

Mathlete Training Centre

1. Find the value of $\frac{1}{420} + \frac{1}{462} + \frac{1}{506} + \frac{1}{552}$.

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2. There are 6 steps in a staircase. Only 1 or 2 steps can be climbed up in each footstep. How many ways are there to climb up this staircase?

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3. It takes Hua 42 minutes to complete a job and it takes Xia 56 minutes to complete the same job. How many minutes does it take for the two of them to work together to complete the job?

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4. A bus takes 20 hours to go from Place A to Place B. A private car takes 24 hours to go from Place B to Place A. Two cars leave from Places A and B respectively in opposite directions. After 11 hours, the distance between the two cars is 10 kilometres. Then, how many kilometres are there between Places A and B?

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5. There are 24 grams of salt water with a concentration of 20% and 40 grams of salt water with a concentration of 12%. What is the concentration of the salt water obtained after mixing them?

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6. There are 123 students in the sixth grade, $\frac{3}{4}$ of the number of boys is equal to $\frac{5}{7}$ of the number of girls. How many boys are there in the sixth grade?

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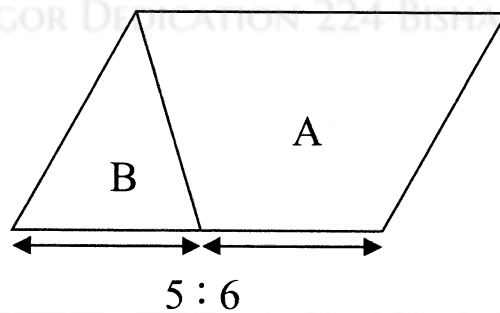
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7. A store sells a batch of goods at a 20% discount and still makes a 20% profit. What is the expected profit rate when pricing this batch of goods at the marked price?

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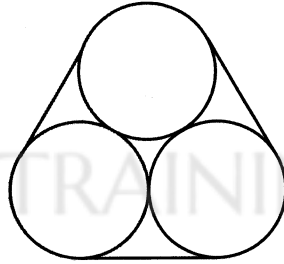
8. Referring to the attached figure, the parallelogram is divided into two parts, A and B, and the base of the parallelogram is divided into two sections. If the area of A is 72 square centimetres greater than the area of B, what is the area of the entire parallelogram in square centimetres?



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9. Referring to the attached figure, three cylindrical pipes with a diameter of 20 centimetres are now bound with a piece of adhesive tape, enclosing the boundary once. How long is this tape in centimetres? (Let $\pi = 3.14$)



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10. Find the value of $2024 \times \frac{107}{212} + 2026 \times \frac{105}{212}$.

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11. If $\frac{2024 \times 39 - 33}{164 + 505 \times 208} = \frac{a}{120}$, find the value of a.

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12. It is known that the sum of all page numbers in a book is 1431, then how many pages does this book have?

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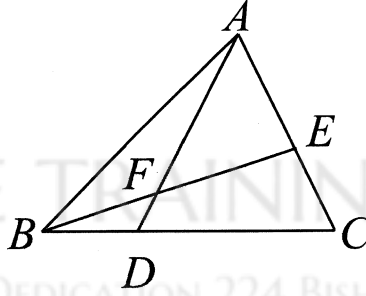
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13. If a city wall and a 40-meter-long fence are used to form a rectangular sheepfold, and the length and width of the rectangle are in integral metres, then what is the maximum area of the sheepfold in square metres?

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14. Referring to the attached figure, the areas of triangle BDF and quadrilateral CDFE are 40 and 224 square centimetres respectively. $2BD=DC$ and $2AE=3EC$. What is the area of triangle ABF in square centimetres?



15. There was a cube water tank filled with water. The inner edge was 12 centimetres long and the water was 3 centimetres high. Now, a cube iron block is put into the water tank. The new water height is 4 centimetres. It is known that the iron block is not completely submerged. What is the edge length of the iron block?

16. If n is an integer which is greater than 20 and $20 \times 21 \times 22 \times \dots \times n$ is a multiple of 2024, find the smallest possible value of n .

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17. A train drives across two bridges at the same speed. It takes 157 seconds to completely pass the first 2,024-meter-long bridge. It takes 227 seconds to completely pass the second bridge. If the speed of the train is 15 meters per second, what is the length of the second bridge in metres?

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18. The hour and minute hands on the clock face point in opposite directions at x minute(s) past 10. Given that x is not an integer, find the value of x .

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19. A piece of green grass grows at a constant rate every day. This tuft of green grass can feed 11 cows for 9 days or 7 cows for 18 days. If each cow eats the same amount of grass every day, what is the number of cows that this grassland can feed on for 12 days?

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20. A flagpole was inserted every 20 meters beside a road. Flagpoles were inserted at both ends with a total of 121 flagpoles. We have not prepared new flagpoles now, but we plan to insert a flagpole every 24 meters. At least how many flagpoles are needed to be moved?

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