Arithmetical Reasoning & Mathematical Operations

Arithmetic Reasoning & Mathematical Operations

Arithmetic reasoning involves the basic mathematical and **arithmetic** problems.
So basically, Arithmetic reasoning primarily deals with converting the word problem and transforming it into equations to reach a solution. What is required of us is to have a look at the problem, check which concept of maths is to be applied and then arrive at the answer which is correct. Use our reasoning skills to analyse the information that can be useful and rule out the redundant data.
Arithmetic reasoning questions are asked from several areas such as: Ages, Profit & loss, Ratio & proportion, Time and work, Percentages, data based etc.

NOTE: Basic Arithmetic formulae are applied in this section to get the required answer.

Problems based on Ages:
Question: The ratio of the present ages of Asha and Lata is 5: 6. If the difference between their ages is 6 years, then what will be Lata's age will be after 5 years?
Solution:
Let the age of Asha = 5x and age of Lata = 6x
ATQ,
6x-5x=6
So, x=6
Lata's age after 5 years=6x+5=6*6+5=41 years.

Question: A father was twelve times as old as his son twenty years ago. Now he is twice as old as his son. What are the present ages of the son and the father?
Solution: Let the present age of father be x years and son be y years.
20 years ago-
x - 20 = 12(y - 20)
x - 20 = 12y - 240
x - 12y = -240 + 20
x - 12y = -220 ---(eq.i)
Now, x = 2y ---(eq.ii)
From eq.i & ii
2y - 12y = - 220
-10y = -220
y = 22 years
x = 2 × 22 = 44 years

Calculation based:

Question: Product A is costlier than product B by Rs ₹ 2. If the price of product A is increased by two times the price of product B, the new price of product A becomes ₹17. What is the price of product B?
Solution: Let, the product B = x
Product A = x+2
According to question -
(Product A) + 2(product B) = 17
(x+2) + 2(x) = 17
x + 2 + 2x = 17
3x + 2 = 17
3x = 15
x = 5
So, the price of product B is ₹5.

Question: In a class, the average weight of five students increased by 3 kg. When a new student comes in place of one of them weighing 41 kg. Find the weight of the new student.
Solution:
Total weight increased = (5 x 3) kg = 15 kg.
Weight of the new student = (41 + 15) kg = 56 kg.

Question: The weights of 4 boxes are 100, 90, 80 and 40 kilograms. Which of the following cannot be the total weight, in kilograms, of any combination of these boxes and in a combination a box can be used only once?
a) 200 b)310 c)230 d)210
Solution: 100 + 90 + 80 + 40 = 310
100 + 90 + 40 = 230
90 + 80 + 40 = 210
There is no possible combination where 200 kilograms can be the total weight.
Hence 200 is the answer.

Question: The sum of three numbers is 170. If the ratio of first to second number is 3 : 4 and that of second to third is 7 : 9, then the second number is?
Solution: Let P, Q and R are the first, second and third number respectively.
Then, P : Q = 3 : 4 & Q : R = 7 : 9
Now,
P : Q : R = 3 × 7 : 4 × 7 : 9 × 4 = 21 : 28 : 36
Suppose the numbers are 21*x*, 28*x* and 36*x*.
Then,
21*x* + 28*x* + 36*x* = 170
85*x* = 170
x = 2
Hence, the second number = 28 × 2 = 56.
Data based problems:
Question: A recent survey of married couples in Indian metro cities showed that 20% of the couples have only one child, 45% of the remaining couples have two children, and the rest of the couples have three or more children. What is the percentage of couples with three or more children?
Solution: Let total couple = 100
couples have only one child=20% of 100=20
couples have two children=45% of the remaining couples=45% of (100-20)=45% of 80=(45/100)*80=36
and rest of the couples have three or more children that means couples have three or more children=100-20-36=100-56=44
so, percentage of couples with three or more children=44%.

Mathematical Operations:
This section deals with questions on basic mathematical operations. Which includes — addition, subtraction, multiplication, and division. Also, statements such as 'less than' or 'greater than', 'equal to' or 'not equal to', etc. are represented by symbols. The questions involving these operations are set using artificial symbols. Hence, to get correct answer, one must substitute the right symbols and solve the question accordingly.
NOTE: While solving a mathematical expression, proceed according to the rule **BODMAS** — i.e., Brackets, Of, Division, Multiplication, Addition, Subtraction.

TYPE 1: Problems based on substitution:
Question: If 'A' stands for 'subtraction', 'B' stands for 'multiplication', 'C' stands for 'addition', and 'D' stands for 'division', then what is the value of the following expression?
27 A 8 B 5 C (11 C 3) B 5 C 36 D 6
Solution: Given that:

'A' stands for 'subtraction', 'B' stands for 'multiplication', 'C' stands for 'addition', and 'D' stands for 'division'
So, 27 A 8 B 5 C (11 C 3) B 5 C 36 D 6
=27 - 8 x 5 + (11 + 3) x 5 + 36 ÷ 6
Now solve the expression
27 - 8 x 5 + (11 + 3) x 5 + 36 ÷ 6 by using BODMAS rule.
27 - 8 x 5 + (11 + 3) x 5 + 36 ÷ 6
=27 - 40 + 14x 5 +6
=27 - 40 + 70 + 6=33+30=63
Question: If '<' means 'minus', '>' means 'plus', '=' means 'multiplied by' and '$' means 'divided by', then what would be the value of

63 > 21 $ 3 = 7?
Solution:
63 > 21 $ 3 = 7

After putting the signs
63 + 21 ÷ 3 × 7
63 + 7 × 7
63 + 49 =112.

TYPE 2: Problem based on interchange of signs and numbers:

Question: Which two signs should be interchanged to make the given equation correct?
225 + 5 × 3 ÷ 5 – 7 = 133
a) + and ÷
b) - and ×
c) + and ×
d) - and ÷

Solution: Given expression is-
225 + 5 × 3 ÷ 5 – 7 = 133
After interchanging-
225 ÷ 5 × 3 + 5 – 7 = 133
Apply BODMAS,
225 ÷ 5 × 3 + 5 – 7 = 133
Or, 45 × 3 -2 = 133
Or, 135 –2 = 133
Or, 133=133
As we got the correct answer, so no need to check more options.
Hence, option (a) is the correct answer.

Based on Equation balancing:

Question: Select the correct combination of mathematical signs to sequentially replace the * signs, to balance the following equation.
(14 * 9 * 6) * 15 * 8
a) ×, =, ÷, -
b) ×, -, ÷, =
c) -, ÷, ×, =
d) ÷, -, =, ×

Solution:
on checking option (a)
(14 * 9 * 6) * 15 * 8
after putting signs

(14 X 9 = 6) ÷ 15 – 8 (incorrect)
on checking option B
(14 * 9 * 6) * 15 * 8
after putting signs
(14 X 9 - 6) ÷ 15 = 8
(126 – 6) ÷ 15 = 8
120 ÷ 15 = 8
8 = 8
Signs in option (b) satisfied the above equation,
So, no need to check other options.
Hence, option (b) is the correct answer.

Question: The two given expressions on both the side of the '=' sign will have the same value if two numbers from either side or both sides are interchanged. Select the correct numbers to be interchanged from the given options.
3 + 5 × 4 – 24 ÷ 3 = 7 × 4 – 3 + 36 ÷ 6
a) 5,7 b) 4,7 c) 6,3 d) 24,36

Solution: Check option (a)-
Given expression is-
3 + 5 × 4 – 24 ÷ 3 = 7 × 4 – 3 + 36 ÷ 6
After interchanging-
3 + 7 × 4 – 24 ÷ 3 = 5 × 4 – 3 + 36 ÷ 6
Apply BODMAS,
3 + 28 – 8 = 20 – 3 + 6
Or, 3 + 28 – 8 = 20 – 3 + 6
Or, 3+20=23
So, 23=23
As we got the correct answer, so no need to check more options.
Hence, option (a) is the correct answer.