※ 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 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.)

1. $4\frac{3}{5}+1\frac{7}{10}$

2. $7\frac{5}{12}-3\frac{7}{8}$

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

4. $0.64\times 1\frac{3}{4}$

5. $4\frac{5}{18}\div 2\frac{1}{5}$

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

7. $8\frac{1}{2} \div 0.75 - 1\frac{3}{4}$

8. $6\frac{4}{7} - \left(18 - (3+8) \div \frac{11}{13}\right)$

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.
$$\begin{array}{r} 4.47 \\ \times \quad 3 \\ \hline \end{array}$$

10.
$$\begin{array}{r} 5.3 \\ \times \quad 3.7 \\ \hline \end{array}$$

11.
$$\begin{array}{r} 27.6 \\ \times \quad 4.3 \\ \hline \end{array}$$

12.
$$\begin{array}{r} 2.46 \\ \times \quad 0.25 \\ \hline \end{array}$$

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.

$7\overline{)\ 5\ 1.9}$

14.

$3.6\overline{)\ 4.7\ 3}$

15.

$7.4\overline{)\ 4\ 9.1\ 7}$

16.

$6.5\overline{)\ 7\ 1.9\ 4}$

17.

$64.1\overline{)\ 7\ 9.7\ 3}$

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. $(x \div 6) \times 4 = 32$

19. $(x+3.3)-2\frac{1}{5}=11\frac{1}{10}$

20. $\left(x\div 3\frac{7}{15}\right)+3.6=7\frac{7}{20}$

21. $\left(x\times 2\frac{2}{5}\right)\div 1.8=20$

22. $2\frac{4}{7}x+7\frac{3}{5}=\frac{3}{7}x-7\frac{2}{5}$

In 23-25, find the value of x.

23. $x:7\frac{1}{2}=\frac{4}{5}:3$

24. $3\frac{3}{10}:x=2\frac{1}{5}:2$

25. $\frac{3}{4} : 2 = 2\frac{5}{8} : x$

In 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. $1.5 : 1\frac{3}{4} : 3\frac{1}{3}$

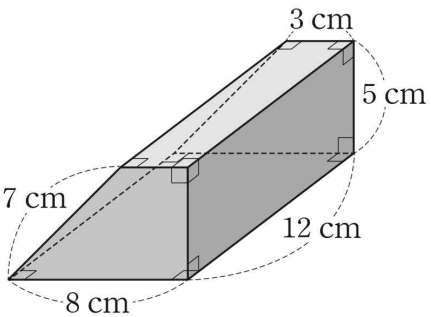
In problems 27-28, solve each question. If the result is a positive number, put 1 at the beginning of the number. However, if the result is a negative number, then put 2 to replace the negative sign for the answer. (For example, if the answer is 45, then write the final answer as 145, but if the answer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

27. $-2.3+(7-(3+(6-3.3)))$

28. $1.75 \div 1\frac{2}{3} \times \left(-2\frac{2}{7}\right) \div 0.8$

29. Find the value of a if the solutions to $\frac{2}{3}x+1\frac{1}{3}=2+\frac{1}{2}x$ and $\frac{a-x}{3}=\frac{x+11}{5}$ are equal.

30. Find the surface area.



$\square$ cm^2

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

31. John and Hannah picked cherries at their grandmother's farm. John picked $3\frac{2}{7}$ kg and Hannah picked $2\frac{1}{7}$ kg. Their grandmother gave $1\frac{3}{7}$ kg of these cherries to a neighbor and divided the remaining cherries equally between John and Hannah. How many kilograms of cherries did John receive?

_____ kg

32. The 4 members of a music club drink an equal amount of grape juice each day. If $16\frac{2}{5}$ L of grape juice was consumed over the last five days, how many milliliters(mL) of grape juice does each person drink each day?

(Note: 1 L = 1000 mL)

_____ mL

33. Matt planted a 50 cm tree in his backyard. After a year, the height of this tree is 62 cm. What is the growth rate of the tree for this one year?

_____ %

34. Anna had a colored string. She cut it into 8 pieces and each piece is 7.6 cm long. What was the length of the colored string before it was cut? Write down only the decimal part. (For example, if the answer is 0.75 write down as 75.)

_____

35. There is a cuboid shaped wardrobe in Olivia's room. The ratio of the length and width of the base of the wardrobe is $3 : 2$ and the ratio of the width and height of the wardrobe is $4 : 11$. Express the length, width and height of the wardrobe as a proportion in the simplest natural form and then add all three numbers. (For example, if the ratio is $7 : 1 : 3$, then write as $7+1+3=11$.)

_____

36. Patrick, Eric, and Jenny plan to run a $1000\,\mathrm{m}$ course divided between them with a ratio of $3 : 2 : 5$ respectively. How many meters would Patrick run?

_____ m

37. Sophie has $10\frac{1}{2}\,\mathrm{m}$ of ribbon and used $\frac{3}{5}$ of it to wrap a gift. She then used $\frac{2}{3}$ of the remaining ribbon to make a butterfly. How much more ribbon did Sophie use to wrap the gift than to make the butterfly? Express the amount of ribbon in the format of $\mathrm{A}\frac{\mathrm{B}}{\mathrm{C}}$. What is the value of $\mathrm{A}+\mathrm{B}+\mathrm{C}$? (Note that $\frac{\mathrm{B}}{\mathrm{C}}$ is an irreducible fraction.)

_____

38. In a playground, Janice stuck white flags and black flags in a row. From the starting point, white flags were placed every 75 cm and black te flags were placed every 120 cm. How near to the starting point is the first point where a white flag and a black flag are placed together?

_____ cm

39. There is 450 g of 6% salt water in a cup. How many grams of pure water should be added to make 4% salt water?

_____ g

40. You have a 3-digit integer, of which the digit in the hundreds place is 4 and the digit in the tens place is 2. When you exchange the digits in the hundreds place and the ones place, you have a number that is smaller than the original number by 99. What was the original number?

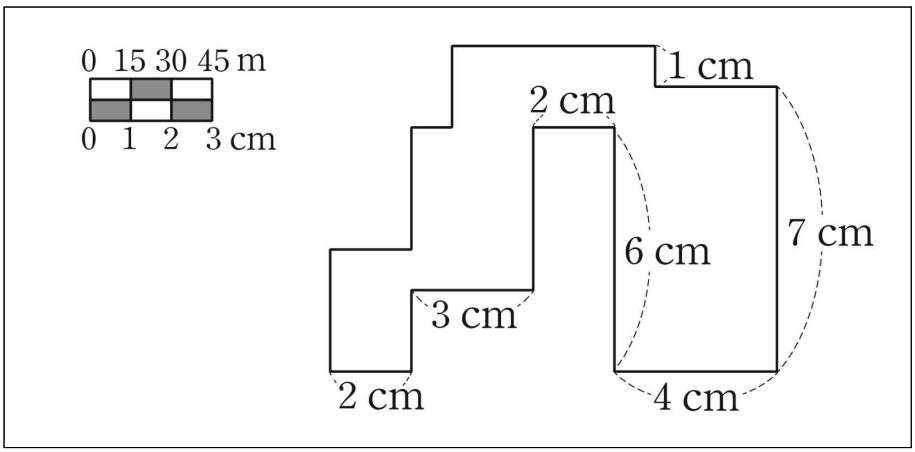
_____

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

$$1+2+3+4+\cdots+9+10=11\times5=55$$
$$11+12+13+14+\cdots+19+20=31\times5=155$$
$$21+22+23+24+\cdots+29+30=51\times5=255$$
$$\vdots$$
$$91+92+93+94+\cdots+99+100=\triangle\times\bigcirc=\square$$

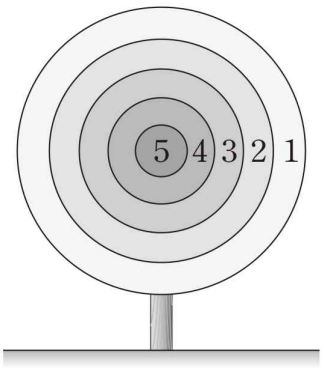
Answer : _____

42. Below is the floor plan of a building. What is the perimeter of this floor plan in meters? [2.3 points]



Answer : _____ m

43. Judy shot 3 arrows that hit zones A, B, and C in order. She may have hit the same zone more than once. She scored 10 points. If ABC is a 3-digit number, how many different ABC are possible? [3.3 points]



Answer : _____

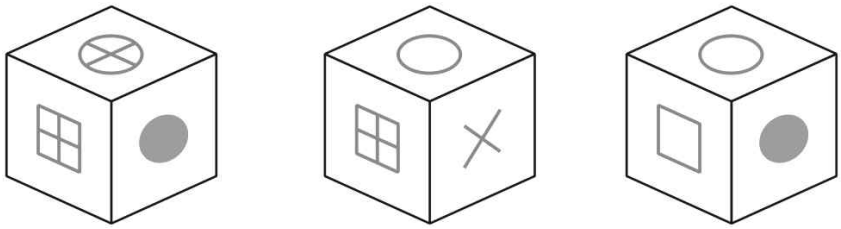
44. How many numbers in the box satisfy the following condition? [3.3 points]

Condition
For each odd digit, there exists at least one neighboring even number digit. [Examples] 324, 2561, 54736, etc.

12345	13524	21345	34215	34521	41532	51234

Answer : _____

45. The following images are three views of the same cube. Which of the following shapes is on the opposite side of ☐? [3.3 points]



①  ②  ③  ④  ⑤ 

Answer : _____

46. Referring to the following descriptions, find the number of statements that are always true. [3.3 points]

Descriptions
· Every giant eats a lot.
· Every giant likes basketball or volleyball.
· Jim likes volleyball.

Statements
1. Jim is a giant.
2. I am a giant and so eat a lot.
3. Since Minho eats a lot, he must be a giant.
4. Every giant likes basketball.
5. I don't like either basketball or volleyball, so I'm not a giant.
6. There is no giant who does not eat a lot.
7. Since Mike is not a giant, he does not like volleyball.

Answer : _____

47. You select three cards from the following six cards [1], [2], [3], [4], [5], [6] and complete the multiplication below. Here A is a multiple of 3 and 4, but not a multiple of 8. When you do not consider the order of the three numbers, how many unique calculations of A are possible? [4.3 points]

$$\square \times \square \times \square = A$$

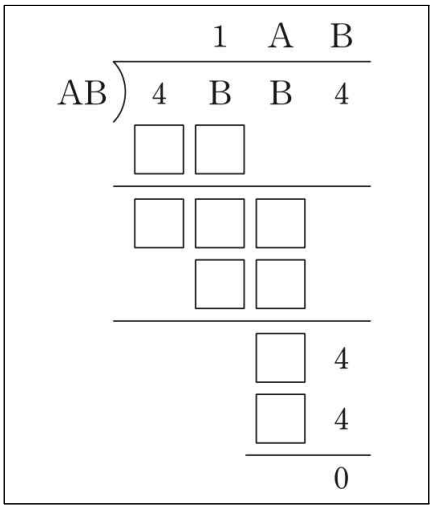
Answer : _____

48. The natural numbers in the following table are arranged in a certain pattern. The position of the number 8 in the table can be indicated as $(2, 3)$ and the position of the number 6 as $(3, 1)$. Find the number whose position is indicated as $(5, 4)$. [4.3 points]

	(1)	(2)	(3)	(4)	(5)	⋯
(1)	1	2	4	7	11	
(2)	3	5	8	12		
(3)	6	9	13			
(4)	10	14				
(5)	15					
⋮						

Answer : _____

49. The 4-digit number $4BB4$ is a multiple of the 2-digit number AB. What is the 2-digit number AB that satisfies the following division? [4.3 points]



Answer : _____

50. All differences of the neighboring two digits in 34, 431, and 3576 are 1 or 2. How many 3-digit numbers for which all differences of the neighboring two digits is 1 or 2. [4.3 points]

Answer : _____