

### Questions

#### (1) Repeated multiplication and integer powers

##### (1) Complete the following:

1)  $\left(\frac{-2}{3}\right)^3 = \dots\dots\dots$

2)  $\left(-2\frac{1}{3}\right)^4 = \dots\dots\dots$

3)  $(2x^2) \times \frac{1}{x} = \dots\dots\dots$

4)  $\left(2\frac{7}{9}\right) \div \left(-1\frac{2}{3}\right)^2 = \dots\dots\dots$

5) The area of a square whose side length equal  $\frac{2x}{7}$  is  $\dots\dots\dots$

6) If  $x = \frac{-3}{2}$ ,  $y = \frac{1}{2}$ , then  $x^2y^2 = \dots\dots\dots$

7)  $\left[\left(\frac{-3}{4}\right)^2\right]^3 = \dots\dots\dots$

8)  $\left(\frac{-xy^6}{z}\right)^2 = \dots\dots\dots$

9)  $(3x^{-1})^2 = \dots\dots\dots$

10)  $2x^{-2}y^{-3} = \frac{2}{\dots\dots\dots}$

11)  $\left(\frac{-1}{2}\right)^3 - \left(\frac{-1}{2}\right)^2 = \dots\dots\dots$

12) The additive inverse of  $\left(\frac{-2}{5}\right)^2$  is  $\dots\dots\dots$

13) If  $x = y$ , then  $\left(\frac{1}{5}\right)^{x-y} = \dots\dots\dots$

14)  $(x - 2)^{zero} = 1$ , if  $x \neq \dots\dots\dots$



15) Quarter of the number  $4^{20} = \dots\dots\dots$

16)  $4^x + 4^x + 4^x + 4^x = \dots\dots\dots$

17)  $\frac{81}{625} = \left(\frac{25}{9}\right)^{\dots\dots\dots}$

18)  $3^{-1} + 4^{-1} = \dots\dots\dots$

19)  $2^3 \times 2^3 = \dots\dots\dots$

20)  $(x^2)^{-3} \times x^6 = \dots\dots\dots$

21) Half of the number  $2^{20} = \dots\dots\dots$

22)  $\left(\frac{2}{3}\right)^2 \times \frac{2}{3} = \dots\dots\dots$

23)  $2\frac{1}{4} = \left(\frac{-3}{2}\right)^{\dots\dots\dots}$

24)  $10^{-3} = \frac{1}{\dots\dots\dots}$

25)  $b^{-3}$  is not defined when  $b = \dots\dots\dots$

**(2) Choose the correct answer:**

1)  $\frac{6a^2x^3}{2a^3x^2} = \dots\dots\dots$   $(3ax, 3a^5x^7, \frac{3x}{a}, \frac{a}{3x})$

2)  $\left(\frac{m^2}{n^{-3}}\right)^{-1} \left(\frac{3m^{-2}}{n^{-2}}\right)^{-2} = \dots\dots\dots$   $(\frac{9m^2}{n^7}, \frac{m^2}{9n^7}, \frac{m^2}{9n}, \frac{9m^6}{n})$

3)  $\frac{(2ab^{-2})^0}{3^0a^{-2}b} = \dots\dots\dots$   $(\frac{a^3}{3b^3}, a^2, 1, \frac{a^2}{b})$

4) If  $a^{-1} = \frac{2}{3}$ , then  $a = \dots\dots\dots$   $(\frac{-2}{3}, \frac{3}{2}, \frac{-3}{2}, 1)$

5) If  $x = \frac{1}{2}$ ,  $y = \frac{3}{4}$ , then  $y \div x = \dots\dots\dots$   $(\frac{2}{3}, \frac{3}{2}, \frac{-2}{3}, \frac{-3}{2})$

6)  $2^7 \times 2^{-3} = \dots\dots\dots$   $(2^4, 2^{10}, 2^{-4}, 8)$

7) If  $\frac{x}{y} = \frac{3}{2}$ , then  $\frac{2x}{3y} = \dots\dots\dots$   $(1, \frac{-2}{3}, \frac{3}{2}, -1)$

8) If  $2^7 \times 3^7 = \dots\dots\dots$   $(5^7, 6^7, 6^{14}, 6^{49})$

**(3) Find the result of:**

1)  $\frac{(-3)^5 \times (-3)^4}{(-3)^7 \times (-3)}$

2)  $\frac{5^4 \times 5^{-2}}{5^2}$

3)  $\left(\frac{7^4 \times 7^{-4}}{7^3}\right)^{-2}$

4)  $\left(\frac{-c^2}{d}\right)^2$

**(4) If  $x = \frac{-1}{2}$ ,  $y = \frac{3}{4}$ , find in the simplest form the value of:**

1)  $x^3y$

2)  $(x - y)^{-1}$

**(5) If  $x = \frac{1}{2}$ ,  $y = \frac{-3}{2}$ ,  $z = \frac{3}{2}$  find in the simplest form the value of  $\left(\frac{x+y}{z}\right)^{-2}$**

**(6) Simplify:**

1)  $\left(\frac{-3}{5}\right)^3 \times \left(\frac{-3}{5}\right)^5$

2)  $\left(\frac{2}{5}\right)^{13} \div \left(\frac{2}{5}\right)^{11}$

3)  $\frac{a^{-1}}{b^2} \left(\frac{a^{-1}}{2b^2}\right)^{-2}$

**(7) If  $a = -\frac{1}{2}$ ,  $b = 2$  and  $c = \frac{3}{4}$  Find the numerical value of  $a^3b^2 + b^2c - 8abc$**



## (2) Scientific notation of the rational number

### (1) Complete the following:

- 1)  $0.00053 = \dots\dots\dots$  (in the standard form)
- 2)  $720 \times 10^5 = \dots\dots\dots$  (in the standard form)
- 3) The standard form of the number  $0.7 \times 0.005 = \dots\dots\dots$
- 4) If  $A = 0.000625$ , then  $\sqrt{A} = 2.5 \times 10^{\dots\dots\dots}$
- 5) If  $(0.004)^2 = 1.6 \times 10^n$ , then  $n = \dots\dots\dots$

### (2) Choose the correct answer:

- 1)  $2.37 \times 10^{-4} = \dots\dots\dots$   
( 0.00237 , 0.000237 , 23700 , 0.0000237 )
- 2) Which of the following numbers is the greatest  
(  $6.3 \times 10^5$  ,  $9.8 \times 10^4$  ,  $5.2 \times 10^5$  )
- 3)  $(3 \times 10^2) \times (15 \times 10^3) = \dots\dots\dots$  (in the standard form)  
(  $45 \times 10^5$  ,  $4.5 \times 10^{-5}$  ,  $4.5 \times 10^6$  ,  $4.5 \times 10^{-6}$  )
- 4) If  $0.0000503 = m \times 10^{-5}$ , then  $m = \dots\dots\dots$   
( 50.3 , 5.03 , 503 )
- 5) If  $0.0035 = 3.5 \times 10^n$ , then  $n = \dots\dots\dots$   
( 2 , -3 , -2 , 3 )
- 6)  $6000 \times 50 = \dots\dots\dots$   
(  $300 \times 10^2$  ,  $3 \times 10^5$  ,  $30 \times 10^5$  ,  $-3 \times 10^3$  )



**(3) Write the result of each of the following in the standard form:**

1)  $(3.8 \times 10^8) \div (1.9 \times 10^6)$

2)  $(3.8 \times 10^5) + (4.6 \times 10^4)$

3)  $(5.3 \times 10^8) - (8 \times 10^7)$

4)  $(4.4 \times 10^3) \times (2 \times 10^5)$

## (3) Order of mathematical operations

**(1) Complete the following:**

1)  $7(6^2 \div 2 \times 3) = \dots\dots\dots$

2)  $3 \times 4 - 21 \div 3 = \dots\dots\dots$

3) 1, 2, 3, 5, 8, ..... in the same pattern

4)  $|-3| + |5| = \dots\dots\dots$

5)  $6 \times 2 - 4 \div 2 = \dots\dots\dots$

**(2) Find the value of the following:**

1)  $2 - [(7 - 3) - 2]$

2)  $30 \div 6 \times 8 - (3 - 1)$

3)  $12 \times (2)^2 \div 24 + (3)^2$

4)  $10 \times 4 - (2 \times 6 - 8)$

5)  $4 - 3(4 - 2(6 - 3)) \div 2$

### (4) The square root of a perfect square rational number

#### (1) Complete:

1)  $-\sqrt{\frac{144}{49}} = -\sqrt{\left(\frac{\dots\dots\dots}{\dots\dots\dots}\right)^2}$

2)  $\sqrt{\left(\frac{3}{25}\right)^2} = \dots\dots\dots$

3)  $\pm\sqrt{\frac{25x^2y^2}{36}} = \dots\dots\dots$

4) If  $3a = \sqrt{4} b$ , then  $\frac{a}{b} = \dots\dots\dots$

5)  $\sqrt{(-8)^2 + (-6)^2} = \dots\dots\dots$

6)  $\sqrt{100 - 64} = 10 - \dots\dots\dots$

7)  $\sqrt{16 + 9} = 2 + \dots\dots\dots$

8)  $\sqrt{9} + \sqrt{4} = \sqrt{\dots\dots\dots}$

#### (2) Choose the correct answer:

1) The multiplicative inverse of  $\sqrt{\frac{100}{36}} = \dots\dots\dots$   
 (  $\pm \frac{10}{6}$  ,  $\pm \frac{6}{10}$  ,  $\frac{10}{6}$  ,  $\frac{6}{10}$  )

2)  $\sqrt{a^2} = \dots\dots\dots$  (  $a$  ,  $-a$  ,  $\pm a$  ,  $|a|$  )

3)  $\sqrt{9 + 16} = \dots\dots\dots$  (  $7$  ,  $5$  ,  $25$  ,  $-7$  )

4) The additive inverse of the number  $\sqrt{\frac{4}{9}} = \dots\dots\dots$   
 (  $\frac{2}{9}$  ,  $\frac{-2}{9}$  ,  $\frac{-2}{3}$  ,  $\frac{4}{3}$  )

5) If  $\sqrt{\frac{a}{b}} = \frac{2}{3}$ , then  $\frac{b}{a} = \dots\dots\dots$  (  $\frac{2}{3}$  ,  $\frac{3}{2}$  ,  $\frac{4}{9}$  ,  $\frac{9}{4}$  )

6)  $\pm\sqrt{\frac{4}{9}} = \dots\dots\dots$  (  $\frac{2}{3}$  ,  $\frac{-4}{9}$  ,  $\pm\frac{2}{3}$  ,  $\frac{-2}{3}$  )

**(3) Find the value of the following in the simplest form:**

1)  $\left(\frac{-2}{5}\right)^2 \times \sqrt{6\frac{1}{4}} \times \left(\frac{-5}{8}\right)^{zero}$

2)  $\left(\frac{-1}{3}\right)^2 + \sqrt{\frac{64}{81}} - \left(\frac{3}{7}\right)^{zero}$

3)  $\sqrt{100 - (-6)^2}$

4)  $\left(\frac{-3}{7}\right)^0 \times \left(\frac{-2}{5}\right)^2 \times \sqrt{6\frac{1}{4}}$

## (5) Solving equations and inequalities in $\mathbb{Q}$

**(1) Complete the following:**

1) The solution set of the equation  $x - 3\frac{1}{2} = 5$  in  $\mathbb{Q} = \dots\dots\dots$

2) If  $x + 9 = 11$ , then the value of  $7x = \dots\dots\dots$

3) If  $2t + 3 = 15$ , then the value of  $\frac{1}{3}t = \dots\dots\dots$

4) If  $\frac{x}{4} = \frac{2}{3}$ , then the value of  $\frac{x}{2} = \dots\dots\dots$

5) If  $\frac{6x}{5} = -2$ , then  $x^2 = \dots\dots\dots$

6) If  $\frac{x}{5} = 30\%$ , then  $x = \dots\dots\dots$

7) If  $zero \in \{5, x - 3\}$ , then  $x = \dots\dots\dots$

8) If  $3x = 6$ , then  $5x = \dots\dots\dots$

9) If  $2x = 2$ , then  $3x - 1 = \dots\dots\dots$

10) If  $2x - 7 = 3$ , then  $x = \dots\dots\dots$

11) If  $\frac{6x}{5} = -2$ , then  $x^2 = \dots\dots\dots$



- 12) If  $x > y$  , then  $x + z$  .....  $y + z$
- 13) If  $x < 0$  , then  $x + 3$  ..... 3
- 14) If  $x > y$  and  $z$  is negative then  $xz$  .....  $yz$ .
- 15) If  $3x + 1 \geq 10$  , then  $x \geq$  .....
- 16) If  $-2x > 8$  , then the S.S in  $z =$  .....
- 17) If  $-x > 4$  , then .....  $<$  .....
- 18) If age of Ali now is  $(x - 2)$  years old, then his age 4 years ago was .....
- 19) The age of Omar is  $x$  years old then his age after 5 years is .....
- 20) The S.S of the inequality  $x < 0$  in  $\mathbb{N}$  is .....

**(2) Find in  $\mathbb{Q}$  the S.S of the following:**

- 1)  $x + 4 = 14$
- 2)  $3x + 1 = 25$
- 3)  $8 + 2x = 14$
- 4)  $3x - 4 = 2x + 5$
- 5)  $3(x + 2) = 12$
- 6)  $3x - 1 \leq 2x + 3$
- 7)  $2x + 13 < 21$

**(3) Solve:  $x + 2 = 8$  in  $\mathbb{Z}$**

**(4) Solve:  $3 - 2x \geq 1$  in  $\mathbb{N}$**

**(5) Find the number that if added to its 3 times the result will be 28**





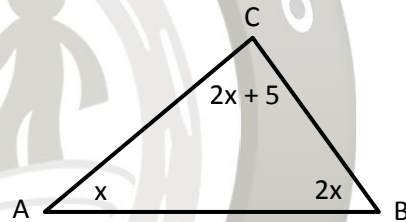
(6) Three consecutive even numbers their sum = 204, find these numbers.

(7) The sum of the ages of three brothers now is 55 years if the eldest was born before the middle by 3 years and the middle was born before the youngest by two years. Find the age of each of them.

(8) Two integer numbers, the smallest one is  $2x$  and the greatest is  $5x$ , if the difference between them is 30. Find the two numbers.

(9) In the opposite figure:

Find the measure of each angle in the triangle ABC



(10) The length of a rectangle is twice its width and its surface area is  $24.5 \text{ cm}^2$ . Calculate each of its length and width.



### (6) Statistics and Probability

#### (1) Complete the following:

- 1) The probability of the certain event = .....
- 2) The probability of the impossible event = .....
- 3) If the probability that the student is absent in a school is 0.15, if the number of students of this school is 600, then the number of the present students that day is .....
- 4) A coin is tossed once, then the probability of getting (tail) = .....
- 5) If a coin flipped once, then the probability of appearance of a head equals .....
- 6) A die is thrown once then the probability of appearance of the number 5 is .....
- 7) A class has 25 boys and 20 girls. A pupil is selected randomly, then the probability that the pupil is a girl = .....
- 8) The probability of any event not less than ..... and not more than .....

#### (2) Choose the correct answer:

- 1) Which of the following may be probability of an event .....  
( -0.35 , 87% , 1.05 , 130% )
- 2) The sum of the probabilities of all possible outcomes of a random experiment is .....  
( zero , 1 , > 1 , < 1 )
- 3) There are 21 boys and 15 girls in a classroom, one pupil is chosen randomly the probability that the chosen pupil is a girl  
= ..... (  $\frac{5}{12}$  ,  $\frac{7}{12}$  ,  $\frac{4}{7}$  ,  $\frac{5}{6}$  )



4) If the probability that a pupil succeed is 75% , then the probability of his failure is .....

( - 0.75 , 0.25 , - 0.25 )

5) The probability of the sunrises from east is .....

( 0 , 1 ,  $\emptyset$  ,  $\frac{1}{2}$  )

**(3) A box contains 5 white balls 4 black balls and 7 red balls a ball is drawn randomly from the box. Calculate the probability of the following events.**

- |                           |                        |
|---------------------------|------------------------|
| 1) The ball is white      | 2) The ball is red.    |
| 3) The ball is not white. | 4) The ball is orange. |

**(4) A card is chosen randomly from ten cards numbered from 5 to 14, what is the probability that the chosen cards is?**

- |                   |                   |
|-------------------|-------------------|
| 1) An even number | 2) A prime number |
|-------------------|-------------------|

**(5) A fair die is rolled once calculate the probability of rolling**

- |                           |                            |
|---------------------------|----------------------------|
| 1) An even number         | 2) A number greater than 2 |
| 3) Odd number less than 5 | 4) A number divisible by 5 |

**(6) The set { 2 , 3 , 5} is used in writing a 2 digit numbers.**

**Find the probability of each of the following events**

- 1) The sum of the two digits is 7
- 2) Both of the two digits are equal.

### Model Answers

#### (1) Repeated multiplication and integer powers

##### (1) Complete the following:

$$1) \left(\frac{-2}{3}\right)^3 = -\frac{8}{27}$$

$$2) \left(-2\frac{1}{3}\right)^4 = \left[\frac{-7}{3}\right]^4 = \frac{2401}{81}$$

$$3) (2x^2) \times \frac{1}{x} = \frac{2x^2}{x} = 2x$$

$$4) \left(2\frac{7}{9}\right) \div \left(-1\frac{2}{3}\right)^2 = \left(\frac{25}{9}\right) \div \left(\frac{-5}{3}\right)^2$$

$$= \frac{25}{9} \times \frac{9}{25} = 1$$

$$5) \text{Area of a square whose } L = \frac{2x}{7}$$

$$A = \left(\frac{2x}{7}\right)^2 = \frac{4x^2}{49}$$

$$6) x = \frac{-3}{2}, y = \frac{1}{2}$$

$$x^2 y^2 = \left[\frac{-3}{2}\right]^2 \left[\frac{1}{2}\right]^2$$

$$= \left(\frac{9}{4}\right) \times \frac{1}{4} = \frac{9}{16}$$

$$7) \left[\left(\frac{-3}{4}\right)^2\right]^3 = \left(\frac{9}{16}\right)^3 = \frac{729}{4096}$$

**OR**  $\left(\frac{-3}{4}\right)^{2 \times 3} = \left(\frac{-3}{4}\right)^6 = \frac{3^6}{4^6}$

$$8) \left(\frac{-xy^6}{z}\right)^2 = \frac{x^2 y^{12}}{z^2}$$

$$9) (3x^{-1})^2 = \left(\frac{3}{x}\right)^2 = \frac{9}{x^2}$$

$$10) 2x^{-2}y^{-3} = \frac{2}{x^2y^3}$$

$$11) \left(\frac{-1}{2}\right)^3 - \left(\frac{-1}{2}\right)^2 = \frac{-1}{8} - \frac{1}{4} = \frac{-1}{8} - \frac{2}{8} = \frac{-3}{8}$$

$$12) \text{The additive inverse of } \left(\frac{-2}{5}\right)^2 \text{ is } -\left(\frac{-2}{5}\right)^2$$

**OR**  $\frac{-4}{25}$

$$13) \text{If } x = y, \text{ then } \left(\frac{1}{5}\right)^{x-y} = 1$$

$$14) (x - 2)^{\text{zero}} = 1, \text{ if } x \neq 2$$

$$15) \frac{4^{20}}{4} = 4^{19}$$

$$16) 4 \times 4^x = 4^{1+x}$$

$$17) \frac{81}{625} = \left(\frac{25}{9}\right)^{-2}$$

$$18) 3^{-1} + 4^{-1} = \frac{1}{3} + \frac{1}{4} = \frac{7}{12}$$

$$19) 2^3 \times 2^3 = 2^{3+3} = 2^6 \quad \text{OR} \quad (2^3)^2 = 2^6$$

$$20) x^{-6} \times x^6 = x^{-6+6} = x^0 = 1$$

$$21) \frac{2^{20}}{2} = 2^{20-1} = 2^{19}$$

$$22) \left(\frac{2}{3}\right)^2 \times \left[\frac{2}{3}\right] = \left[\frac{2}{3}\right]^3 = \frac{8}{27}$$

$$23) \left(2\frac{1}{4}\right) = \left(\frac{9}{4}\right) = \left(\frac{-3}{2}\right)^2$$

$$24) 10^{-3} = \frac{1}{10^3}$$

$$25) \mathbf{b = zero}$$

**(2) Choose the correct answer:**

1)  $3a^{-1}x^1 = \frac{3x}{a}$

2)  $\frac{m^2}{9n^7}$

3)  $\frac{a^2}{b}$

4)  $\frac{3}{2}$

5)  $\frac{3}{2}$

6)  $2^4$

7) 1

8)  $6^7$

**(3) Find the result of:**

1)  $[-3]^{5+4-7-1} = (-3)^1 = -3$

2)  $5^{4-2-2} = 5^0 = 1$

3)  $(7^{4-2-3})^{-2} = (7^{-1})^{-2} = 7^2 = 49$

4)  $\left(\frac{-c^2}{d}\right)^2 = \frac{c^4}{d^2}$

**(4)**  $x = \frac{-1}{2}, y = \frac{3}{4}$

1)  $x^3y = \left(\frac{-1}{2}\right)^3 \times \frac{3}{4}$   
 $= \frac{-1}{8} \times \frac{3}{4} = \frac{-3}{32}$

2)  $(x - y)^{-1}$   
 $= \left(\frac{-1}{2} - \frac{3}{4}\right)^{-1} = \left[\frac{-2}{4} - \frac{3}{4}\right]^{-1}$   
 $= \left(\frac{-5}{4}\right)^{-1} = \frac{-4}{5}$

**(5)**  $x = \frac{1}{2}, y = \frac{-3}{2}, z = \frac{3}{4}$

$\left(\frac{x+y}{z}\right)^{-2}$   
 $= \left[\frac{\frac{1}{2} + \left(\frac{-3}{2}\right)}{\frac{3}{4}}\right]^{-2} = \left(\frac{-1}{\frac{3}{4}}\right)^{-2} = \left(\frac{-4}{3}\right)^{-2}$   
 $= \frac{-3^2}{4^2} = \frac{-9}{16}$

### (6) Simplify:

$$1) \left(\frac{-3}{5}\right)^{3+5} = \left(\frac{-3}{5}\right)^8 = \frac{3^8}{5^8}$$

$$2) \left(\frac{2}{5}\right)^{13-11} = \left(\frac{2}{5}\right)^2 = \frac{4}{25}$$

$$3) \frac{1}{ab^2} \left[\frac{1}{2ab^2}\right]^{-2} = \frac{4a^2b^4}{ab^2} = 4ab^2$$

$$(7) a = \frac{-1}{2}, b = 2, c = \frac{3}{4}$$

$$a^3b^2 + b^2c - 8abc$$

$$= \left(\frac{-1}{2}\right)^3 (2)^2 + (2)^2 \times \frac{3}{4} - 8 \left[\frac{-1}{2} \times 2 \times \frac{3}{4}\right]$$

$$= \frac{-1}{8} \times 4 + 3 + 6$$

$$= \frac{-1}{2} + 3 + 6 = 8\frac{1}{2}$$

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## (2) Scientific notation of the rational number

### (1) Complete:

$$1) 5.3 \times 10^{-4}$$

$$2) 7.2 \times 10^2 \times 10^5 = 7.2 \times 10^7$$

$$3) 0.7 \times 0.005 = 7 \times 10^{-1} \times 5 \times 10^{-3}$$

$$= 35 \times 10^{-4}$$

$$= 3.5 \times 10^{-3}$$

$$4) 2.5 \times 10^{-2}$$

$$5) -5$$

### (2) Choose the correct answer:

1)  $2.3 \times 10^{-4} = 0.000237$

2)  $6.3 \times 10^5$

3)  $45 \times 10^5 = 4.5 \times 10 \times 10^5$   
 $= 4.5 \times 10^6$

4) 5.03

5) - 3

6)  $3 \times 10^5$

### (3) Write the result of each:

1)  $(3.8 \times 10^8) \div (1.9 \times 10^6)$

$$= \left(\frac{3.8}{1.9}\right) \times \left(\frac{10^8}{10^6}\right)$$
$$= 2 \times 10^2$$

2)  $(3.8 \times 10^5) + (4.6 \times 10^4)$

$$= 10^4 (3.8 \times 10 + 4.6)$$
$$= 10^4 (42.6)$$
$$= 10^4 (4.26 \times 10) = 4.26 \times 10^5$$

3)  $(5.3 \times 10^8) - (8 \times 10^7)$

$$= (5.3 \times 10 - 8) \times 10^7$$
$$= (45) \times 10^7$$
$$= (4.5 \times 10) \times 10^7$$
$$= 4.5 \times 10^8$$

4)  $(4.4 \times 10^3) \times (2 \times 10^5)$

$$= (4.4 \times 2) \times (10^3 \times 10^5)$$
$$= 8.8 \times 10^8$$



### (3) Order of mathematical operations

(1) Complete the following:

$$\begin{aligned} 1) & 7 (62 \div 2 \times 3) \\ & = 7 (36 \div 2 \times 3) \\ & = 7 (18 \times 3) = 7 (54) \\ & = 378 \end{aligned}$$

$$\begin{aligned} 2) & 3 \times 4 - 21 \div 3 \\ & = 12 - 21 \div 3 \\ & = 12 - 7 = 5 \end{aligned}$$

$$3) 1, 2, 3, 5, 8, \underline{13}$$

$$4) |-3| + |5| = 3 + 5 = 8$$

$$\begin{aligned} 5) & 6 \times 2 - 4 \div 2 \\ & = 12 - 2 = 10 \end{aligned}$$

Find the value of:

$$\begin{aligned} 1) & 2 - [(7 - 3) - 2] \\ & = 2 - [4 - 2] \\ & = 2 - [2] = \text{zero} \end{aligned}$$

$$\begin{aligned} 2) & 30 \div 6 \times 8 - (3 - 1) \\ & = 30 \div 6 \times 8 - 2 \\ & = 5 \times 8 - 2 \\ & = 40 - 2 = 38 \end{aligned}$$

$$\begin{aligned}
 3) \quad & 12 \times (2)^2 \div 24 + (3)^2 \\
 & = 12 \times 4 \div 24 + 9 \\
 & = 48 \div 24 + 9 \\
 & = 2 + 9 = 11
 \end{aligned}$$

$$\begin{aligned}
 4) \quad & 10 \times 4 - (2 \times 6 - 8) \\
 & = 10 \times 4 - (12 - 8) \\
 & = 10 \times 4 - 4 \\
 & = 40 - 4 = 36
 \end{aligned}$$

$$\begin{aligned}
 5) \quad & 4 - 3(4 - 2(6 - 3)) \div 2 \\
 & = 4 - 3(4 - 2)3) \div 2 \\
 & = 4 - 3(4 - 6) \div 2 \\
 & = 4 - 3(-2) \div 2 \\
 & = 4 - (-6) \div 2 \\
 & = 4 + 6 \div 2 = 4 + 3 = 7
 \end{aligned}$$

---

### (4) The square root of a perfect square rational number

#### (1) Complete:

$$1) -\sqrt{\frac{144}{49}} = -\sqrt{\left(\frac{12}{7}\right)^2}$$

$$2) \sqrt{\left(\frac{3}{25}\right)^2} = \frac{3}{25}$$

$$3) \pm \sqrt{\frac{25x^2y^2}{36}} = \pm \frac{5xy}{6}$$

$$4) 3a = \sqrt{4b} \rightarrow \frac{a}{b} = \frac{\sqrt{4}}{3} = \frac{2}{3}$$

$$5) \sqrt{(-8)^2 + (-6)^2} = \sqrt{64 + 36} = \sqrt{100} = 10$$

$$6) \sqrt{100 - 64} = \sqrt{36} = 6$$

$$= 10 - 4$$

$$7) \sqrt{16 + 9} = \sqrt{25} = 5$$

$$= 2 + 3$$

$$8) \sqrt{9} + \sqrt{4} = 3 + 2 = 5 = \sqrt{25}$$

**(2) Choose the correct answer:**

$$1) \sqrt{\frac{100}{36}} = \sqrt{\frac{25}{9}} = \frac{5}{3} \quad \begin{matrix} \text{M} \\ \text{I} \end{matrix} \rightarrow \frac{3}{5} = \frac{6}{10}$$

$$2) \sqrt{a^2} = |a|$$

$$3) \sqrt{9 + 16} = \sqrt{25} = 5$$

$$4) \sqrt{\frac{4}{9}} = \frac{2}{3} \quad \begin{matrix} \text{A} \\ \text{I} \end{matrix} \rightarrow \frac{-2}{3}$$

$$5) \sqrt{\frac{a}{b}} = \frac{2}{3} \rightarrow \frac{a}{b} = \frac{4}{9}$$

$$\frac{b}{a} = \frac{9}{4}$$

$$6) \pm \sqrt{\frac{4}{9}} = \pm \frac{2}{3}$$

**(3) Find the value of:**

$$1) \left(\frac{-2}{5}\right)^2 \times \sqrt{6 \frac{1}{4}} \times \left(\frac{-5}{8}\right)^0$$

$$= \left(\frac{4}{25}\right) \times \sqrt{\frac{25}{4}} \times 1$$

$$= \frac{4}{25} \times \frac{5}{2} \times 1 = \frac{2}{5}$$

$$2) \left(\frac{-1}{3}\right)^2 + \sqrt{\frac{64}{81}} \times \left(\frac{3}{7}\right)^0$$

$$= \frac{1}{9} + \frac{8}{9} - 1$$

$$= \frac{9}{9} - \frac{9}{9} = \text{zero}$$

$$3) \sqrt{100 - (-6)^2} = \sqrt{100 - 36}$$

$$= \sqrt{64} = 8$$

$$4) \left(\frac{-3}{7}\right)^0 \times \left(\frac{-2}{5}\right)^2 \times \sqrt{6\frac{1}{4}}$$

$$= 1 \times \left(\frac{4}{25}\right) \times \sqrt{\frac{25}{4}}$$

$$= 1 \times \frac{4}{25} \times \frac{5}{2} = \frac{2}{5}$$

### (5) Solving equations and inequalities in $\mathbb{Q}$

#### (1) Complete:

$$1) \quad x - 3\frac{1}{2} = 5$$

$$x - \frac{7}{2} = 5$$

$$x - \frac{17}{2} = 8.5$$

$$2) \quad x + 9 = 11 \rightarrow x = 2$$

$$7x = 7 \times 2 = 14$$

$$3) \quad 2t + 3 = 15 \rightarrow 2t = 12$$

$$t = 6$$

$$\frac{1}{3}t = \frac{1}{3} \times 6 = 2$$

$$4) \quad \frac{x}{4} = \frac{2}{3} \rightarrow x = 4 \times \frac{2}{3}$$

$$x = \frac{8}{3}$$

$$\frac{x}{2} = \frac{8}{3} \div 2 = \frac{4}{3}$$

$$5) \quad \frac{6x}{5} = -2 \rightarrow x = 2 \times \frac{5}{6}$$

$$x = \frac{-5}{3}$$

$$x^2 = \left(\frac{-5}{3}\right)^2 = \frac{25}{9}$$

6)  $\frac{x}{5} = 30\% = 0.3$

$$x = 1.5 = \frac{3}{2}$$

7)  $x = 3$

8)  $3x = 6 \rightarrow x = 2$

Then  $5x = 5 \times 2 = 10$

9)  $2x = 2 \rightarrow x = 1$

Then  $3x - 1 = 3(1) - 1 = 2$

10)  $2x - 7 = 3$ , then  $x = 5$

11)  $\frac{6x}{5} = -2 \rightarrow 6x = -10$

$$6x = \frac{-10}{6} = \frac{-5}{3}$$

$$x^2 = \left(\frac{-5}{3}\right)^2 = \frac{25}{9}$$

12)  $x > y$ ,  $x + z > y + z$

13) if  $x < 0$  then  $x + 3 < 3$

14) If  $x > y$ ,  $z$  is (-ve) then  $xz > yz$

15)  $3x + 1 \geq 10$ , then  $x \geq 3$

16)  $-2x > 8$ , S.S =  $\{x : x \in \mathbb{Z}, x < -4\}$

17)  $-x > 4$  then  $x < -4$

18) age of Ali  $(x - 2)$

His age four years ago is  $(x - 2) - 4$

$$(x - 6)$$

19) age of Omar is  $x$  years his age after 5 years  $(x + 5)$

20) S.S of the inequality  $x < 0$  in  $\mathbb{N}$  is  $\emptyset$

**(2) Find in  $\mathbb{Q}$  the S.S of the following:**

1)  $x + 4 = 14$

$$x = 14 - 4 = 10$$

$$\text{S.S} = \{ 10 \}$$

2)  $3x + 1 = 25$

$$3x = 25 - 1$$

$$3x = 24 \rightarrow x = 8$$

$$\text{S.S} = \{ 8 \}$$

3)  $8 + 2x = 14$

$$2x = 6 \rightarrow x = 3$$

$$\text{S.S} = \{ 3 \}$$

4)  $3x - 4 = 2x + 5$

$$3x - 2x = 4 + 5$$

$$x = 9$$

$$\text{S.S} = \{ 9 \}$$

5)  $3(x + 2) = 12$

$$3x + 6 = 12$$

$$3x = 6 \rightarrow x = 2$$

$$\text{S.S} = \{ 2 \}$$

6)  $3x - 1 \leq 2x + 3$

$$3x - 2x \leq 1 + 3$$

$$x \leq 4$$

$$\text{S.S} = \{ x : x \in \mathbb{Q}, x \leq 4 \}$$



7)  $2x + 13 < 21$

$$2x \leq 8$$

$$x \leq 4$$

$$\mathbf{S.S} = \{x : x \in \mathbb{Q}, x \leq 4\}$$

**(3) Solve:**

$$x + 2 = 8 \text{ in } \mathbb{Z}$$

$$x = 8 - 2$$

$$x = 6 \quad \mathbf{S.S} \{6\}$$

**(4)  $3 - 2x \geq 1$  in  $\mathbb{Q}$**

$$-2x \geq 1 - 3$$

$$-2x \geq -2$$

$$x \leq 1 \quad \mathbf{S.S} = \{x : x \in \mathbb{N}, x \geq 1\}$$

**(5) let the number is  $x$**

**3 times of the no.  $3x$**

$$x + 3x = 28$$

$$4x = 28$$

$$x = 7$$

**The number is 7**

**(6) The three consecutive even numbers are:**

$$x, x + 2, x + 4$$

$$x + x + 2 + x + 4 = 204$$

$$3x + 6 = 204$$

$$x = 66$$

**Three consecutive numbers are 66, 68, 70**

**(7)** Let the age of the middle is  $x$

The eldest one:  $x + 3$

The youngest age:  $x - 2$

$$x + x + 3 + x - 2 = 55$$

$$3x + 1 = 55$$

$$x = 18$$

The age of middle is 18

The age of eldest is 21

The age of youngest is 16

**(8)**  $5x - 2x = 30$

$$3x = 30$$

$$x = 10$$

Smaller = 20

Greater = 50

**(9)**  $x + 2x + 5 + 2x = 180^\circ$

$$5x + 5 = 180^\circ$$

$$5x = 175^\circ$$

$$x = 35^\circ$$

$$\therefore x = 25^\circ$$

$$2x = 70^\circ$$

$$2x + 5 = 75^\circ$$

**(10)** Let the length of a rectangle is  $2x$

Width is  $x$

$$\text{Area} = 24.5 \text{ cm}^2$$

$$L \times w = 24.5 \text{ cm}^2$$



$$x(2x) = 24.5$$

$$2x^2 = 24.5$$

$$x^2 = 12.25 \rightarrow x = 3.5$$

$$2x = 7 \text{ cm}$$

## (6) Statistics and Probability

**(1) Complete the following:**

1) 1

2) zero

3) absent =  $0.15 = \frac{15}{100} \times 600 = 90$  students

Present =  $600 - 90 = 510$  students

4)  $\frac{1}{2}$

5)  $\frac{1}{2}$

6)  $\frac{1}{6}$

7)  $\frac{20}{45} = \frac{4}{9}$

8) 0.1

**(2) Choose the correct answer:**

1) 87%

2) 1

3)  $\frac{5}{12}$

4) 0.25

5) 1

**(3) 5 white balls , 4 blacks balls , 7 red balls**

Sum of balls = 16

1)  $\frac{5}{16}$

2)  $\frac{7}{16}$

3)  $\frac{11}{16}$

4)  $\emptyset$

**(4) 10 cards**

5  $\rightarrow$  14

1)  $\frac{5}{10} = \frac{1}{2}$

2)  $\frac{4}{10} = \frac{2}{5}$

**(5) 1)  $\frac{3}{6} = \frac{1}{2}$**

2)  $\frac{4}{6} = \frac{2}{3}$

3)  $\frac{2}{6} = \frac{1}{3}$

4)  $\frac{1}{6}$

**(6) {2 , 3 , 5} no. of sets = 9**

S.S = { 22, 23, 24, 32, 33, 35, 52, 53, 55 }

1)  $\frac{2}{9}$

2)  $\frac{3}{9} = \frac{1}{3}$