

※ YOU CAN RECEIVE 1.5 POINTS EACH FOR PROBLEMS NUMBER 1 TO 30.

In problems 1-8, solve the problem into its simplest form as a proper fraction or mixed number. Then write the numerator of the fraction as your answer. (For example, if the answer is $3\frac{10}{6}$, make $4\frac{2}{3}$ and write the final answer as 2)

1. $2\frac{5}{7} + 4\frac{9}{14}$

2. $8\frac{9}{20} - 5\frac{7}{12}$

3. $2\frac{1}{10} \times 1\frac{1}{6}$

4. $0.84 \times 2\frac{2}{7}$

5. $3\frac{15}{16} \div 4\frac{2}{3}$

6. $2\frac{7}{9} \div 3\frac{3}{4} \times 1\frac{2}{5}$

$$7. 4\frac{4}{5} \div 1.44 - 1\frac{5}{6}$$

$$8. 5\frac{1}{8} - \left(15 - (5+7) \div \frac{8}{9}\right)$$

In problems 9-12, solve each question and write the decimal part as your answer. (For example, if the answer is 18.2 or 18.20, then write the final answer as 2. If the answer is 2.54 or 2.054, then write the final answer as 54.)

$$9. \begin{array}{r} 3.63 \\ \times \quad 4 \\ \hline \end{array}$$

$$10. \begin{array}{r} 3.8 \\ \times 7.2 \\ \hline \end{array}$$

$$11. \begin{array}{r} 14.7 \\ \times 3.6 \\ \hline \end{array}$$

$$12. \begin{array}{r} 3.35 \\ \times 0.62 \\ \hline \end{array}$$

In problems 13-17, calculate the quotient up to the hundredths place and write the remainder. Then, add the quotient and the remainder. Write the decimal part of this number as your answer. (For example, if the quotient is 2.56 and the remainder is 0.004, calculate $2.56 + 0.004 = 2.564$, and write the final answer as 564.)

13.

$$6 \overline{) 32.6}$$

14.

$$1.4 \overline{) 3.68}$$

15.

$$5.2 \overline{) 40.02}$$

16.

$$7.2 \overline{) 91.79}$$

17.

$$55.2 \overline{) 74.82}$$

In problems 18-22, solve each equation. If ~~it~~ x is a positive number, put 1 at the beginning of the number. However, if it x is a negative number, then put 2 at the beginning of the number to replace the negative sign for the answer. (For example, if the answer is 45, then write the final answer as 145, but if the answer is -3 , then write the final answer as 23.)

18. $(x \times 3) \div 6 = 12$

19. $(x - 1.9) + 6\frac{2}{5} = 3\frac{1}{2}$

22. $2\frac{1}{6}x - 4\frac{2}{3} = \frac{5}{6}x - 10$

20. $\left(x \times 1\frac{2}{5}\right) - 8.5 = 12\frac{1}{2}$

In 23-25, find the value of x .

23. $x : 5\frac{1}{3} = \frac{3}{8} : 1$

21. $\left(x \div 3\frac{3}{4}\right) \div 1.2 = 6$

24. $3\frac{3}{4} : x = 1\frac{1}{14} : 2$

25. $2\frac{1}{4} : 15 = 1\frac{1}{5} : x$

In problem 26, express the ratio in the simplest natural number form and then add all three numbers. (For example, if the ratio is $7:1:3$, then write as $7+1+3=11$.)

26. $4\frac{1}{2} : 2.4 : 6\frac{3}{5}$ (15:8:22)

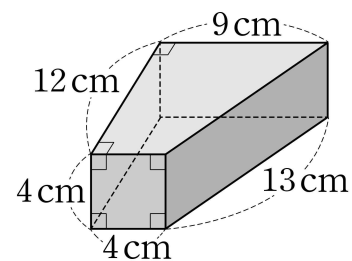
In problems 27-28, solve each question. If the result is a positive number, put 1 at the beginning of the number. However, if the result is a negative number, then put 2 to replace the negative sign for the answer. (For example, if the answer is 45, then write the final answer as 145, but if the answer is -3 , then write the final answer as 23.)

27. $-\frac{3}{5} + (6 - (5 + (8 - 2.6)))$

28. $2.25 \div \frac{7}{24} \times \left(-2\frac{5}{8}\right) \div \left(-\frac{9}{4}\right)$

29. Find the value of a if the solutions to $3x + 3\frac{1}{2} = \frac{3}{4}x - 1$ and $\frac{a-x}{3} = \frac{x+18}{4}$ are equal.

30. Find the surface area.



※ YOU CAN RECEIVE 2.0 POINTS EACH FOR PROBLEMS NUMBER 31 TO 40.

31. Chess is a popular board game played between two players. Each player starts with 16 pieces on the chess board. When Abe and Becky finished a chess game, Abe had lost half of his pieces and Becky had lost $\frac{3}{8}$ of her pieces.

How many pieces remained on the board in total?

_____ pieces

32. A basketball game is played in 4 quarters. Each quarter is $\frac{1}{5}$ of an hour. There are 2 minute breaks between the first and second quarters and between the third and fourth quarters. The half-time break between the second and third quarters is $\frac{1}{4}$ of an hour. How long in minutes is a basketball game including the 3 breaks? (Note: 1 hour = 60 min.)

_____ minutes

33. 4.5 m of a ribbon costs \$1.35. What is the cost of 20 m of the ribbon?

\$ _____

34. Greg is going to pour 10 L of water into 1.2 L bottles. What is the least number of bottles that he needs?

_____ bottles

35. Steve ran 1.6 km at a constant speed. He took 57 seconds to run 200 m. How long did he take to run the whole course? If the time is A minutes B seconds, write $A+B$.

$A+B=$ _____

36. Bill wanted to compress a 209.4 megabyte computer file. He used an app which reduced the file size to 85% of the original file. What is the size of the compressed file? Write the natural number closest to the reduced size (For example, if the answer is 145.83, then write the final answer as 146).

_____ megabytes

37. Sarah and her brother had the same number of bananas. She gave two bananas to her brother and the ratio of bananas became 2:3. How many bananas did they have in total?

_____ bananas

38. If you select 4 numbers from the 5 numbers below, you can pair them up to produce equivalent ratios. Which number will be unused?

| | | | | |
|----|----|----|----|----|
| 10 | 14 | 15 | 18 | 21 |
|----|----|----|----|----|

39. Find the area in square meters of a triangle whose base and height are $\frac{3}{4}$ m and 0.56 m respectively. Write the 2-digit decimal part as the answer.

0. _____ m²

40. A gear consists of two wheels, A and B. A has 48 teeth and B has 60 teeth. How many times would the wheel A need to turn so that the same teeth on A and B meet again?

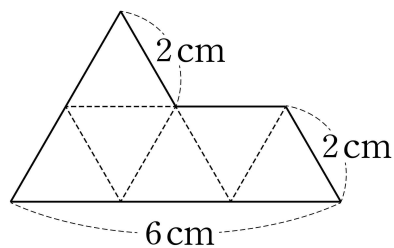
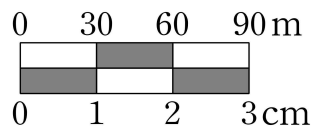
_____ times

41. The following shows a rule for finding the sum of certain numbers. What number goes in \square ? [2.3 points]

$$\begin{aligned} 1 + 3 + 5 + 7 + 9 &= 5 \times 5 = 25 \\ 11 + 13 + 15 + 17 + 19 &= 15 \times 5 = 75 \\ 21 + 23 + 25 + 27 + 29 &= 25 \times 5 = 125 \\ &\vdots \\ 91 + 93 + 95 + 97 + 99 &= \triangle \times \bigcirc = \square \end{aligned}$$

Answer : _____

42. The figure below is drawn to scale so that 1 cm represents 30 m. Find the perimeter of the actual shape in meters. The figure can be divided into six equilateral triangles. [2.3 points]

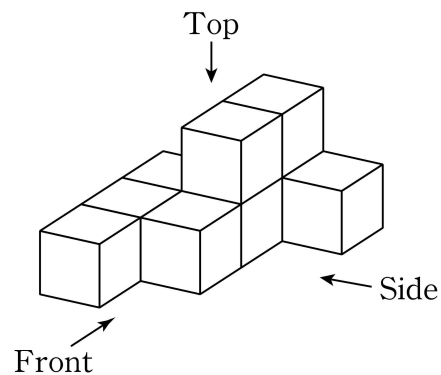


Answer : _____

43. The first Sunday of the year 2021 is January 3rd and the first Sunday of June of 2021 is the 6th. What is the sum of the dates of the first Sundays of the first 6 months of 2021? [3.3 points]

Answer : _____

44. You can look at the blocks from different directions. Let A, B, and C be the number of blocks you can see from the front, side, and top, respectively. What is the sum of A, B, and C? [3.3 points]

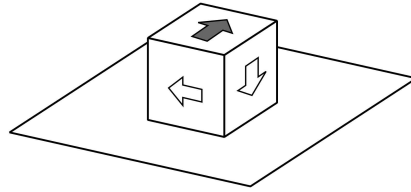


Answer : _____

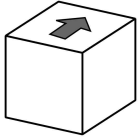
- 45.** At a park there are some bicycles and some tricycles. There are 12 vehicles in total and the number of wheels is 29. How many bicycles are there? [3.3 points]

Answer : _____

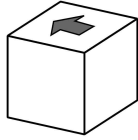
- 46.** The cube below has arrow signs on its faces. If you repeatedly roll the cube in the direction of the top arrow, the grey arrow returns to the top of the cube again after three moves. At that time, which direction does the grey arrow point?[4.3 points]



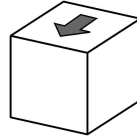
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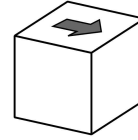
②



③



④



Answer : _____

47. Dave made two decimal numbers $a.b$ and $b.a$ using two digits a and b . Surprisingly, the product of these numbers was a natural number. What was that number?
[4.3 points]

Answer : _____

48. The natural numbers in the following table are arranged in a certain pattern. When read in the direction of the arrow point, the first number is 1 and the second number is 9. Then, what is the 10th number in this direction? [4.3 points]

| | | | | | | |
|--|----|----|----|----|-----|--|
| | | | | | | |
| | 17 | 16 | 15 | 14 | 13 | |
| | 18 | 5 | 4 | 3 | 12 | |
| | 19 | 6 | 1 | 2 | 11 | |
| | 20 | 7 | 8 | 9 | 10 | |
| | 21 | 22 | 23 | 24 | ... | |
| | | | | | | |

Answer : _____

49. What is the 2-digit number AB that satisfies the following division? [4.3 points]

$$\begin{array}{r}
 76 \\
 A B \overline{) B A B A} \\
 \underline{B \square B} \\
 B \square A \\
 \underline{\square B \square} \\
 B A
 \end{array}$$

Answer : _____

50. Alice, Beth, Carrol, and Dora visited an exhibition. They were each given name tags. But every person received the wrong name tag. The number of possible combinations of name tags for four people is 24. Among these, what is the number of cases in which no one has their own name tag? [4.3 points]

Answer : _____