

※ You can receive 1.5 points each for problems number 1 to 30.

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In problems 1-2, reduce each fraction to its simplest form. Add both digits of the numerator and the denominator. (For example, if the fraction is  $\frac{2}{3}$ , then write the final answer as  $2+3=5$ .)

1.  $\frac{56}{84}$

2.  $\frac{72}{135}$

In problems 3-19, solve the calculation into its simplest form as a proper fraction or a mixed number. 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.)

3.  $2\frac{1}{6} + 2\frac{1}{3}$

4.  $4\frac{5}{8} + 2\frac{3}{20}$

5.  $5\frac{7}{8} - 1\frac{15}{16}$

6.  $8\frac{11}{12} - 4\frac{7}{18}$

$$7. \frac{1}{3} + \left( \frac{3}{5} - \frac{1}{2} \right)$$

$$8. 5\frac{1}{2} - 2\frac{5}{8} + 3\frac{3}{4}$$

$$9. 2\frac{3}{5} \times 2\frac{2}{9}$$

$$10. 0.81 \times 2\frac{7}{9}$$

$$11. 5\frac{3}{5} \times \frac{8}{9} \times 2\frac{1}{7}$$

$$12. 0.6 \times \frac{7}{9} \times \frac{5}{8}$$

$$13. 2\frac{2}{9} \div \frac{7}{15}$$

$$14. 8\frac{1}{6} \div 2.8$$

15.  $8\frac{4}{5} \div 4\frac{5}{7}$

16.  $4\frac{2}{3} \div 5\frac{1}{4} \div 1\frac{5}{9}$

17.  $6\frac{2}{9} \div 1.6 \times \frac{3}{8}$

18.  $1\frac{2}{9} \div 2\frac{10}{17} \times 1\frac{5}{7}$

19.  $\left(1\frac{5}{6} - \frac{1}{4}\right) \times 4\frac{2}{7} \div 1\frac{7}{8}$

In problems 20-22, write the decimal part after solving each question. (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.)

20. 
$$\begin{array}{r} 2.53 \\ \times 36 \\ \hline \end{array}$$

21. 
$$\begin{array}{r} 6.4 \\ \times 2.7 \\ \hline \end{array}$$

22. 
$$\begin{array}{r} 7.8 \\ \times 0.17 \\ \hline \end{array}$$

In problems 23-24, 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.)

23. 
$$5.4 \overline{) 4.49}$$

24. 
$$8.4 \overline{) 38.89}$$

In problems 25-26, solve each equation as a mixed number in its simplest form. Then add the numerator and the denominator of the mixed number. (For example, if the answer is  $4\frac{2}{3}$ , write down the final answer as  $2 + 3 = 5$ .)

25. 
$$\left(x \div \frac{5}{9}\right) \times \frac{7}{18} = 1\frac{11}{15}$$

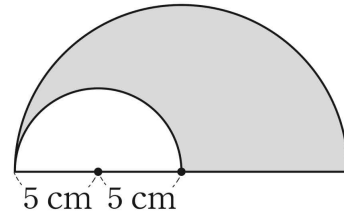
26. 
$$3\frac{2}{3} : x = 1\frac{5}{6} : 1.8$$

In problems 27-28, solve the 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.  $-9 - (-5 + (-7 + 4)) - 17$

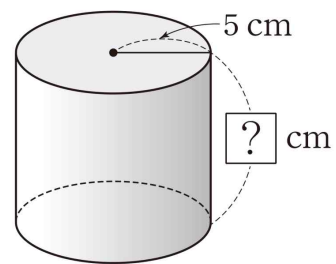
28.  $-1.5 \times 1\frac{7}{9} \div 1\frac{1}{5} \times \left(-6\frac{3}{4}\right) \div (-0.6)$

29. What is ten times the perimeter of the shaded area? The diameter of the small semicircle is equal to the radius of the large semicircle. ( $\pi = 3.14$ )



cm

30. Find the height of a cylinder with the given surface area. ( $\pi = 3.14$ )



Surface area =  $628 \text{ cm}^2$

cm

※ You can receive 2.0 points each for problems number 31 to 40.

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- 31.** Harry, Billy, and Jane start at the main gate of a lake and run laps around the lake. It takes Harry 6 minutes, Billy 9 minutes, and Jane 12 minutes to run a complete lap round the lake. If the three people start together at 5 pm, how much time will pass before they are together again at the main gate?

\_\_\_\_\_ minutes

- 32.** Last week, Charlie, John, and Chris went to a temple and stayed there. Charlie stayed for 1 day 2 hours and 25 minutes, John stayed for 18 hours and 20 minutes, and Chris stayed for 960 minutes. Whose stay was the shortest? Write down their length of stay in minutes. (Note: 1 hour = 60 min.)

\_\_\_\_\_ minutes

- 33.** Nary had  $3\frac{1}{2}$  cabbages and used  $1\frac{2}{3}$  cabbages to make salad. Express the amount of remaining cabbages in the format of  $A\frac{B}{C}$ . What is the value of  $A+B+C$ ? (Note that  $\frac{B}{C}$  is an irreducible fraction.)

\_\_\_\_\_

- 34.** Kate's family had guests and together they consumed  $\frac{2}{5}$  of the contents of her rice bin over 3 days. They consumed  $\frac{1}{6}$  of the rice bin on the first day and  $\frac{1}{10}$  of the rice bin on the second day. How much did they consumed on the third day? Express the amount in the form of an irreducible fraction  $\frac{A}{B}$  and write down your answer as the value of  $A+B$ .

\_\_\_\_\_

35. If a machine uses  $\frac{3}{4}$  of  $6\frac{3}{4}$  L oil to make 15 products. How many liters of oil does the machine use to make 80 products?

\_\_\_\_\_ L

36.  $1\frac{1}{5}$  m iron bar weighs  $3\frac{3}{4}$  kg. What is the weight of 64 cm of the iron bar?

(Note: 1 m = 100 cm)

\_\_\_\_\_ kg

37. Dan has A, B, and C type model cars. When the A type car runs 4m, the B type car runs 7m. When the B type car runs 7m, the C type car runs 10m. When the A type car runs 12m, how many meters does the C type car run?

\_\_\_\_\_ m

**38.** If 5.4 L water flows out of a water tank in 1.5 minutes, how many liters of water will flow out from this water tank in an hour? (Note: 1 hour = 60 min.)

\_\_\_\_\_ L

**39.** When Daniel pours  $452.16 \text{ cm}^3$  milk into a cylindrical bottle, the height of milk reaches half of the height of the bottle. If the diameter of the bottle is 12 cm, what is the height of the bottle? ( $\pi = 3.14$ )

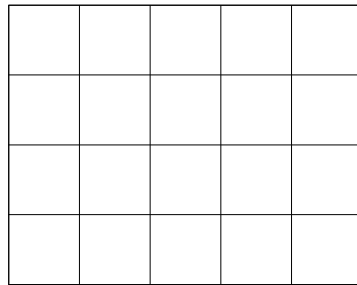
\_\_\_\_\_ cm

**40.** The natural number A is a multiple of 4 and 6. If the sum of all factors of A is 60, what is the value of A?

\_\_\_\_\_

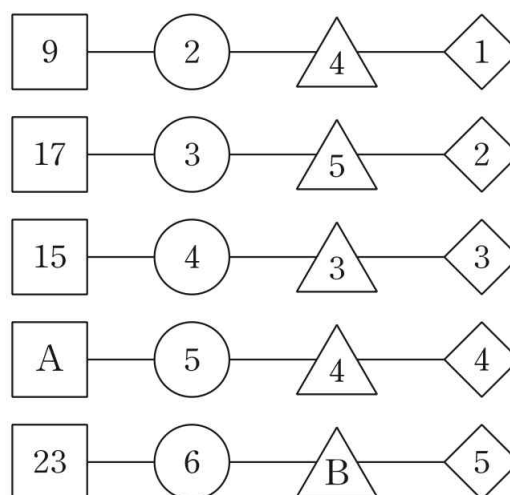


41. How many rectangles made from 6 squares can be found in the following figure?  
[2.3 points]



Answer : \_\_\_\_\_

42. The sets of numbers in each row are arranged following a common mathematical rule. Find the sum of A and B. [2.3 points]



Answer : \_\_\_\_\_

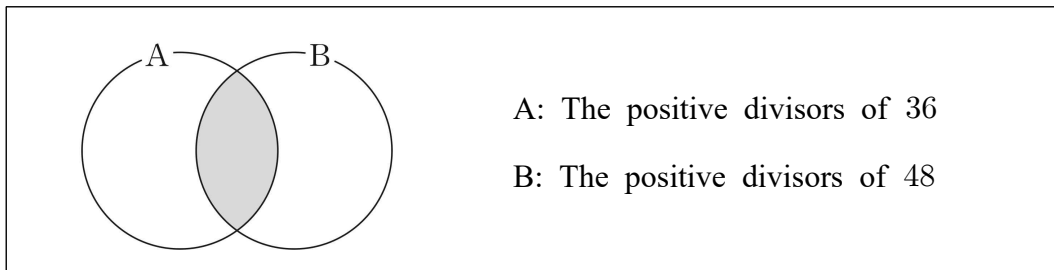
43. Mina has five cards [1], [2], [3], [4], and [5]. She colored these five cards Blue, Red, Purple, Pink, and Green. Each card was colored only one color. Based on the following descriptions, what number is on the Red card? [3.3 points]

**Descriptions**

- (1) The number on the Blue card is the greatest.
- (2) The number on the Green card is less than 2.
- (3) The number on the Purple card is greater than 3.
- (4) The number on the Red card is not 2.

Answer : \_\_\_\_\_

44. How many natural numbers should be placed in the shaded area in the Venn diagram shown below? [3.3 points]



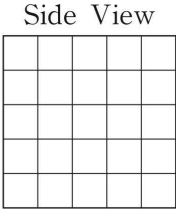
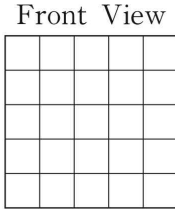
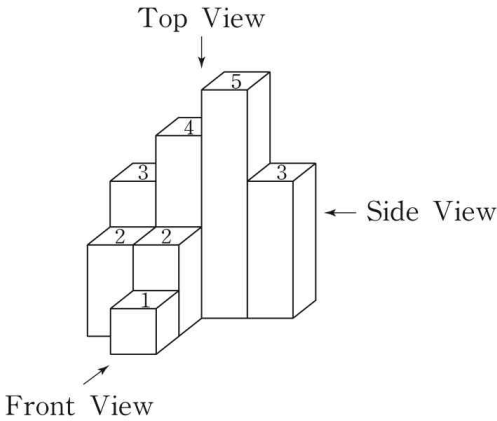
Answer : \_\_\_\_\_

45. You are going to complete the following number sentence. When you are doing so, each symbol, +, −, ×, and ÷ should be used only once. Among all the possible combinations, what is the greatest value that you can get? [3.3 points]

$$32 \square 16 \square 8 \square 4 \square 2$$

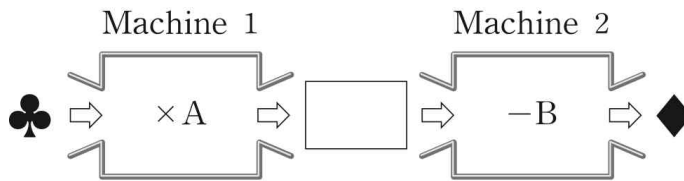
Answer : \_\_\_\_\_

46. Below is the figure of a set of cube blocks. The numbers indicated are the height of each column. On the graph papers below the figure, draw and color the faces from the front view and the side view, respectively. What is the total number of the squares that you colored? (There are no blocks hidden behind the structure.) [3.3 points]



Answer : \_\_\_\_\_

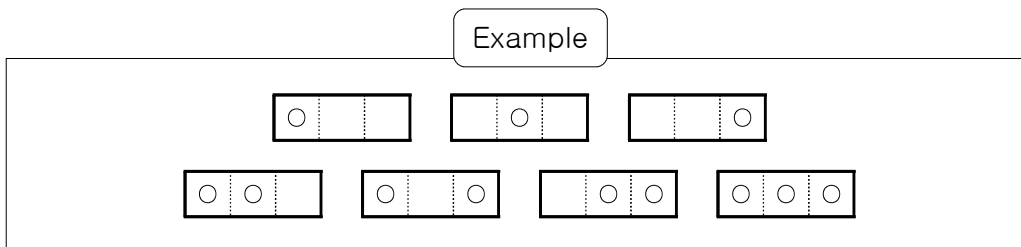
47. There are two magic machines. If a number is put in [Machine 1], then the number is multiplied by  $A$ . If a number is put in [Machine 2], then  $B$  is subtracted from the number. When you put number ♣ in [Machine 1], the number you take out of [Machine 2] at the end is ♦. Find the number '?' in the following table. [4.3 points]



| ♣  | ♦  |
|----|----|
| 3  | 5  |
| 4  | 10 |
| 10 | 40 |
| 15 | ?  |

Answer : \_\_\_\_\_

48. The example shows that there are 7 ways to place circles (○) in 3 empty boxes (□). Find the number of ways to place circles (○) in 4 empty boxes (□). [4.3 points]



Answer : \_\_\_\_\_

49. The following box shows the division process of the 3-digit number B78 by the 1-digit number A. What is the 3-digit number ABC? [4.3 points]

$$\begin{array}{r}
 \phantom{A}7A \\
 A \overline{)B78} \\
 \underline{BA} \phantom{0} \\
 C8 \\
 \underline{CA} \\
 B
 \end{array}$$

Answer : \_\_\_\_\_

50. You should fill the following box with all natural numbers from 1 to 9. The multiple of the numbers in each column is written underneath the table and the multiple of the numbers in each row is written on the right, outside the table. What is the 3-digit number ABC? [4.3 points]

|    |    |    |     |
|----|----|----|-----|
| A  |    |    | 24  |
|    | B  |    | 84  |
|    |    | C  | 180 |
| 72 | 80 | 63 |     |

Answer : \_\_\_\_\_