

BANK EXAMS

QUANTITATIVE APTITUDE

Simplifications

Simplifications are very important in Bank Exams. In Quantitative Aptitude / Numerical Ability section, about 40 - 50% of questions in clerical exam and about 20 - 25% of questions in Probationary Officers exam will be of simplifications.

All simplification questions are to be solved based on BODMAS rule only.

B – Bracket

O – Of

D – Division

M – Multiplication

A – Addition

S – Subtraction

When there are more brackets in the given expression, simplification should be started from inner most bracket to the outer most bracket.

Some Important Identities

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

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

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

$$\star (a + b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$$

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

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

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

$$\star (a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$$

$$\star a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ac)$$

Laws of Indices

★ $a^m \times a^n = a^{m+n}$

e.g.: $8^4 \times 8^3 = 8^{4+3} = 8^7$

★ $\frac{a^m}{a^n} = a^{m-n}$

e.g.: $\frac{3^8}{3^2} = 3^{8-2} = 3^6$

★ $(a^m)^n = a^{mn}$

e.g.: $(5^3)^2 = 5^{3 \times 2} = 5^6$

★ $(ab)^m = a^m \times b^m$

e.g.: $(3 \times 4)^2 = 3^2 \times 4^2$

★ $a^{-m} = \frac{1}{a^m}$

e.g.: $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$

★ $\sqrt[m]{a} = a^{1/m}$

e.g.: $\sqrt[9]{15} = 15^{1/9}$

★ $a^{m/n} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$

e.g.: $27^{2/3} = \sqrt[3]{27^2} = \sqrt[3]{729} = 9$ or $(\sqrt[3]{27})^2 = (3)^2 = 9$

★ $a^0 = 1$

e.g.: $9^0 = 1$

Squares and Cubes of numbers are very useful in simplification questions. Following table gives squares and cubes of 25 numbers

| No. | Square | Cube |
|-----|--------|-------|
| 1 | 1 | 1 |
| 2 | 4 | 8 |
| 3 | 9 | 27 |
| 4 | 16 | 64 |
| 5 | 25 | 125 |
| 6 | 36 | 216 |
| 7 | 49 | 343 |
| 8 | 64 | 512 |
| 9 | 81 | 729 |
| 10 | 100 | 1000 |
| 11 | 121 | 1331 |
| 12 | 144 | 1728 |
| 13 | 169 | 2197 |
| 14 | 196 | 2744 |
| 15 | 225 | 3375 |
| 16 | 256 | 4096 |
| 17 | 289 | 4913 |
| 18 | 324 | 5832 |
| 19 | 361 | 6859 |
| 20 | 400 | 8000 |
| 21 | 441 | 9261 |
| 22 | 484 | 10648 |
| 23 | 529 | 12167 |
| 24 | 576 | 13824 |
| 25 | 625 | 15625 |

Some Model Questions

Directions (Q.No.1 - 20): What should come in place of question mark (?) in the following questions?

1.
$$\frac{1.87 \times 1.87 \times 1.87 + 0.13 \times 0.13 \times 0.13}{1.87 \times 1.87 + 0.13 \times 0.13 - 0.13 \times 1.87} = ?$$

- 1) 2 2) 1.74 3) 1 4) 0.24
5) None of these

2. $750 \div 375 \times (25)^2 = ?$

1) 1250

2) 1260

3) 1350

4) 1230

5) 1290

3. $(25)^3 \div 625 \times 5^5 = (5)^?$

1) 8

2) 6

3) 7

4) 2

5) None of these

4. $8476 - 2334 + 3297 = ? + 6447$

1) 2872

2) 2992

3) 2912

4) 3012

5) None of these

5. $23 \times 15 \div 25 - ? + 48.2 = -35$

1) 68

2) 86

3) 91

4) 97

5) 94

6. $?% \text{ of } 450 - 118 = 8$

1) 33

2) 28

3) 45

4) 67

5) None

7. $(64)^2 \times 8^2 = (?)^2$

1) 2

2) 3

3) 8

4) 64

5) 32

8. $3\frac{1}{5} \div \frac{4}{5} \times 223 = ?$

1) 768

2) 868

3) 892

4) 829

5) None

9. $(6 \times 15) - (8 \times 6) - 18 = ? \div 3$

1) 24

2) 64

3) 12

4) 36

5) None

10. $1587 + 2277 = ? \div 69$

1) 49

2) 44

3) 73

4) 56

5) None

11. $120 \times ? = 10 \div \frac{126 \times 0.5}{63 \times 2} \times 12$

- 1) 12 2) 4 3) 3 4) 2
5) 6

12. $\frac{2.4 \times 2.4 - 1.6 \times 1.6}{0.8} = ?$

- 1) 12 2) 4 3) 2 4) 1
5) 5

13. $483 \div 23 \div 3 = ?$

- 1) 14 2) 6 3) 7 4) 3
5) None

14. $\frac{((12)^{-2})^2}{((12)^2)^{-2}} = ?$

- 1) 12 2) 144 3) 64 4) 24
5) None

15. $\frac{5}{22}$ of 110% of 750 = ?

- 1) 375 2) 187.5 3) 125 4) 175.5
5) 132.5

16. $(15 \times 35.2 \times 4) \div 12 = (?)^2 - 20$

- 1) 7 2) 28 3) 14 4) $\sqrt{14}$
5) None

17. $17^{10.5} \times 17^{5.1} \div 17^{1.2} = 17^?$

- 1) 14.4 2) 7.2 3) 6.6 4) 4.2
5) None of these

18. $14.2 \times 8.5 \times 12.4 = ?$

- 1) 1392.68 2) 1496.68 3) 1493.78 4) 1529.38
5) None of these

19. $\sqrt{2809} = \sqrt{? + 4}$

- 1) 49 2) 7 3) 2401 4) 53
5) None of these

20. $\frac{3}{4}$ of $\frac{5}{7}$ of $\frac{2}{3}$ of 2520 = ?

- 1) 30 2) 90 3) 225 4) 120
5) None of these

ANSWERS

1-1; 2-1; 3-3; 4-2; 5-4; 6-2; 7-1; 8-3; 9-5; 10-4; 11-4; 12-2; 13-3; 14-5; 15-2; 16-3; 17-1; 18-2; 19-3; 20-5.

EXPLANATIONS

1.
$$\frac{1.87 \times 1.87 \times 1.87 + 0.13 \times 0.13 \times 0.13}{1.87 \times 1.87 + 0.13 \times 0.13 - 0.13 \times 1.87} = ?$$

This is like in the form of $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

∴ Answer is $1.87 + 0.13 = 2$

2.
$$\frac{750 \times 25 \times 25}{375} = 1250$$

3. $(25)^3 \div 625 \times 5^5 = (5)^?$

$$\Rightarrow \frac{5^6 \times 5^5}{5^4} = 5^?$$

$$\Rightarrow 5^6 + 5 - 4 = 5^?$$

$$\Rightarrow ? = 7$$

4. $? = 8476 - 2334 + 3297 - 6447 = 2992$

5. $23 \times 15 \div 25 - ? + 48.2 = -35$

$$\Rightarrow ? = \frac{23 \times 15}{25} + 48.2 + 35 = 97$$

6. $\frac{?}{100} \times 450 = 126$

$$\Rightarrow ? = \frac{126 \times 100}{450} = 28$$

7. $(64)^2 \div 83 = (?)^2$

$$\Rightarrow ?^3 = \frac{64 \times 64}{8 \times 8 \times 8} = 8 = 23$$

$$\Rightarrow ? = 2$$

8. $3 \frac{1}{5} \div \frac{4}{5} \times 223 = ?$

$$\Rightarrow \frac{16}{5} \times \frac{5}{4} \times 223$$

9. $(6 \times 15) - (8 \times 6) - 18 = ? \div 3$

$$\Rightarrow 90 - 48 - 18 = ? \div 3$$

$$\Rightarrow ? = 72$$

10. $? = \frac{1587 + 2277}{69} = 56$

11. $120 \times ? = 10 \div \frac{126 \times 0.5}{63 \times 2} \times 12$

$$\Rightarrow 120 \times ? = 10 \div \frac{1}{2} \times 12$$

$$\Rightarrow ? = \frac{240}{120} = 2$$

12. $\frac{2.4 \times 2.4 - 1.6 \times 1.6}{0.8} = ?$

$$\Rightarrow ? = \frac{(2.4)^2 - (1.6)^2}{2.4 - 1.6} = 2.4 + 1.6 = 4$$

$$\left[\frac{a^2 - b^2}{a - b} = a + b \right]$$

13. $483 \div 23 \div 3$

$$\Rightarrow 483 \frac{1}{23} \times \frac{1}{3} = 7$$

14. $\frac{((12)^{-2})^2}{((12)^2)^{-2}} = ?$

$$\Rightarrow ? = \frac{\left(\frac{1}{144}\right)^2}{(144)^{-2}} = \frac{(144)^2}{(144)^2} = 1$$

15. $\frac{5}{22}$ of 110% of 750

$$\Rightarrow \frac{5}{22} \times \frac{110}{100} \times 750 = 187.5$$

16. $(15 \times 35.2 \times 4) \div 12 = (?)^2 - 20$

$$\Rightarrow ?^2 = \frac{15 \times 35.2 \times 4}{12} + 20$$

$$\Rightarrow ?^2 = 176 + 20 = 196 = 14^2$$

$$? = 14$$

17. $17^{10.5} \times 17^{5.1} \div 17^{1.2} = 17^?$

$$\Rightarrow 17^{10.5 + 5.1 - 1.2} = 17^?$$

$$\Rightarrow ? = 10.5 + 5.1 - 1.2 = 14.4$$

19. $\sqrt{2809} = \sqrt{? + 4}$

20. $\frac{3}{4}$ of $\frac{5}{7}$ of $\frac{2}{3}$ of 2520

$$\frac{3}{4} \times \frac{5}{7} \times \frac{2}{3} \times 2520 = 900$$

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