

section 1.3
Operations on Real numbers :-

①

Adding Real numbers :-

- 1) To add numbers with the same sign, add their absolute value and attach their common sign.
- 2) To add two numbers with different signs, subtract the smaller absolute value from the larger absolute value and attach the sign of the number with the larger absolute value.

Subtracting Real Numbers :-

if a and b are real numbers then
 $a - b = a + (-b)$.

EX

$$\begin{aligned} \textcircled{1} \quad -7 + (-10) &= - \{ |-7| + |-10| \} \\ &= - \{ 7 + 10 \} \\ &= -17 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad 7 - 14 &= 7 + (-14) \\ &= - \{ |14| - |7| \} \\ &= \underline{-7} \end{aligned}$$

(2)

* Multiplying Two Real Numbers

* Multiplying two numbers with the same sign is a positive number.

* Multiplying two numbers with different sign is a negative number.

* Dividing Two Real Numbers:

The quotient of two numbers with the same sign is a positive number.

The quotient of two numbers with different sign is a negative number.

* Division by 0 is undefined.

* If a, b are real numbers and $b \neq 0$, then

$$-\frac{a}{b} = \frac{a}{-b} = -\frac{a}{b}$$

Exponents :-

if a is a real number and n is a natural number, then, ' a raised to the power n :

$$a^n = \underbrace{a \cdot a \cdot a \cdot \dots \cdot a}_{n \text{ times.}}$$

EX

simplify

a) 4^2

$$4^2 = 4 \cdot 4 = 16$$

b) -2^3

$$-2^3 = -2 \cdot 2 \cdot 2 = -8$$

c) $\left(\frac{1}{3}\right)^4$

$$\left(\frac{1}{3}\right)^4 = \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{81}$$

* The opposite of squaring a number is taking the square root of a number.

* There is other values for the roots, such as cubic root, fifth root.

EX

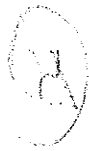
Find each root

a) $\sqrt[3]{8} = 2$

b) $\sqrt[4]{1} = 1$

c) $\sqrt[5]{32} = 2$

d) $\sqrt[3]{27} = 3$



order of operations :-

simplifying expressions :-

1) Raise to the power or take roots from left to right

2) multiply or divide in order from left to right.

3) Add or subtract from left to right.

EX :
simplify

$$a) 15 - 2 \cdot 5 = 15 - 10 = 5$$

$$b) 5(2-6)^2 = 5(-4)^2 \\ = 5 \cdot 16 \\ = 80.$$

$$c) \frac{|-3|^2 + 5}{\sqrt{9} - 10} = \frac{9 + 5}{3 - 10} = \frac{14}{-7} = -2$$

$$d) 7 - [2(1-3) + 5(10-12)]$$

$$= 7 - [2 \cdot -2 + 5 \cdot -2]$$

$$= 7 - [(-4) + (-10)]$$

$$= 7 - (-14)$$

$$= 7 + 14 = 21.$$

HW.

11, 19, 25, 31, 33, 37
39, 41, 47, 51, 59, 65
69, 75, 79.