the lion Leo. Anty stated that Beary ate the honey. Beary stated that it as Leo. Foxy and Leo denied eating the honey. Who ate the honey if only one of them was telling the truth? (5 Points)

A) Foxy B) Beary C) Anty D) Leo E) Not enough information

↪ 10) Aron, Bern and Carl always lie. Each of them owns one stone, either a red stone or a green stone.
Arron says: "My stone is the same colour as Bern's stone."
Bern says: "My stone is the same colour as Carl's stone."
Carl says: "Exactly two of us own red stones."
Which of the following statements is true? (5 Points)

A) Aron's stone is green
B) Bern's stone is green
C) Carl's stone is red
D) Aron's stone and Carl's stone have different colors
E) None of A, B, C or D is true

↪ 11) The number 100 is multiplied either by 2 or 3, then the result is increased either by 1 or by 2, and then the new result is divided either by 3 or by 4. If the final result is a natural number, what is the final result? (5 Points)

A) 50 B) 51 C) 67 D) 68 E) More than one possible result

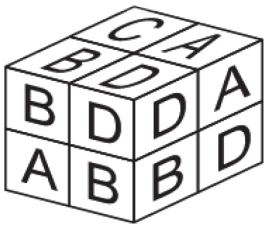
↪ 12) A rubber ball falls vertically from the roof of a house, at a height of 10m. After each impact on the ground it bounces back up to $\frac{4}{5}$ of its previous height. How many times will the ball appear in front of a rectangular window whose bottom edge is at a height of 5 m and whose top edge is at a height of 6m? (5 Points)

A) 3 B) 4 C) 5 D) 6 E) 8

↪ 13) A positive integer has three digits. The product of the digits is 135. What is the sum of the digits? (5 Points)

A) 12 B) 15 C) 16 D) 17 E) 18

↪ 14) Lisa has 8 dice with the letters A, B, C, and D, teh same letter on all sides of each die. She builds a block with them. Two adjacent dice always have different letters. What letter is on the die that cannot be seen on the picture (in the far bottom corner of the block)? (5 Points)

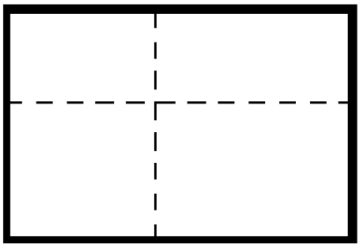


A) A B) B C) C D) D E) E

↪ 15) Fifteen numbers are arranged in a row so that the sum of any four consecutive numbers is 12. Three numbers are already given in the respective cell of a row. What number must be in the cell marked with a smile? (5 Points)

A) 1 B) 2 C) 4 D) 5 E) 6

↪ 16) Rectangle ABCD is cut into four smaller rectangles, as shown in the figure. The four smaller rectangles have the following properties: (a) the perimeters of three of them are 11, 16, and 19; (b) the perimeter of the fourth is neither the biggest nor the smallest of the four. What is the perimeter of the original rectangle ABCD? (5 Points)



A) 30 B) 40 C) 38 D) 32 E) 28

↪ 17) The points A, B, C, D, E and F lie on a straight line in that order. We know that AF=35, AC=12, BD=11,CE=12,DF=16. What is the distance BE? (5 Points)

A) 13 B) 14 C) 15 D) 16 E) 17

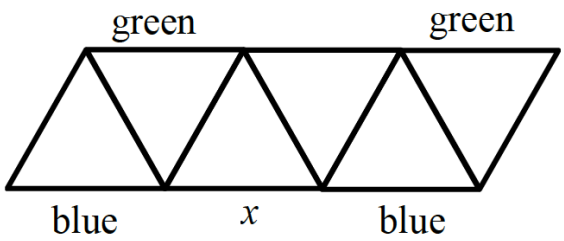
↪ 18) Consider all natural numbers m and n, both different than 0, that satisfy the condition $75 \times m = n^3$. The smallest possible value for the sum $m + n$ is: (7 Points)

A) 15 B) 30 C) 50 D) 60 E) 5700

↪ 19) A magical kingdom is inhabited by dragons with six, seven, and eight heads. Those with seven heads always lie, and those with six or eight heads will. always tell the truth. One day four dragons from the kingdom met. The blue dragon said, "Together we have 28 heads," the green dragon said, "Together we have 27 heads," the yellow dragon said, "Together we have 26 heads," and the red dragon said, "Together we have 25 heads." What colour was the dragon that did not lie? (7 Points)

A) red B) blue C) green D) yellow E) It is impossible to determine

↪ 20) The diagram indicates the colours of some unit segments of a pattern. Luis wants to colour each remaining unit segment in the pattern either red or blue or green. Each triangle must have one side of every colour. What colour can he use for the segment marked x? (7 Points)



A) only green B) only red C) only blue D) either red or blue E) The task is impossible

↪ 21) Ann and Bill are participating in a math reality show. Each of them is secretly given one positive integer. They know that their numbers are two consecutive numbers (for instance, Ann's number is 7 , Bill's number is 6). They know only their own number, and they have to guess the number of the other person. Ann and Bill have the following discussion: (7 Points)

- Ann to Bill: I do not know your number
- Bill to Ann: I do not know your number
- Ann to Bill: Now I know your number! It is a factor of 20!

What is Ann's number?

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

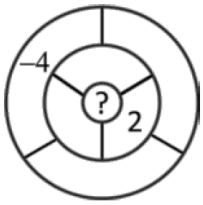
↪ 22) What is the greatest number n, which, when divided by 7, has a remainder that is equal to the quotient? (7 Points)

A) 7 B) 8 C) 48 D) 56 E) 77

↪ 23) Four points lie on a line. The distances between them are, in increasing order: 2,3,k, 11,12,14. What is the value of k? (7 Points)

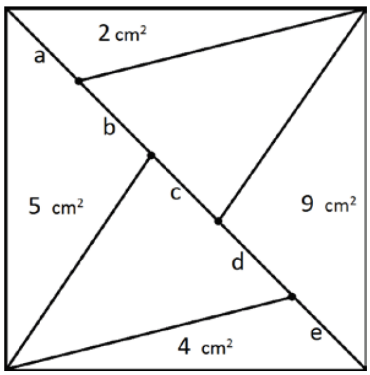
A) 5 B) 6 C) 7 D) 8 E) 9

↪ 24) Ria wants to write a number in each of the seven bounded regions in the diagram. Two regions are neighbours if they share part of their boundary. The number in each region is to be the sum of the numbers in all its neighbours. Ria has already written in two of the numbers, as shown. What number must she write in the central region? (7 Points)



A) 1 B) -2 C) 6 D) -4 E) 0

↪ 25) A square with area 30 cm^2 is divided in two by a diagonal and then into two triangles as shown. The areas of some of these traingles is given in the figure. (7 Points)



Which diagonal is the longest?

A) a B) b C) c D) d E) e

↪ 26) In trapezoid $PQRS$, the sides PQ and SR are parallel. Angle RSP is 120 degrees and $RS = SP = \frac{1}{3}PQ$. In degrees, what is the size of angle PQR? (7 Points)

A) 15 B) 22.5 C) 25 D) 30 E) 45