

Global Innovator Olympiad (GIO)

English	10 Questions	Social Science	10 Questions
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GLOBAL INNOVATOR OLYMPIAD (GIO)

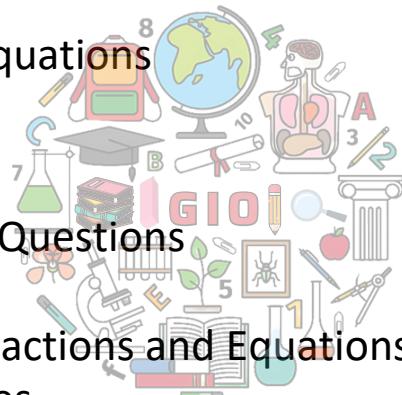
10th: Syllabus

ENGLISH 10 Questions

Tense
Modals
Subject Verb Concord
Reported Speech

MATHEMATICS 35 Questions

Real Numbers
Polynomials
Quadratic Equations
Triangles



SCIENCE 35 Questions

CHEMISTRY
Chemical Reactions and Equations
Life Processes

PHYSICS
Light - Reflection and Refraction

SOCIAL SCIENCE 10 Questions

Geography
Resources and Development
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MENTAL ABILITY 10 Questions

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1. English

1. Tense

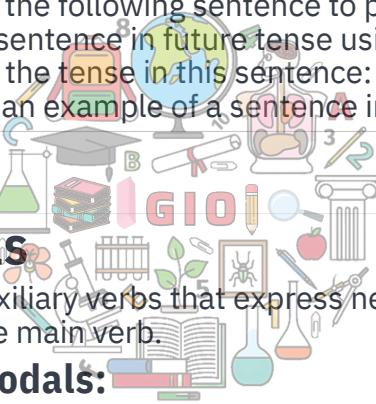
Tense indicates the time of an action or state of being. Understanding different tenses helps convey the correct time frame in writing and speech.

Key Tenses:

1. **Present Tense:** Indicates actions happening now or regularly.
 - o **Example:** She **writes** a letter every day.
2. **Past Tense:** Indicates actions that have already occurred.
 - o **Example:** He **wrote** a letter yesterday.
3. **Future Tense:** Indicates actions that will happen.
 - o **Example:** They **will write** a letter tomorrow.

Questions:

1. Convert the following sentence to past tense: "She walks to school."
2. Write a sentence in future tense using "will."
3. Identify the tense in this sentence: "They are playing soccer."
4. Provide an example of a sentence in the simple present tense.



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2. Modals

Modals are auxiliary verbs that express necessity, possibility, permission, or ability. They modify the meaning of the main verb.

Common Modals:

- Can:** Indicates ability (e.g., She **can** swim).
- Could:** Indicates past ability or possibility (e.g., He **could** play the guitar).
- May:** Indicates permission or possibility (e.g., You **may** leave early).
- Must:** Indicates necessity (e.g., You **must** finish your homework).

Questions:

1. Write a sentence using "can" to express ability.
2. How is "must" different from "may" in terms of meaning?
3. Provide an example of "should" used in a sentence.
4. Convert the following: "He is able to run fast" using a modal.



3. Subject-Verb Concord

Subject-verb concord (or agreement) means that the subject and verb in a sentence must agree in number and person.

Key Concepts:

- Singular Subjects:** Take singular verbs (e.g., The cat **sleeps**).
- Plural Subjects:** Take plural verbs (e.g., The cats **sleep**).
- Indefinite Pronouns:** Some require singular verbs (e.g., Everyone **is** happy).

Questions:

1. Identify the error in the following sentence: “The team are winning the match.”
2. Write a correct sentence using a plural subject and verb.
3. Explain the rule of concord with collective nouns.
4. Provide an example of a sentence using an indefinite pronoun.

4. Reported Speech

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Reported speech (or indirect speech) is used to report what someone else has said without quoting them directly. It often requires changes in tense, pronouns, and time expressions.

Key Concepts:

- Direct Speech:** Quoting the exact words spoken (e.g., He said, “I am tired.”).
- Reported Speech:** Paraphrasing what was said (e.g., He said that he was tired).

Questions:

1. Convert the direct speech to reported speech: “She said, „I am going to the market.””
2. What changes occur when converting from direct to reported speech?
3. Rewrite this sentence in reported speech: The teacher said, “You must complete your homework.”
4. Convert this reported speech to direct speech: He said that he would help us.



2. Mathematics

1. Real Numbers

Real numbers include all the numbers on the number line, encompassing both rational and irrational numbers. They can be positive, negative, or zero.

Key Concepts:

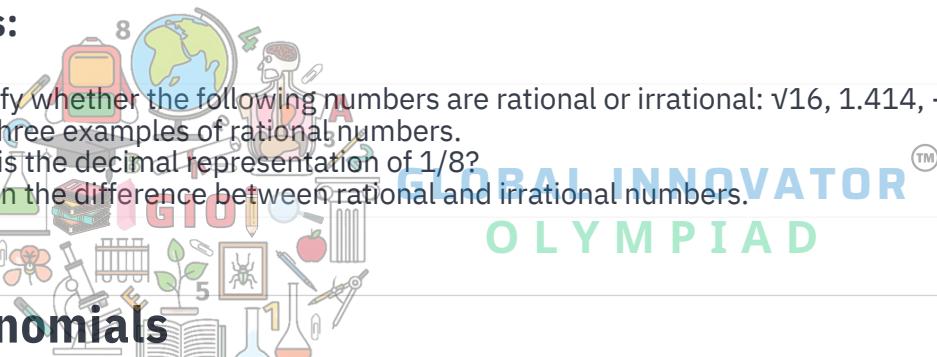
- Rational Numbers:** Numbers that can be expressed as the quotient of two integers (e.g., $\frac{1}{2}$, 3).
- Irrational Numbers:** Numbers that cannot be expressed as fractions (e.g., $\sqrt{2}$, π).
- Properties of Real Numbers:** Commutative, associative, distributive properties, and closure property.

Examples:

- Rational:** $\frac{3}{4}$, -5, 0.75
- Irrational:** $\sqrt{3}$, π

Questions:

1. Identify whether the following numbers are rational or irrational: $\sqrt{16}$, 1.414, -3.5.
2. Give three examples of rational numbers.
3. What is the decimal representation of $\frac{1}{8}$?
4. Explain the difference between rational and irrational numbers.



2. Polynomials

A polynomial is a mathematical expression consisting of variables, coefficients, and non-negative integer exponents.

Key Concepts:

- Standard Form:** A polynomial written in descending order of degrees (e.g., $(3x^3 + 2x^2 - 5x + 4)$).
- Types of Polynomials:**
 - Monomial:** A polynomial with one term (e.g., $(4x^2)$).
 - Binomial:** A polynomial with two terms (e.g., $(x^2 + 3x)$).
 - Trinomial:** A polynomial with three terms (e.g., $(x^2 - x + 5)$).

Examples:

- Monomial:** $(5x^3)$
- Binomial:** $(2x+3)$
- Trinomial:** $(x^2 + 4x + 4)$



Questions:

1. Identify the degree of the polynomial $(4x^2 + 3x + 7)$.
2. Write a polynomial in standard form with the terms $(3x^2, -2x, 6)$.
3. Classify the polynomial $(5x^3 - 3x + 2)$ as a monomial, binomial, or trinomial.
4. Evaluate the polynomial $(2x^2 + 3x - 5)$ for $(x = 2)$.

3. Quadratic Equations

A quadratic equation is a second-degree polynomial equation in the form $(ax^2 + bx + c = 0)$, where $(a \neq 0)$.

Key Concepts:

- Standard Form:** $(ax^2 + bx + c = 0)$
- Roots of the Equation:** The values of (x) that satisfy the equation can be found using factoring, completing the square, or the quadratic formula.

Examples:

- Quadratic Equation:** $(x^2 - 5x + 6 = 0)$
- Quadratic Formula:** $(x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a})$

Questions:

1. Solve the quadratic equation $(x^2 - 4x - 5 = 0)$ by factoring.
2. Find the roots of the equation $(2x^2 + 3x - 2 = 0)$ using the quadratic formula.
3. Explain how to identify a quadratic equation.
4. What is the significance of the discriminant in a quadratic equation?

4. Triangles

Triangles are three-sided polygons that have various properties and classifications based on their sides and angles.



Key Concepts:

- Types of Triangles:**
 - By Sides:** Equilateral, Isosceles, Scalene.
 - By Angles:** Acute, Right, Obtuse.
- Sum of Angles:** The sum of the interior angles of a triangle is always (180°) .

Examples:

- Equilateral Triangle:** All sides and angles are equal (each angle is (60°)).
- Right Triangle:** One angle is (90°) .

Questions:

1. Classify the triangle with sides of lengths 3, 4, and 5.
2. Calculate the third angle of a triangle if the other two angles are (45°) and (55°) .
3. What is the formula for the area of a triangle?
4. Explain the Pythagorean theorem and its application in right triangles.



3.Science

1. Chemistry: Chemical Reactions and Equations

Overview

Chemical reactions involve the transformation of substances into new products through the breaking and forming of chemical bonds. Understanding chemical equations is essential for representing these reactions.

Key Concepts:

- Chemical Reaction:** A process that leads to the chemical transformation of one set of chemical substances to another.
- Types of Reactions:**
 - Combination Reaction:** Two or more substances combine to form a single product (e.g., $(A + B \rightarrow AB)$).
 - Decomposition Reaction:** A single compound breaks down into two or more products (e.g., $(AB \rightarrow A + B)$).
 - Displacement Reaction:** An element displaces another in a compound (e.g., $(A + BC \rightarrow AC + B)$).
 - Redox Reactions:** Reactions involving the transfer of electrons.

Examples:

- Combination Reaction:** $(2H_2 + O_2 \rightarrow 2H_2O)$
- Decomposition Reaction:** $(2H_2O \rightarrow 2H_2 + O_2)$

Questions:

1. Write a balanced chemical equation for the combustion of methane ((CH_4)).
2. Explain the difference between endothermic and exothermic reactions.
3. What is a catalyst, and how does it affect a chemical reaction?
4. Describe a real-life example of a chemical reaction.

2. Biology: Life Processes

Overview

Life processes refer to the essential functions that living organisms perform to maintain life. These processes include nutrition, respiration, transportation, excretion, and reproduction.

Key Concepts:

- Nutrition:** The process by which organisms obtain and use food for energy and growth.
- Respiration:** The process of breaking down food to release energy.



- **Transportation:** Movement of substances within the organism (e.g., blood circulation in humans).
 - **Excretion:** Removal of waste products from the body.
 - **Reproduction:** The biological process by which new individual organisms are produced.

Examples:

- ☐ **Photosynthesis:** Plants convert sunlight into energy.
 - ☐ **Cellular Respiration:** Cells convert glucose and oxygen into energy.

Questions:

1. Explain the process of photosynthesis and its importance.
 2. Describe how respiration occurs in humans.
 3. What are the different modes of nutrition in organisms?
 4. Why is excretion important for living organisms?

3. Physics: Light - Reflection and Refraction

Overview

Light is a form of energy that travels in waves. Reflection and refraction are two fundamental behaviors of light that are essential for understanding optical phenomena.

Key Concepts:



- **Reflection:** The bouncing back of light when it hits a surface. The law of reflection states that the angle of incidence is equal to the angle of reflection.
 - **Refraction:** The bending of light as it passes from one medium to another, caused by a change in speed.
 - **Lens:** A transparent object that refracts light to converge or diverge.

Examples:

- **Reflection:** A mirror reflects light, allowing you to see your image.
 - **Refraction:** A straw appears bent when placed in a glass of water due to the bending of light.

Questions:

1. What is the law of reflection?
 2. Explain the phenomenon of refraction with an example.
 3. Describe the difference between a convex lens and a concave lens.
 4. How does the bending of light cause objects to appear distorted in water?

4. Social Science

1. Geography: Resources and Development

Overview

Resources are materials or substances that are useful to humans, and development refers to the process of improving the economic, social, and environmental conditions of a region.

Key Concepts:

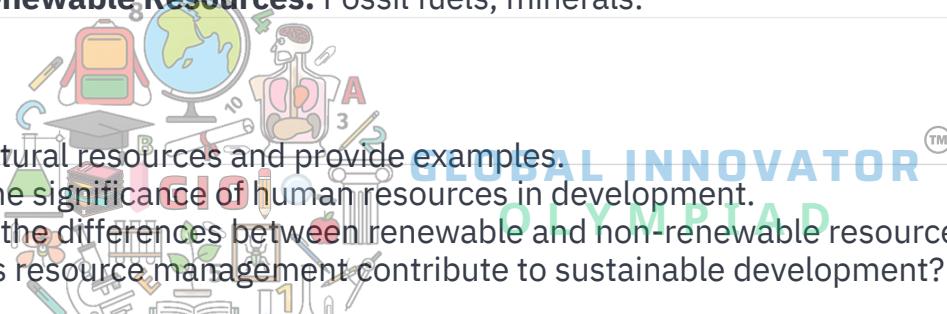
- Types of Resources:**
 - o **Natural Resources:** Resources provided by nature (e.g., water, minerals).
 - o **Human Resources:** Skills and knowledge of people.
 - o **Capital Resources:** Tools and machinery used in production.

Examples:

- Renewable Resources:** Solar energy, wind energy.
- Non-Renewable Resources:** Fossil fuels, minerals.

Questions:

1. Define natural resources and provide examples.
2. Explain the significance of human resources in development.
3. What are the differences between renewable and non-renewable resources?
4. How does resource management contribute to sustainable development?



2. Civics: Forest and Wildlife Resources

Overview

Forests and wildlife resources are critical components of the environment that support biodiversity, provide livelihoods, and contribute to ecological balance.

Key Concepts:

- Importance of Forests:** Forests help in carbon sequestration, water conservation, and providing habitats for various species.
- Conservation of Wildlife:** Efforts to protect endangered species and their habitats.

Examples:

- Protected Areas:** National parks and wildlife sanctuaries.
- Forestry Practices:** Sustainable logging and afforestation.



Questions:

1. Discuss the ecological importance of forests.
2. What are the main threats to wildlife?
3. Describe one conservation effort for endangered species.
4. How can communities benefit from forest resources sustainably?

3. Civics: Power-Sharing

Overview

Power-sharing is the distribution of political power among different entities within a state to ensure stability and peace.

Key Concepts:

- Forms of Power-Sharing:** Can include federalism, decentralization, and coalition governments.
- Importance:** Helps to maintain peace among diverse groups and prevents the concentration of power.

Examples:

- Federalism:** Division of powers between the central and state governments.
- Coalition Governments:** When multiple parties come together to form a government.

Questions:

1. What are the benefits of power-sharing in a diverse society?
2. Explain how federalism works in India.
3. Discuss the role of coalition governments in maintaining political stability.
4. Provide examples of countries that practice power-sharing.

4. Civics: Federalism

Overview

Federalism is a system of government in which power is divided between a central authority and constituent political units (like states or provinces).

Key Concepts:

- Two Levels of Government:** The central government and state governments.
- Distribution of Powers:** Exclusive, concurrent, and residual powers.



Examples:

- **Indian Federal Structure:** Powers are divided among the Union and State governments as outlined in the Constitution.

Questions:

1. Describe the features of federalism.
2. What are the advantages of a federal system of government?
3. How does federalism promote unity in diversity?
4. Identify and explain the types of powers in a federal system.

5. Economics: Development

Overview

Development refers to the economic, social, and political progress of a nation or region, typically measured by indicators such as GDP, literacy rates, and health care.

Key Concepts:

- **Economic Development:** Improvement in the economic well-being of a community.
- **Social Development:** Enhancements in education, health, and quality of life.

Examples:



- **Indicators of Development:** GDP per capita, Human Development Index (HDI).

Questions:

1. What are the main indicators used to measure development?
2. Explain the difference between economic growth and economic development.
3. How does development impact the standard of living?
4. Discuss the challenges faced in achieving sustainable development.

6. Economics: Sectors of the Indian Economy

Overview

The Indian economy is divided into three main sectors: primary, secondary, and tertiary. Each sector plays a vital role in the overall economic development.

Key Concepts:



- **Primary Sector:** Involves extraction of natural resources (e.g., agriculture, mining).
- **Secondary Sector:** Involves manufacturing and processing (e.g., textiles, automobiles).
- **Tertiary Sector:** Involves services (e.g., education, healthcare, tourism).

Examples:

- **Primary Sector:** Farming, fishing.
- **Secondary Sector:** Construction, food processing.
- **Tertiary Sector:** Banking, retail.

Questions:

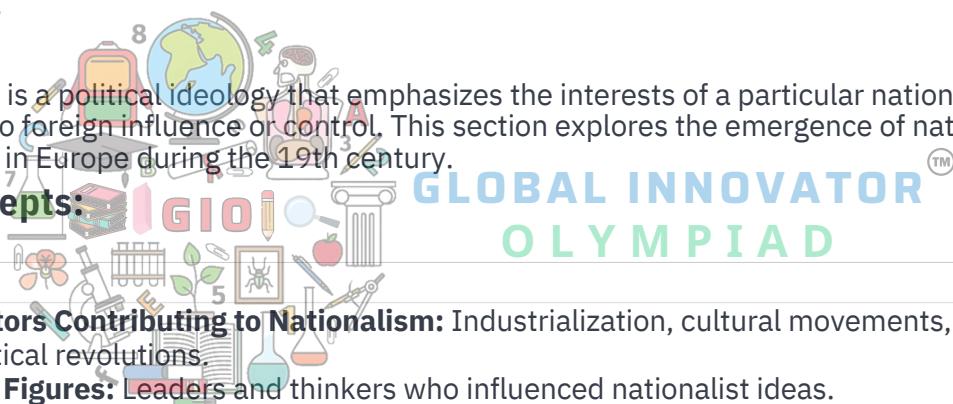
1. Identify the three sectors of the Indian economy and provide examples for each.
2. Discuss the significance of the primary sector in the Indian economy.
3. How has the tertiary sector evolved in India over the years?
4. Explain the interdependence of the three sectors.

7. History: The Rise of Nationalism in Europe

Overview

Nationalism is a political ideology that emphasizes the interests of a particular nation, often in opposition to foreign influence or control. This section explores the emergence of nationalist movements in Europe during the 19th century.

Key Concepts:



- **Factors Contributing to Nationalism:** Industrialization, cultural movements, and political revolutions.
- **Key Figures:** Leaders and thinkers who influenced nationalist ideas.

Examples:

- **The Unification of Germany:** Otto von Bismarck's role in uniting the German states.
- **The Italian Renaissance:** The movement that fostered a sense of Italian identity.

Questions:

1. What were the major factors that contributed to the rise of nationalism in Europe?
2. Discuss the impact of the Industrial Revolution on nationalist movements.
3. Who was Otto von Bismarck, and what role did he play in German unification?
4. Explain how cultural movements influenced nationalism.

8. History: Nationalism in India



Overview

This topic examines the rise of nationalism in India, highlighting the struggle for independence from British colonial rule and the various movements that emerged.

Key Concepts:

- Indian National Congress:** A key political party that played a significant role in the independence movement.
- Non-Cooperation Movement:** A major campaign led by Mahatma Gandhi against British rule.
- Partition of India:** The division of British India into two independent dominions, India and Pakistan.

Examples:

- Civil Disobedience Movement:** A non-violent resistance against British laws and regulations.
- The Quit India Movement:** A mass protest demanding an end to British rule in India.

Questions:

1. What role did the Indian National Congress play in the struggle for independence?
2. Explain the significance of the Non-Cooperation Movement.
3. How did Mahatma Gandhi influence the nationalist movement in India?
4. Discuss the reasons and implications of the partition of India.



5. Mental Ability

1. Alphabet Test

An alphabet test involves identifying the position of letters in the English alphabet or finding relationships between different letters.

Key Concepts:

- Positioning:** Each letter has a numerical position (A=1, B=2, ..., Z=26).
- Reversing Positions:** Understanding the reverse order of letters.

Examples:

1. **Position:** A = 1, B = 2, C = 3, ...
 - o **Question:** What is the position of the letter D?
 - Answer:** 4
2. **Reverse Position:** Z = 1, Y = 2, ...
 - o **Question:** What is the reverse position of the letter A?
 - Answer:** 26

Questions:

1. What is the position of the letter F in the English alphabet?
2. If A = 1, what is the sum of the positions of the letters A, B, and C?
3. What is the reverse position of the letter M?
4. Find the letter that is 3 positions after J in the alphabet.

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2. Coding-Decoding

Coding-decoding problems involve substituting letters or words based on a specific rule, testing logical reasoning and pattern recognition.

Key Concepts:

- Substitution:** Replacing letters with other letters or numbers.
- Pattern Recognition:** Identifying relationships in coding.

Examples:

1. **Code:** If A = 1, B = 2, C = 3, what is the code for the word "CAT"?
 - o **Solution:** C = 3, A = 1, T = 20 → Code = 3-1-20.
2. **Reverse Code:** If "DOG" is coded as "GOL," how is "CAT" coded?
 - o **Solution:** Each letter is reversed → CAT → TAC.

Questions:

1. If A = 2, B = 4, C = 6, what is the code for "CAB"?
2. How would you code the word "FISH" if each letter is shifted by +1?
3. If "RAIN" is coded as "SBOJ," what is the code for "SUN"?
4. Decode the following: If M = 13, N = 14, O = 15, what does "MON" equal?



3. Series Completion

Series completion involves identifying the next item in a sequence based on a specific pattern.

Key Concepts:

- Pattern Recognition:** Understanding how elements relate to each other in a series.

Examples:

1. **Series:** 1, 3, 5, 7, ...
 - o **Next Number:** 9 (odd numbers).
2. **Series:** 2, 4, 8, 16, ...
 - o **Next Number:** 32 (each number is multiplied by 2).

Questions:

1. What is the next number in the series: 5, 10, 15, 20, ...?
2. Find the missing number in the series: 1, 4, __, 16, 25.
3. What comes next in the series: 3, 6, 12, 24, ...?
4. Identify the next term: A, B, D, F, ...?

4. Analogy & Similarity

Analogy problems involve comparing two different things to highlight their similarities, while similarity tests assess likeness between pairs of items.

Key Concepts:

- Analogy:** A comparison between two different things to show how they are similar.
- Similarity:** Identifying how two things are alike.

Examples:

1. **Analogy:** Hand is to Glove as Foot is to __?
 - o **Answer:** Sock.
2. **Analogy:** Tree is to Forest as Star is to __?
 - o **Answer:** Galaxy.

Questions:

1. Bird is to Fly as Fish is to __?
2. Teacher is to School as Doctor is to __?
3. Sun is to Day as Moon is to __?
4. Book is to Read as Song is to __?

5. Direction Sense Test

Direction sense problems involve understanding and interpreting directional information.

Key Concepts:

- Cardinal Directions:** North, South, East, and West.
- Turning Directions:** Understanding how to navigate based on turns.

Examples:

1. If you face north and turn 90° to the right, which direction are you facing?
 - o **Answer:** East.
2. You walk 10 meters south, then turn left and walk 5 meters. In which direction are you now?
 - o **Answer:** East.

Questions:

1. If you are facing west and turn 180° , which direction are you facing now?
2. You walk 5 km north, then 3 km east. How far are you from your starting point?
3. If you go south from your house, turn right, and then go east, which direction are you facing now?
4. A person walks 2 km north and then 2 km east. What is the shortest distance back to the starting point?

6. Logical Venn Diagrams

Venn diagrams are used to illustrate the relationships between different sets, helping visualize commonalities and differences.

Key Concepts:

- Sets:** A collection of distinct objects or elements.
- Relationships:** Understanding intersections, unions, and differences.

Examples:

1. **Venn Diagram:** Show the relationship between “Mammals,” “Animals,” and “Pets.”
2. **Question:** If Set A = {1, 2, 3} and Set B = {2, 3, 4}, what is the intersection of Set A and Set B?



Questions:

1. Draw a Venn diagram to represent the sets of “Fruits” and “Vegetables.”
2. If Set X = {A, B, C} and Set Y = {B, C, D}, what is the union of Set X and Set Y?
3. What is the difference between the two sets A and B if A = {1, 2, 3, 4} and B = {2, 4, 6}?
4. Explain how Venn diagrams can help in understanding set theory.

7. Dice

Dice problems involve understanding the possible outcomes when rolling one or more dice. These exercises help in probability and combinatorics.

Key Concepts:

- Faces of a Die:** A standard die has six faces numbered from 1 to 6.
- Probability:** The likelihood of a specific outcome when rolling dice.

Examples:

1. If a die is rolled, what is the probability of rolling a number greater than 4?
 - o **Answer:** $1/3$ (only 5 and 6).
2. If two dice are rolled, what is the probability of getting a sum of 7?
 - o **Answer:** $6/36$ or $1/6$.

Questions:

1. How many faces does a standard die have?
2. What is the probability of rolling an even number on a single die?
3. If two dice are rolled, what is the total number of possible outcomes?
4. Explain how to calculate the probability of a specific outcome when rolling two dice.

8. Arithmetical Problems

Arithmetical problems involve mathematical calculations and the application of basic arithmetic operations.

Key Concepts:

- Operations:** Understanding how to perform and apply arithmetic operations in various contexts.
- Order of Operations:** Knowing the correct order to perform calculations (PEMDAS/BODMAS).

Examples:

1. **Problem:** If you buy 3 apples for \$2 each, how much do you spend in total?
 - o **Solution:** $3 \times 2 = \$6$.
2. **Problem:** What is 25% of 200?
 - o **Solution:** $0.25 \times 200 = 50$.

Questions:

1. If you have 15 candies and you give away 5, how many do you have left?
2. Calculate the sum of 234 and 567.
3. If a book costs \$15 and you buy 4, what is the total cost?
4. Solve the equation: $5x + 3 = 18$.

