

Simplification

Of all the important topics in the quantitative aptitude section for various Government exams, the simplification and approximation questions are one of the most frequently asked questions.

Aspirants who are preparing for the upcoming Government exams must know that the simplification/ approximation questions are the one where marks can be scored easily without any errors if solved carefully and efficiently.

The weightage of questions asked from this topic mostly varies between 3-5 questions and this topic is generally included in the initial phases of the examination.

Candidates willing to know about the other topics included in the quantitative aptitude section and the exams in which this section is included can visit the linked article.

In this article, we shall discuss in detail the concept of approximation and simplification and how to solve questions based on this topic. For the reference of candidates, we have also given some sample questions to make the topic more understandable.

Apart from the approximation/ simplification questions, candidates can also check the below-mentioned links to ace the numerical ability section for the various competitive exams:

Simplification & Approximation – Concept

The simplification and approximation topic is one of the easiest in the numerical ability section and only efficient calculation can help a candidate solve questions from this section easily.

The main idea behind asking questions from the approximation and simplification topic is to test the ability of a candidate to work with numbers and basic calculations.

Questions are made to confuse the candidates with long decimal numbers and calculations which may seem complicated but this topic is one where a candidate can score most without making errors.

The simplification questions can be asked in two ways:

Missing numbers – An equation can be given in the paper and candidates need to fill the blank in that equation, given either in LHS (Left-hand side) or RHS (Right-hand side). For example, $252 - \underline{\hspace{2cm}} + 100 = 5 \times 45 + 275$. Candidates need to fill the blank

Simplifying the equation – The second way in which the simplification questions may be asked is the direct way of giving an equation and solving it to find the answer. For example: $252 - 225 + 100 = ?$. In such questions, candidates have to answer what comes in place of the question mark (?)

Tips & Tricks to Solve Simplification/ Approximation Questions

To ensure that the candidate does not lose marks in this topic, there are some basic tips and tricks which may be used to solve the approximation and simplification questions. Refer to the tips given below:

Always solve the Approximation or simplification questions following the BODMAS rule.

Numbers which are given in a decimal format, use a rounded-off value for those numbers. For example, 45.62 can be taken as 46, 22.10 can be taken as 22, etc.

Learning tables till at least 20 can be of great help for the candidates and help them save some time

Remember the basic important formulas which can be used in such question:

$$(a+b)^2 = a^2 + b^2 + 2ab$$

$$(a-b)^2 = a^2 + b^2 - 2ab$$

$$a^2 - b^2 = (a+b)(a-b)$$

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$(a+b)^3 = a^3 + b^3 + 3ab(a+b)$$

$$(a-b)^3 = a^3 - b^3 - 3ab(a-b)$$

Do not overcomplicate the questions and make sure that long calculations need to be skipped in order to solve the equations within shorter time period

The image given below shows what is the BODMAS rule as mentioned in the first point of tips:

The **BODMAS** Rule

B RACKETS () [] { }

O RDER POWER OF $\sqrt{\quad}$ $(\quad)^2$

D IVIDE / \div

M ULTIPLY * x

A DDITION +

S UBTRACTION —

Solved Examples For You

Part I

Example 1: What value will replace the question mark in the following equation?

$$4\left(\frac{1}{2}\right) + 3\left(\frac{1}{6}\right) + ? + 2\left(\frac{1}{3}\right) = 13\left(\frac{2}{5}\right).$$

A) $3\left(\frac{2}{5}\right)$

B) $3\left(\frac{3}{5}\right)$

C) $2\left(\frac{1}{2}\right)$

D) Data not

sufficient

Answer: Let 'x' be the missing fraction.

$$\text{We will have: } 9/2 + 19/6 + x + 7/3 = 67/5.$$

Then, $x = 67 - [(9/2) + (19/6) + (7/3)]$. Using the BODMAS or the PEMDAS rule, we can write that: $x = 67/5 - [(27 + 19 + 14)/6] = [(67/5) - (60/6)]$.

In other words we can write: $x = [67/5 - 10] = 17/5 = 3(2/5)$. Hence the missing fraction is $= 3(2/5)$ and the correct option is A) $3(2/5)$.

Example 2: Simplify the following: $b - [b - (a + b) - \{b - (b - (a - b))\} + 2a]$?

A) $4a$

B) $6a$

C) $8a$

D) $10a$

Answer: Let us rewrite the expression as $b - [b - (a+b) - \{b - (b - a + b)\} + 2a]$.

Which gives $= b - [b - a - b - \{b - 2b + a\} + 2a]$

We can write it as: $b - [-a - \{b - 2b + a + 2a\}]$ or $b - [-a - \{-b + 3a\}] = b - [-a + b - 3a]$

In other words we have: $b - [-4a + b] = b + 4a - b = 4a$. Thus the correct answer is A) $4a$.

Example 3: $\frac{4}{15}$ of $\frac{5}{7}$ of a number is greater than $\frac{4}{9}$ of $\frac{2}{5}$ of the same number by 8. What is half of that number? [SBI – PO 2009]

A) 112

B) 216

C) 315

D) 412

Answer: Let the number be x . Then, $\frac{4}{15}$ of $\frac{5}{7}$ of $x - \frac{4}{9}$ of $\frac{2}{5}$ of $x = 8$.

This implies that $(\frac{4}{21})x - (\frac{8}{45})x = 8$. In other words, we have $[\frac{4}{21} - \frac{8}{45}]x = 8$.

Thus we have $[(\frac{60 - 56}{315})]x = 8$ or $\frac{4x}{315} = 8$. This gives the value of 'x' as $[(\frac{8 \times 315}{4})] = 630$ or $(\frac{1}{2})x = 315$. Hence the required number is 315 and the correct option is C) 315.

Part II

Example 4: If $2x + 3y + z = 55$, $x + z - y = 4$ and $y - x + z = 12$, then what are the values of x , y and z ? [Bank P.O. 2003]

A) 7, 11, 8 respectively

B) 12, 4, 2 respectively

C) 11,

19, 15 respectively

D) 13, 14, 15 respectively

Answer: The given equations are:

$2x + 3y + z = 55$ (i); $x + z - y = 4$ (ii); $y - x + z = 12$ (iii)

Subtracting (ii) from (i), we get: $x + 4y = 51$ (iv)

Subtracting (iii) from (i), we get: $3x = 2y = 43$ (v)

Multiplying (v) by 2 and subtracting (iv) from it, we get: $5x = 35$ or $x = 7$.

Putting $x = 7$ in (iv), we get: $4y = 44$ or $y = 11$. Putting $x = 7$, $y = 11$ in (i), we get $z = 8$. Hence the correct option is A) 7, 11, 8 respectively.

Example 5: A man divides Rs. 8600 among 5 sons, 4 daughters and 2 nephews. If each daughter receives four times as much as each nephew, and each son receives five times as much as each nephew, how much does each daughter receive? [SSC 2000]

A) Rs. 800

B) Rs. 600

C) Rs. 1600

D) Rs. 1800

Answer: Let the share of each nephew be Rs. x . Then, share of each daughter = Rs. $(4x)$; share of each son = Rs. $(5x)$. So, $5(5x) + 4(4x) + 2x = 8600$. This implies that $25x + 16x + 2x = 8600$.

In other words, we have $43x = 8600$ and thus $x = 200$.

Therefore the share of each daughter = Rs. $(4 \times 200) = \text{Rs. } 800$. Thus the correct option is A) Rs. 800

Simplification Questions with Answers

Q.1. $136 \div 5 \div 0.4 = ? - 24 \times 3.5$

(A) 144

(B) 152

(C) 164

(D) 172

(E) 186

Answer

Ans . B

Q.2. $1331 \times 121 \times 0.11 = (1.1)^? \times 11000$

(A) 5

(B) 7

(C) 4

(D) 3

(E) 8

Answer Ans . A

Q.3. What will come in place of question mark (?) in the following equations?

$$135\% \text{ of } 342 - 342\% \text{ of } 13.5 = ?$$

(A) 411.13

(B) 412.23

(C) 413.33

(D) 414.43

(E) 415.53

Answer

Ans . E

Q.4. Find the value of X

$$X = (6/119) * (63/8) * (17/9)$$

(A) 1/4

(B) 2/4

(C) 3/4

(D) 4

Answer Ans . C

Q.5. $13.57 + 29.49 + 23.46 = ? + 50.79$

(A) 16.73

(B) 13.73

(C) 12.73

(D) 15.73

(E) 17.37

Answer

Ans . D

Q.6. $6 \times 3 + 4.8 \times 12.50 - 2.5 \times 12.40 = ?$

(A) 56

(B) 47

(C) 72

(D) 84

(E) 96

Answer

Ans . B

Q.7. $53457 + 19743 - 49850 = ?$

(A) 24,350

(B) 23,350

(C) 25,330

(D) 23,550

(E) 23,840

Answer

Ans . B

Q.8. What approximate value should come in place of question mark (?) in the following equations.

$185\% \text{ of } 1359 + 18.5\% \text{ of } 1319 = ?$

(A) 2510

(B) 2630

(C) 2760

(D) 2890

(E) 3025

Answer Ans . C

Q.9. $5.8 * 2.5 + 0.6 * 6.75 + 139.25 = ?$

(A) 157.60

(B) 147.80

(C) 147.60

(D) 157.80

Answer

Ans . D

Q.10. $13\% \text{ of } 1100 + 17\% \text{ of } 2100 = ? + 26\% \text{ of } 350$

(A) 409

(B) 411

(C) 413

(D) 415

(E) 417

Answer

Ans . A

Q.11. $3640 \div 14 \times 16 + 340 = ?$

(A) 3500

(B) 4500

(C) 1500

(D) 2500

Answer

Ans . B

Q.12. $175 \div 12.5 \times 4.5 + 38 \times 1.5 = ?$

(A) 60

(B) 80

(C) 100

(D) 120

(E) 140

Answer

Ans . D

Q.13. Simplify

$$b - [b - (a+b) - \{b - (b - a+b)\} + 2a]$$

(A) a

(B) 2a

(C) 4a

(E) 0

Answer

Ans . D

Q.14. Along a yard 225 metres long, 26 trees are painted at equal distances, one tree being at each end of the yard. What is the distance between two consecutive trees

(A) 8

(B) 9

(C) 10

(D) 11

Answer

Ans . D

Q.15. What will come in place of the question mark (?) in the following equations?

$$144 \times 7 + 612 \times 4 = ?\% \text{ of } 12800$$

(A) 24

(B) 27

(C) 30

(D) 32

(E) 35

Answer Ans . B

Q.16. $9.6 \div 0.24 \times 2.5 + 150 = ?$

(A) 255

(B) 250

(C) 260

(D) 265

(E) 245

Answer

Ans . B

Q.17. The number of girls in a class are 7 times the number of boys, which value can never be the of total students

(A) 40

(B) 48

(C) 24

(D) 30

Answer

Ans . D

Q.18. 7% of 400+? % of 66=30.5×2

(A) 40

(B) 45

(C) 50

(D) 60

(E) 70

Answer

Ans . C

Q.19. What will come in place of question mark (?) in the following equations?

= ?

(A) 3.45

(B) 3.55

(C) 3.65

(D) 3.75

(E) 3.85

Answer

Ans . C

Q.20. 15% of 275% of $\frac{10}{3}$ of 120=?

(A) 144

(B) 156

(C) 165

(D) 175

(E) 192

Answer Ans . C

Q 21: A man spends $\frac{2}{5}$ of his salary on his salary on house rent, $\frac{3}{10}$ of his salary on food and $\frac{1}{8}$ of his salary on conveyance. if he has Rs. 1400 left with him, find his expenditure on food and conveyance.

- A) Rs 200 B) Rs 1400 C) Rs 1000 D) Rs
2100

Ans: C) Rs 1000

Q 22: In a certain office, $\frac{1}{3}$ of the workers are women, $\frac{1}{2}$ of the women are married and $\frac{1}{3}$ of the married women have children. if $\frac{3}{4}$ of the men are married and $\frac{2}{3}$ of the married men have children, what part of workers are without children?

- A) $\frac{1}{2}$ of all workers B) $\frac{11}{12}$ of all workers
C) $\frac{11}{16}$ of all workers D) $\frac{11}{18}$ of all workers

Ans: D) $\frac{11}{18}$ of all workers

Directions (3-7): What should come in place of the question mark (?) in the following questions?

Q23. 3.2% of 500 × 2.4% of ? = 288

(a) 650

(b) 700

(c) 600

(d) 750

(e) 850 S1. Ans.(d)

Sol.

$$16 \times 2.4$$

$$100 ? = 288 \quad ? = 750$$

Q24. $(-251 \times 21 \times (-12)) \div ? = 158.13$

(a) 250

(b) 400

(c) 300

(d) 15

(e) 18 S2. Ans.(b)

Sol.

$$(-251 \times 21 \times (-12)) \div ? = 15813$$

$$100$$

$$? = 400$$

Q25. $[(130)^2 \div 25 \times 15] \div 30 = ?$

(a) 352

(b) 314

(c) 326

(d) 338

(e) 426 S3. Ans.(d)

Sol.

$$? = [130 \times 130 \div 25 \times 15]^{1/30} = 338$$

Q26. $\sqrt{\sqrt{4900}} + \sqrt{5476} = ?$

(a) 576

(b) 144

(c) 256

(d) 16

(e) 12 S4. Ans.(e)

$$\text{Sol. } ? = \sqrt{\sqrt{4900}} + \sqrt{5476} = \sqrt{70} + 74 = \sqrt{144} = 12$$

Q27. (6.5% of 375) – (0.85% of 230) =?

(a) 23.42

(b) 24.24

(c) 21.64

(d) 25.76

(e) 22.42 S5. Ans.(e)

Sol. ? = 24.375 – 1.955 = 22.420

Q28. (25.16 × 16.01) ÷ (12 × 18.94) + 24.10 + √37 × √2.26 = ?

A 25

B 35

C 45

D 50

E 55

Correct Option: B

$(25.16 \times 16.01) \div (12 \times 18.94) + 24.10 + \sqrt{37} \times \sqrt{2.26} = ?$

$? \approx (25 \times 16) \div (12 \times 19) + 24 + \sqrt{36} \times \sqrt{2.25}$

$$= 25 \times 16 + 24 + 6 \times 12 + 19 = ?$$

$$= 400 + 24 + 72 + 19 = ?$$

$$1.75 + 33 = ?$$

$$? = 34.75 \approx 35$$

Hence, option B is correct.