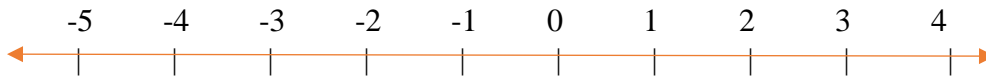


Lesson 0.1 – Review of Numbers & Arithmetic

I. Integers and the Numbers Line

The negative whole numbers, zero, and the positive whole numbers, together form the set of all **integers** \mathbb{Z} . They can be represented on the real number line.



1. Simplify the following.

(a) $4 + -9$

-5

(b) $4 - -9$

13

(c) $-3 + -5$

-8

(d) $-3 - -5$

2

- Adding a positive shifts the number to the **right** on the number line.
- Adding a negative shifts the number to the **left** on the number line.
- Subtracting a positive shifts the number to the **left** on the number line.
- Subtracting a negative shifts the number to the **right** on the number line.

2. Find the value of:

(a) 3×4

12

(b) 3×-4

-12

(c) -3×4

-12

(d) -3×-4

12

Multiplying or dividing a:

- **(positive)** by a **(positive)** gives a **(positive)**
- **(positive)** by a **(negative)** gives a **(negative)**
- **(negative)** by a **(positive)** gives a **(negative)**
- **(negative)** by a **(negative)** gives a **(positive)**

3. Find the value of:

(a) $14 \div 2$

7

(b) $14 \div -2$

-7

(c) $-14 \div 2$

-7

(d) $-14 \div -2$

7

II. Order of Operations

Simplify the following:

4. (a) $3 + 7 - 5 = 5$

(b) $6 \times 3 \div 2 = 9$

(c) $23 - 10 \div 2 = 18$

(d) $3 \times 8 - 6 \times 5 = -6$

Order of Operations (PEMDAS)

1. **Parentheses**
2. **Exponents**
3. **Multiplication & Division**
(from left to right)
4. **Addition and Subtraction**
(from left to right)

(e) $3 + (11 - 7) \times 2 = 11$

(f) $[12 + (9 \div 3)] - 11 = 4$

(g) $\frac{12+(5-7)}{18 \div (6+3)} = 5$

III. Exponents

5. Simplify the following

(a) $-4^2 = -16$ (b) $(-4)^2 = 16$ (c) $-2^3 = -8$ (d) $(-2)^3 = -8$

(d) $30 - (15 \div 3)^2 = 5$

If n is a positive integer, then a^n is the product of n factors of a .

$$a^n = a \times a \times a \times a \times \dots \times a$$

Where n is the power or exponent

6. $2^3 \times 2^5$

7. $4^2 \times 4^2$

8. $9^2 \times 9 \times 9^3$

9. $\frac{10^3}{10}$

10. $\frac{11^8}{11^5}$

11. $(3^5)^2$

12. 7^0

13. 3^{-2}

14. $3^0 - 3^1$

15. $(\frac{5}{3})^2$

16. Write the following expressions as powers of 2.

(a) 16

(b) $1/16$

(c) 1

(d) 4×2^n

(e) $2^m/8$

Laws of Exponents

Multiplying numbers with the same base: $a^m \times a^n = a^{m+n}$

Dividing numbers with the same base: $\frac{a^m}{a^n} = a^{m-n}$

Raising a power to a power: $(a^m)^n = a^{mn}$

Power of a product is product of powers: $(ab)^n = a^n b^n$

Power of quotient is quotient of powers: $(\frac{a}{b})^n = \frac{a^n}{b^n}$

Any non-zero raised to the zero power: $a^0 = 1, a \neq 0$

Negative power is reciprocal of number: $a^{-n} = \frac{1}{a^n}$

IV. Fractions, Decimals, and Percentages

17. Write $\frac{32}{40}$ in simplest form.

$$4/5$$

18. Evaluate $\frac{3}{4} + \frac{5}{6}$

$$1 \frac{7}{12}$$

19. Evaluate $1 \frac{2}{3} - 1 \frac{2}{5}$

$$1 \frac{2}{3} - 1 \frac{2}{5}$$

20. Evaluate $\frac{1}{4} \times \frac{2}{3}$.

$$1/6$$

21. Evaluate $(3\frac{1}{2})^2$

$$49/4 \quad \text{or} \quad 12 \frac{1}{4}$$

22. Evaluate $3 \div \frac{2}{3}$

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

23. Evaluate $2 \frac{1}{3} \div \frac{2}{3}$

$$3 \frac{1}{2}$$

24. Write 5.704 in expanded form.

$$5 + \frac{7}{10} + \frac{4}{1000}$$

25. Write $3 + \frac{2}{10} + \frac{4}{100} + \frac{1}{10000}$ in decimal form.

$$3.2401$$

26. Evaluate 31.26×100

$$3126$$

27. Evaluate $58.07 \div 1000$

$$0.05807$$

28. Evaluate 24.1×0.8

$$19.28$$

29. Evaluate $3.6 \div 0.02$

$$180$$

Working with Fractions

Fractions represent parts to a whole. The number above the bar is called the **numerator** and the number below the bar is called the **denominator**.

$\frac{4}{5}$ is a **proper fraction** (numerator < denominator)

$\frac{7}{6}$ is an **improper fraction** (numerator > denominator)

$2\frac{3}{4}$ is a **mixed number** (whole number + fraction)

Two fractions are **equivalent** if they represent the same amount. $\frac{1}{2}$ and $\frac{3}{6}$ are equivalent fractions. A fraction is in its **simplest form** if written with the smallest possible integer denominator.

To **add or subtract fractions**: convert the fractions so they have the same denominator, then add or subtract the new numerators. The denominator stays the same.

To **multiply** two fractions, we multiply the two numerators and the two denominators.

Working with Decimals

The decimal point separates place values for whole numbers from place values for parts to a whole.

To add or subtract decimals, we line one decimal on top of the other and apply the standard algorithm.

To multiply by 10, we shift the decimal point to the right.

To divide by 10, we shift the decimal point to the left.

30. Write as a fraction in simplest form:

(a) 40%

$$\frac{2}{5}$$

(b) 150%

$$\frac{3}{2}$$

(c) $12\frac{1}{2}\%$

$$\frac{1}{8}$$

Working with Percentages

% means “per cent”
meaning in every hundred

To convert a percentage
into a fraction or a decimal,
we divide by 100%

31. Write as a decimal:

(a) 43%

$$0.43$$

(b) $12\frac{1}{2}\%$

$$0.125$$

32. Write as a percentage:

(a) $\frac{3}{5}$

$$60\%$$

(b) 0.042

$$4.2\%$$

33. Find the following percentages:

(a) 35% of \$25000

$$\$8750$$

(b) 108% of 5000 kg.

$$5.4 \text{ kg}$$

V. Rounding Numbers & Estimation

34. Round off

(a) 286 to the nearest 10.

$$290$$

(b) 19439 to the nearest 100.

$$19400$$

(c) 319 to one significant figure

$$300$$

(d) 3850 to two significant figures

$$3900$$

35. Round 39.748 to:

(a) The nearest whole number

$$40$$

(b) one decimal place

$$39.7$$

(c) two decimal places

$$39.75$$

36. Find $\frac{2}{7}$ correct to 3 decimal places.

$$0.286$$

37. Perform one figure approximations for the following

(a) 57×8

$$480$$

(b) 537×6

$$3000$$

(c) 623×69

$$42000$$

(d) $4123 \div 47$

$$80$$