Mathlete Training Centre
Round 2 RIPMWC open

2008 RIPMWC open round 2

1.

Tour groups A and B were taken to Sentosa by buses. Each bus can seat 36 people. After occupying all the seats in some buses, 11 members from group A had to combine with the remaining members from group B to take up all the seats in another bus. When they reached Sentosa, each member of tour group A took a picture with every member of group B. If each roll of film can take 36 pictures, how many more pictures can the last roll of film take after all have taken the photograph?

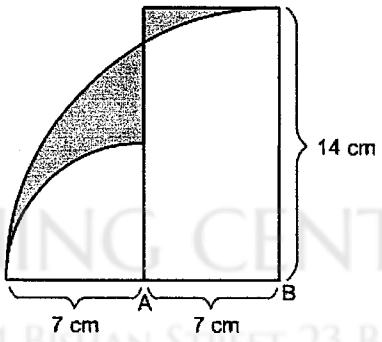
2.

Five pupils took a mathematics test and all had obtained different test scores. If exactly three of them were given the wrong test scores, how many possible ways could this have happened?

3.

The diagram shows two quadrants with A and B as the centres respectively, find the difference of the areas of the two shaded regions.

(Take π as $\frac{22}{7}$)



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4.

Mr Khoo hoped to earn 50% profit for a batch of goods. He managed to sell 70% of his goods. For the remaining goods, he sold it at a discount to the marked price. If the total profit is 82% of the planned profit, what is the percentage discount?

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5.

Find the value of

$$\left(\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{60}\right)+\left(\frac{2}{3}+\frac{2}{4}+\ldots+\frac{2}{60}\right)+\left(\frac{3}{4}+\frac{3}{5}+\ldots+\frac{3}{60}\right)+\ldots+\left(\frac{58}{59}+\frac{59}{60}\right)+\left(\frac{59}{60}\right)$$

6.

If two digits of a 3-digit number are identical, how many of such 3-digit numbers are there?

7.

In a bag of marbles, the number of blue marbles is $\frac{3}{4}$ of the number of green marbles.

91 marbles are removed from the bag, of which the number of blue marbles removed is $\frac{5}{8}$ times the number of green marbles removed. The number of remaining blue marbles is $1\frac{1}{3}$ times the number of remaining green marbles. Find the total number of blue and green marbles that were in the bag originally.

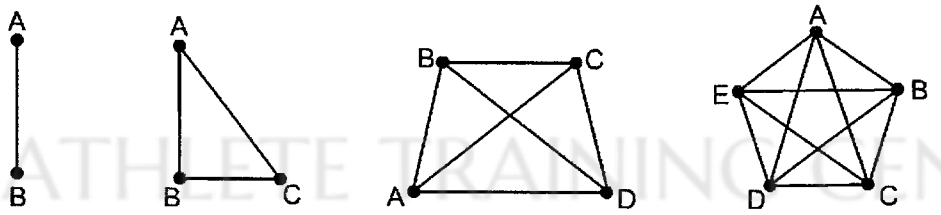
8.

What is the value of $\frac{1^2+2^2}{1\times 2} + \frac{2^2+3^2}{2\times 3} + \frac{3^2+4^2}{3\times 4} + \ldots + \frac{2007^2+2008^2}{2007\times 2008}$

when it is rounded to the nearest whole number?

9.

The teachers in a staffroom are to be linked by direct telephone lines. The following diagram shows the number of telephone lines needed for the number of teachers involved. If there are 190 telephone lines, how many teachers are there?



2 teachers 1 line | 3 teachers 3 lines | 4 teachers 6 lines | 5 teachers 10 lines

10.

The grass on a farm is growing at a constant rate. 27 oxen can finish eating the grass on the farm in 6 weeks. 23 oxen can finish eating the grass on the farm in 9 weeks. How many weeks it will take for 21 oxen to finish eating the grass on the farm?

11. A staircase consists of 9 steps. A boy walks from the bottom to the top, each time climbing 1, 2 or 3 steps. How many different ways can he climb the staircase?

12. How many zeros are there at the end of the product $4 \times 8 \times 12 \times 16 \times \ldots \times 2004 \times 2008$?

13.

In the diagram, a goat is tied by a rope of length 7 m to the vertex of a regular pentagonal building. The length of side of the building is 3 m. The building is surrounded by grass. Find the area of grass (in terms of π) that the goat can reach.

14.

A triangle can be formed with side lengths 3, 5 and 7. It is impossible, however, to construct a triangle with side lengths 5, 6 and 11. Esther has nine sticks, each having lengths which are whole numbers. She observes that she cannot form a triangle by using any three sticks as side lengths. What is the shortest possible length of the longest of the nine sticks?

15. The diagram shows a square ABCD. E and F are the midpoints of side AB and BC respectively. BD and FD intersect the line CE at G and H respectively. Given that the area of ABCD is 120 cm², what is the area of BGHF?