SSC GD Constable Exam: Ratio and Proportion Syllabus Summary

Overview:
The Ratio and Proportion topic is a significant part of the Mathematics section in the SSC GD Constable Exam, contributing approximately 3–5 questions (6–10 marks out of 160 total marks) in the Computer-Based Examination (CBE). The syllabus focuses on understanding ratios, setting up proportions, and solving problems involving comparisons of quantities, including real-world applications. Questions test conceptual understanding, computational accuracy, and application of ratio and proportion principles at a 10th-grade level. The exam includes 80 questions (2 marks each, 0.50 negative marking per wrong answer) to be completed in 60 minutes.

Key Topics in Ratio and Proportion:

1. Ratio: Definition, simplification, and comparison of ratios.
2. Proportion: Understanding direct and inverse proportions, solving proportion equations.
3. Types of Ratios: Equivalent ratios, compound ratios, and duplicate/triplicate ratios.
4. Applications of Ratios: Dividing quantities in a given ratio, partnership problems, and mixture problems.
5. Proportions in Word Problems: Problems involving time, work, speed, and quantities.
6. Continued Proportion: Understanding mean proportional and third proportional.
7. Percentage and Ratio: Converting ratios to percentages and vice versa.
8. Variation: Direct and inverse variation in practical scenarios.

Important Formula and Techniques:

1. Ratio:
   - A ratio a:b represents the comparison of two quantities, written as a/b or a:b.
   - Simplification: Divide both terms by their Highest Common Factor (HCF).
     - Example: 12:18 = (12÷6):(18÷6) = 2:3.

- Equivalent Ratios: Multiply or divide both terms by the same non-zero number.
  - Example: 2:3 = (2×2):(3×2) = 4:6.

2. Proportion:
- If a:b = c:d, then a/b = c/d (a and d are extremes, b and c are means).
- Product of means = Product of extremes: a × d = b × c.
  - Example: If 2:3 = x:9, then 2 × 9 = 3 × x, so x = 18/3 = 6.

3. Types of Ratios:
- Compound Ratio: For ratios a:b and c:d, compound ratio = (a×c):(b×d).
  - Example: 2:3 and 4:5 = (2×4):(3×5) = 8:15.
- Duplicate Ratio: For a:b, duplicate ratio = a^2:b^2.
  - Example: 2:3 = 2^2:3^2 = 4:9.
- Triplicate Ratio: For a:b, triplicate ratio = a^3:b^3.
  - Example: 2:3 = 2^3:3^3 = 8:27.

4. Dividing Quantities in a Ratio:
- For a quantity Q divided in ratio a:b, parts are (a/(a+b)) × Q and (b/(a+b)) × Q.
- Example: Divide ₹100 in ratio 2:3:
  - First part = (2/(2+3)) × 100 = 40.
  - Second part = (3/(2+3)) × 100 = 60.

5. Proportion in Word Problems:
- Direct Proportion: If a ∝ b, then a/b = k (constant).
  - Example: If 5 workers complete a task in 10 days, 10 workers take 5 days (5/10 = 10/x, x = 5).
- Inverse Proportion: If a ∝ 1/b, then a × b = k.
  - Example: If 5 workers finish in 10 days, 10 workers take 5 days (5 × 10 = 10 × x, x = 5).

6. Continued Proportion:
- For a:b = b:c, b is the mean proportional, c is the third proportional.
- Mean Proportional: b = √(a × c).

- Example: For 4:6 = 6:x, mean proportional = $\sqrt{(4 \times x)} = 6$, so $x = 9$.
- Third Proportional: $c = b^2/a$.
- Example: For 4:6 = 6:x, $x = 6^2/4 = 36/4 = 9$.

7. Ratio to Percentage Conversion:
- Convert ratio a:b to percentage: $(a/(a+b)) \times 100$ for first part, $(b/(a+b)) \times 100$ for second part.
- Example: Ratio 2:3 = $(2/5) \times 100 = 40\%$, $(3/5) \times 100 = 60\%$.

8. Partnership Problems:
- If partners invest amounts A and B for times t_1 and t_2, profit is divided in ratio $A \times t_1 : B \times t_2$.
- Example: A invests ₹2000 for 6 months, B invests ₹3000 for 4 months, ratio = (2000×6):(3000×4) = 12000:12000 = 1:1.

Key Points for SSC GD Preparation:

- Focus Areas: Simplifying ratios, solving proportions, dividing quantities, and word problems (e.g., work, time, partnerships) are frequently tested.
- Question Types: Direct ratio calculations (e.g., simplify 12:18), proportion equations (e.g., 2:3 = x:9), dividing quantities, and word problems (e.g., time and work).
- Difficulty Level: 10th-grade level, requiring quick calculations and understanding of ratio/proportion applications.
- Practice Tips: Master ratio simplification, memorize proportion formulas, practice direct/inverse variation problems, and solve word problems from past SSC GD papers.

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