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APPSC GROUP-I & GROUP-II

FREE SAMPLE CHAPTER · PERCENTAGE

APPSC GROUP-I PRELIMS PAPER II · GROUP-II SCREENING TEST

Mental Ability

Problems, shortcuts, every APPSC previous question solved the fast way, and simulated practice

English Medium | **2026-27 Edition**

25	212	500
chapters, syllabus-wise	APPSC PYQs solved	simulated practice questions

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Jupudi Anil Kumar

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FREE PYQ PRACTICE

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About this book



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This book covers the **Mental Ability** part of two APPSC examinations: the **Group-II Screening Test** (Mental Ability, 30 marks) and the **Group-I Preliminary Examination, Paper II, Section A** (General Mental Ability, Administrative and Psychological Abilities, 60 marks). It is built from **all 212 mental-ability questions APPSC has asked** in the Group-I Prelims Paper II of 2019, 2023 and 2024, the Group-II Screening Tests of 2019 and 2024 and the Group-II Mains Paper I of 2019.

Every chapter works the same way

1. **What APPSC asks:** the types of problems, each with the real question it came from.
2. **The basics in two minutes:** only what you need.
3. **Shortcuts:** each with the rule, why it works and a 10-second example.
4. **Solved from the exam:** every APPSC question on the topic, with the official answer and the fast way.
5. **Simulated practice:** 20 new APPSC-style questions in three levels, with answers and quick solutions. Every answer has been worked out twice.
6. **Quick revision:** the whole chapter in one box for the last week.

The chapter list shows how many previous questions each topic has had (G-I = Group-I, G-II = Group-II). Start with the big ones. Chapter 25 is for Group-I only.

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CHAPTER 3

Percentage

Group-II Screening Test · Mental Ability · Basic numeracy 3.4 Percentage ★ · Group-I Prelims Paper II · Section A · Arithmetic: percentages · 15 previous questions (Group-I 10, Group-II 5)

Percentage is the most useful chapter in arithmetic. Group-I Paper II asked it 1, 2 and 7 times in 2019, 2023 and 2024; Group-II asked it 4 times in the 2019 Mains Paper I and once in the 2024 Screening Test. It also sits inside profit and loss, interest, data interpretation and ratio questions. Learn the 12 shortcuts below and most percentage questions take less than a minute.

3.1 What APPSC asks

GROUP-I + GROUP-II

Problem type	How it looks in the paper	Asked in
Percent of a percent (chains)	"M was 20% of P and C was 15% of M"	G-II Screening 2024 Q137
Two parts of a total and their difference	"One secured 9 marks more … his marks were 56% of the sum"	G-II Mains 2019 Q1
Equal totals, different add-ons	"A gets 65% of basic as allowance, B gets 80%; totals equal"	G-II Mains 2019 Q73
What is left after successive cuts	"Sold 60%, threw away 15% of the rest …"; pens bought 10%, 20%, 25%	G-II Mains 2019 Q76 · G-I 2024 Q24
Price, consumption and expenditure	"Petrol up 25%: cut consumption by how much?"	G-II Mains 2019 Q77
Letters for numbers (x% of y)	"X% of Y is 100 and Y% of Z is 200"; sweets with r% rejected	G-I 2019 Q21 · G-I 2024 Q17
Groups inside groups	70% vendors are X, 60% of X earn more; party guests and couples	G-I 2023 Q7 · G-I 2024 Q30
Success rate and overall percentage	"Won 50% of the first 6 matches, ended at 75%"; marks in 4 : 5 : 6 : 7 : 8	G-I 2023 Q50 · G-I 2024 Q42
Depreciation, growth and half-life	Bike loses 10%, 9.5%, 9% … of its cost; half-life of 800 years	G-I 2024 Q16 · G-I 2024 Q44
Change in a product of two quantities	Report pages: lines per page × letters per line	G-I 2024 Q36

The trend: Group-I puts percentage inside a story (a sweet shop, a new-year party, a bike that loses value) and tests whether you can see the simple percentage under it. Group-II asks shorter, direct questions, though the 2024 Screening Test also used a story (a Deputy Collector's salary). In both, the four options are usually close, so rough guessing does not work but a clean shortcut does.

3.2 The basics in two minutes

GROUP-I + GROUP-II

- **Percent means "out of 100".** x% = x/100. So 18% of 450 = 18/100 × 450 = 81.
- **Percentage change = (change ÷ original value) × 100.** The original value is the **base**: the word after "than" or "of", or the value before the change.
- **Reverse a change:** if a value becomes V after an r% increase, the original was V × 100/(100 + r). After an r% decrease, it was V × 100/(100 − r).
- **Percent vs percentage points:** a rise from 60% to 66% is a rise of **6 percentage points** but of **10 percent** (6 out of 60). APPSC likes to test this in statement questions.

- **When nothing is given, take 100** (100 students, ₹100, 100 litres). If fractions get messy, take the LCM of the denominators instead.

3.3 The 12 shortcuts

GROUP-I + GROUP-II

SHORTCUT 1 · LEARN THE FRACTION–PERCENT TABLE

Fraction	%	Fraction	%	Fraction	%
1/2	50	1/9	11 1/9 (11.11)	1/16	6 1/4
1/3	33 1/3	1/10	10	1/20	5
1/4	25	1/11	9 1/11 (9.09)	1/25	4
1/5	20	1/12	8 1/3	3/8	37 1/2
1/6	16 2/3	1/14	7 1/7 (7.14)	5/8	62 1/2
1/7	14 2/7 (14.29)	1/15	6 2/3	5/6	83 1/3
1/8	12 1/2	1/18	5 5/9 (5.56)	7/8	87 1/2

Use: 37.5% of 1,248 = 3/8 × 1,248 = 468. 16 2/3% of 726 = 726 ÷ 6 = 121. Multiplying by a fraction is always faster than multiplying by a decimal.

SHORTCUT 2 · SWAP THE TWO NUMBERS: X% OF Y = Y% OF X

Both are xy/100. Pick the easier side: **16% of 75 = 75% of 16 = 12**. **48% of 25 = 25% of 48 = 12.** It also explains questions like "X% of Y is 100": it simply means XY = 10,000.

SHORTCUT 3 · TURN EVERY CHANGE INTO A MULTIPLYING FACTOR

An increase of r% multiplies by (100 + r)/100; a decrease multiplies by (100 − r)/100. Several changes one after another: **multiply the factors**. Use fractions:

Increase	Factor	Decrease	Factor
+10%	× 11/10	−10%	× 9/10
+12.5%	× 9/8	−12.5%	× 7/8
+20%	× 6/5	−20%	× 4/5
+25%	× 5/4	−25%	× 3/4
+33 1/3%	× 4/3	−33 1/3%	× 2/3
+50%	× 3/2	−50%	× 1/2

Example (G-I 2024 Q24): pens n × 9/10 × 4/5 × 3/4 = n × 27/50 = 270, so n = 500. Ten seconds.

SHORTCUT 4 · TWO CHANGES IN A ROW: A + B + AB/100

For two successive changes of a% and b% (write a decrease as a minus number), the net change is **a + b + ab/100**.

- +20% then −20%: 20 − 20 − 400/100 = **−4%** (never "no change").
- Length +10%, breadth +10%: area changes by 10 + 10 + 1 = **+21%**.
- −10% and −10%: −10 − 10 + 1 = **−19%**.
- For three changes, combine the first two, then combine the result with the third.

SHORTCUT 5 · THE 1/N RULE: +1/N IS UNDONE BY −1/(N + 1)

When a product must stay the same (price × consumption = expenditure, speed × time = distance, length × breadth = area), an increase of 1/n in one factor needs a decrease of 1/(n + 1) in the other. A decrease of 1/n needs an increase of 1/(n − 1).

One factor	The other must	One factor	The other must
+10% (1/10)	−9 1/11% (1/11)	−10% (1/10)	+11 1/9% (1/9)
+20% (1/5)	−16 2/3% (1/6)	−20% (1/5)	+25% (1/4)
+25% (1/4)	−20% (1/5)	−25% (1/4)	+33 1/3% (1/3)
+50% (1/2)	−33 1/3% (1/3)	−50% (1/2)	+100% (1/1)

The same rule answers "more than / less than": if A is 25% more than B, **B is 20% less than A**. The general form: r/(100 + r) × 100 after an increase, r/(100 − r) × 100 after a decrease.

SHORTCUT 6 · TWO PARTS OF A TOTAL: THE GAP IS (2P − 100)%

If one part is p% of the total, the other is (100 − p)%, so the **difference between them is (2p − 100)% of the total**.

Example (G-II Mains 2019 Q1): one student's marks are 56% of the sum and 9 more than the other's. Gap = 56 − 44 = 12% of the total = 9, so the total = 75 and the marks are 42 and 33. The same works for elections: winner 58%, loser 42%, margin 16% of the valid votes.

SHORTCUT 7 · EQUAL TOTALS, DIFFERENT ADD-ONS: THE RATIO FLIPS

If A × (100 + a) = B × (100 + b), then **A : B = (100 + b) : (100 + a)**. The person with the bigger allowance must have the smaller basic pay.

Example (G-II Mains 2019 Q73): allowances 65% and 80%, totals equal: A : B = 180 : 165 = **12 : 11**. Also: 35% of A = 50% of B gives A : B = 50 : 35 = 10 : 7.

SHORTCUT 8 · GROUPS INSIDE GROUPS: TAKE 100 PEOPLE

When a question gives "x% of the total are … and y% of them …", take 100 and turn every percent into a head count. Then subtract.

Example (G-I 2023 Q7): 100 vendors: 70 X and 30 Y. High earners in X = 60% of 70 = 42. All high earners = 48, so Y has 6 of its 30 = 20% high earners, and **80%** of Y earn less. For two overlapping groups use the Venn rule: both = A + B − (at least one).

SHORTCUT 9 · SUCCESS RATE: HOW MANY MORE WINS TO REACH R%

A team has won w of n games. To reach R% by winning the next k games in a row:
k = (R × n − 100 × w) ÷ (100 − R).

Example (G-I 2023 Q50): 3 wins out of 6, target 75%: k = (450 − 300) ÷ 25 = 6, so the tournament had 6 + 6 = **12** matches. Also works for exam marks and attendance.

SHORTCUT 10 · GROWTH, DEPRECIATION AND HALF-LIFE

- **Same rate on the latest value (compound):** final = P × $(1 \pm r/100)^n$. Two years of +10% = × 1.21 (+21%).
- **Rates charged on the original value each year:** just **add the rates**. 10 + 9.5 + 9 + 8.5 + 8 = 45%, so 55% of the cost is left (G-I 2024 Q16).
- **A fixed number added or removed every year:** do the years one at a time.
- **Half-life:** after n half-lives, the amount left = original ÷ 2^n. 3,200 years with an 800-year half-life = 4 half-lives = 1/16 left.

SHORTCUT 11 · A PRODUCT OF TWO QUANTITIES CHANGES: COMPARE THE PRODUCTS

If a total is fixed and spread over pages, trips or days, the number needed changes in the **inverse ratio of the capacity**.

Example (G-I 2024 Q36): letters per page go from 75 × 80 = 6,000 to 70 × 95 = 6,650. Pages × 6,000/6,650 ≈ × 0.90, a change of about **−10%**. You never need the 2,40,000-letter total.

SHORTCUT 12 · LETTERS IN THE OPTIONS? PUT IN EASY NUMBERS

When the answers are formulas in p, q, r, choose numbers that make the arithmetic easy, find the answer by common sense, and test each option.

Example (G-I 2024 Q17): take an order of p = 180 sweets, q = 20 made a day and r = 10% rejected. Good sweets = 18 a day, so 10 days. Only option (3), 100p/((100 − r)q) = 18,000/1,800 = 10, gives 10. Avoid numbers that make two options equal (p = 90, q = 10, r = 10 makes option (4) give 10 as well). An option that comes out negative or impossible is ruled out at once.

😂 **MEME BREAK** **37.5% of 1,248?**

🤦 **Multiply 1,248 by 0.375 and pray** ✗

😎 **1,248 ÷ 8 × 3 = 468, done** ✓

👉 Fractions first, decimals never (Shortcut 1).

3.4 Solved from the exam: all 15 APPSC questions

GROUP-I + GROUP-II

Every percentage question APPSC has asked in the Group-I Prelims Paper II (2019, 2023, 2024), the Group-II Screening Test (2019, 2024) and the old Group-II Mains Paper I (2019), with the answer from APPSC's final key and the fast way. The 2019 Group-II Mains and the 2019 and 2023 Group-I keys printed only the answers, so those questions are shown with the answer only.

`Group-II Screening Test 2024 · Q137`

E1 Suneetha works as a Deputy Collector and gets a monthly salary of ₹74,000. She spends it on three heads: Personal and family expenses (P), Medical (M) and Charity (C), and the rest are her savings. P was 70% of her salary, M was 20% of P and C was 15% of M. After a salary hike, her salary is 60% higher. She maintained the same percentage for P, but M became 25% of P and C became 20% of M. The difference between the two savings is:

(1) ₹284 (2) ₹370

(3) ₹424 (4) ₹474

APPSC answer: (2) ₹370

Fast way (work in % of salary): Before: savings = 100 − 70 − 14 − 2.1 = 13.9% of ₹74,000 = ₹10,286 (M = 20% of 70 = 14; C = 15% of 14 = 2.1). After: M = 25% of 70 = 17.5 and C = 20% of 17.5 = 3.5, so savings = 100 − 70 − 17.5 − 3.5 = 9% of ₹1,18,400 = ₹10,656. Difference = ₹370. Keep everything as a percent of the salary and turn it into rupees only once.

`Group-II Mains 2019 · Paper I · Q1`

E2 Two students appeared at an examination. One of them secured 9 marks more than the other and his marks were 56% of the sum of their marks. The marks obtained by them are:

APPSC answer: 42 and 33

Fast way (Shortcut 6): Gap = (56 − 44)% = 12% of the total = 9 marks, so the total = 75. The marks are 56% of 75 = 42 and 75 − 42 = 33.

`Group-II Mains 2019 · Paper I · Q73`

E3 The total emoluments of A and B are equal. However, A gets 65% of his basic salary as allowance and B gets 80% of his basic salary as allowance. What is the ratio of the basic salaries of A and B?

APPSC answer: 12 : 11

Fast way (Shortcut 7): 1.65 × A = 1.80 × B, so A : B = 180 : 165 = 12 : 11. The bigger allowance goes with the smaller basic salary.

Group-II Mains 2019 · Paper I · Q76

E4 A vendor sells 60% of the apples he had and throws away 15% of the remainder. Next day he sells 50% of the remainder and throws away the rest. What percent of his apples does the vendor throw away?

APPSC answer: 23%

Fast way (take 100): 100 apples: sells 60, 40 left; throws 15% of 40 = 6, 34 left; sells half = 17 and throws the other 17. Thrown = 6 + 17 = 23 out of 100 = 23%.

Group-I Prelims 2024 · Paper II · Q24

E5 Jaya, a shopkeeper, initially had 'n' pens. A customer bought 10% pens from n, then another customer bought 20% of the remaining pens, after that one more customer purchased 25% of the remaining pens. Finally, Jaya was left with 270 pens in her shop. How many pens were there initially in her shop?

(1) 600 (2) 450

(3) 700 (4) 500

APPSC answer: (4) 500

Fast way (Shortcut 3): n × 9/10 × 4/5 × 3/4 = n × 27/50 = 270, so n = 270 × 50/27 = 500.

Group-II Mains 2019 · Paper I · Q77

E6 The price of petrol is increased by 25%. By how much percent must a car owner reduce his consumption so as not to increase his expenditure on petrol?

APPSC answer: 20%

Fast way (Shortcut 5): +25% = +1/4, so consumption must fall by 1/5 = 20%.

Group-I Prelims 2019 · Paper II · Q21

E7 If X% of Y is 100 and Y% of Z is 200, find the relation between X and Z.

APPSC answer: Z = 2X

Fast way (Shortcut 2): X% of Y = XY/100 = 100, so XY = 10,000. Y% of Z = YZ/100 = 200, so YZ = 20,000. Divide: Z/X = 2, so Z = 2X.

Group-I Prelims 2024 · Paper II · Q17

E8 Neelima places an order for 'p' number of sweets from Agarwal Sweet Shop that produces 'q' number of sweets every day. r% of the total number of sweets produced in a day fail quality check and are discarded. What will be the number of days in which the order will be completed?

(1) p/(100q(1 - r)) (2) 100qr/p

(3) 100p/((100 - r)q) (4) 100r/(q(100 - p))

APPSC answer: (3) 100p/((100 - r)q)

Fast way (Shortcut 12): Put in p = 180, q = 20, r = 10: 18 good sweets a day, so 10 days. Option (3): 100 × 180/(90 × 20) = 10. Options (1) and (4) come out negative and (2) gives 111. In letters: good sweets a day = q(100 − r)/100, so days = 100p/((100 − r)q).

Group-I Prelims 2023 · Paper II · Q7

E9 In a rural market there are two types of vendors, X and Y. 70 percent of the vendors are X, and 60% of the X earn ₹50,000 or more in a month. Total number of vendors who earn ₹50,000 or more per month in the rural market is 48 percent of the total vendors. What percentage of Y earn less than ₹50,000 ?

APPSC answer: 80%

Fast way (Shortcut 8): 100 vendors: 70 X, 30 Y. X earning ₹50,000 or more = 60% of 70 = 42. All such vendors = 48, so Y has 6. 6 of 30 = 20% of Y earn more, so 80% earn less.

Group-I Prelims 2024 · Paper II · Q30

E10 In a new year party, out of the total guests, 60% are women. If 80% of the guests are married couples (form a pair of husband and wife) and the rest are unmarried, then which of the following statements are correct ?

I. All men are married.

II. More than 30% of women are unmarried.

Select the correct answer using the codes given below :

(1) I only

(2) II only

(3) Both I and II

(4) Neither I nor II

APPSC answer: (3) Both I and II

Fast way (Shortcut 8): 100 guests: 60 women, 40 men. 80 married guests = 40 couples = 40 husbands + 40 wives, so all 40 men are married (I true). Unmarried women = 20 of 60 = 33 1/3%, more than 30% (II true). Both.

Group-I Prelims 2023 · Paper II · Q50

E11 In a badminton tournament between schools A and B, school A won 50% of the matches played in the first three weeks. At the end of the tournament, its success rate was 75%. If 6 matches were played in the first three weeks and school A won all its matches played after that, how many matches did the tournament have ?

APPSC answer: 12

Fast way (Shortcut 9): Won 3 of the first 6. $k = (75 \times 6 - 100 \times 3)/(100 - 75) = 150/25 = 6$ more matches, so 6 + 6 = 12 matches in all. Check: 9 wins out of 12 = 75%.

Group-I Prelims 2024 · Paper II · Q42

E12 Pawan appeared for examination in 5 subjects. The maximum marks are the same for each subject. His marks in these 5 subjects are in the proportion 4 : 5 : 6 : 7 : 8 and overall he scored 60%. In how many subjects did he score less than 50% of the maximum marks ?

(1) 1

(2) 2

(3) 3

(4) 4

APPSC answer: (1) 1

Fast way (average of the parts): Marks 4 : 5 : 6 : 7 : 8 average 6 parts, and the average is 60%, so 1 part = 10%. Scores: 40%, 50%, 60%, 70%, 80%. Only one subject (40%) is below 50%.

Group-I Prelims 2024 · Paper II · Q16

E13 Madhu purchased a bike in the year 2024 at the cost of ₹ 78,000. It depreciates in value, 10% the first year, 9.5% the next year, 9% the third year and so on, with all the percentages applied on the original cost of the bike. What will be its value in the year 2029?

(1) ₹ 43,000
(2) ₹ 42,000
(3) ₹ 42,500
(4) ₹ 42,900

APPSC answer: (4) ₹ 42,900

Fast way (Shortcut 10): Rates are on the original cost, so add them: 2024 to 2029 is 5 years, 10 + 9.5 + 9 + 8.5 + 8 = 45%. Value = 55% of ₹78,000 = ₹42,900.

Group-I Prelims 2024 · Paper II · Q44

E14 A professor of pharmaceutical sciences in his classroom defines that the 'half-life of a drug substance is the time period in which the drug substance becomes just half of it'. If it is known that the half-life of a drug Adrenaline is 800 years, then after 3200 years, 1200 gm of Adrenaline becomes X. Which of the following is a possible value for the sum of all digits in X ?

(1) 12
(2) 28.5
(3) 22.5
(4) 37.5

APPSC answer: (1) 12

Fast way (Shortcut 10): 3,200 ÷ 800 = 4 half-lives, so 1,200 ÷ 2^4 = 1,200 ÷ 16 = 75 g. Digit sum = 7 + 5 = 12. A digit sum is always a whole number, so 28.5, 22.5 and 37.5 are impossible anyway.

Group-I Prelims 2024 · Paper II · Q36

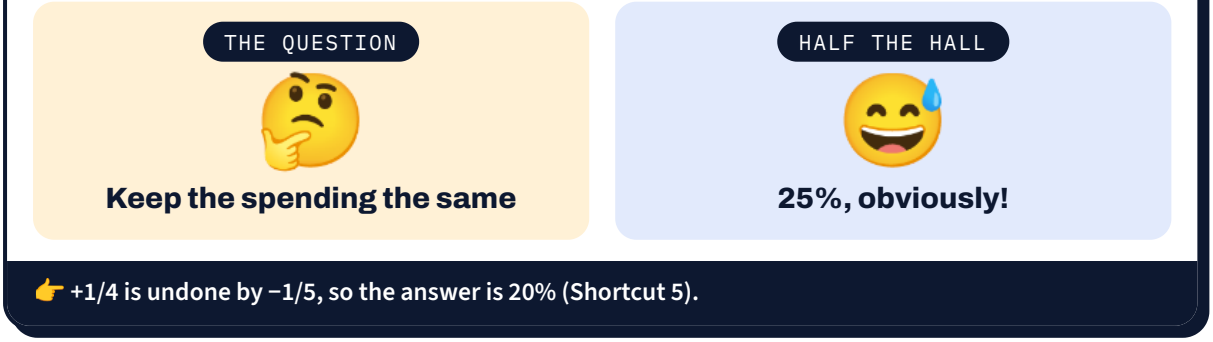
E15 Kalpana's project report consists of 40 pages, each of 75 lines with 80 characters in each line. The lines are reduced to 70, but the number of characters is increased to 95 per line. What is the approximate change in the number of pages ?

(1) -7.5%
(2) -10%
(3) -12%
(4) -14%

APPSC answer: (2) -10%

Fast way (Shortcut 11): Letters per page: 75 × 80 = 6,000 before, 70 × 95 = 6,650 after. Pages × 6,000/6,650 ≈ × 0.90, so about −10%. Use the exact ratio, not whole pages: 36.09 pages is a change of about −9.8%; rounding up to 37 pages would give −7.5%, which is not APPSC's answer.

MEME BREAK **Petrol up 25%. Cut consumption by how much?**



+1/4 is undone by −1/5, so the answer is 20% (Shortcut 5).

3.5 Simulated practice: 20 questions

GROUP-I + GROUP-II

New questions written in the APPSC style, in three levels. **Level 1** (Q1–5) is a warm-up, **Level 2** (Q6–15) is the usual exam level and **Level 3** (Q16–20) is at the level of the harder Group-I questions. Time yourself: aim for 15 minutes for all 20. Answers and quick solutions follow.

Level 1 · Warm-up

P1 62.5% of 1,128 is:

(1) 695 (2) 705
(3) 715 (4) 725

P2 A number is first increased by 30% and then decreased by 30%. The net change is:

(1) No change (2) 9% increase
(3) 3% decrease (4) 9% decrease

P3 Ravi's salary is 20% more than Kiran's. By what percent is Kiran's salary less than Ravi's?

(1) 20% (2) 15%
(3) 16⅔% (4) 25%

P4 The price of sugar falls by 16⅔%. By what percent can a family increase its consumption so that its expenditure on sugar stays the same?

(1) 20% (2) 16⅔%
(3) 25% (4) 14⅔%

P5 A candidate needs 35% of the maximum marks to pass. Ramesh scored 196 marks and failed by 14 marks. The maximum marks are:

(1) 600 (2) 560
(3) 640 (4) 700

Level 2 · Exam level

P6 The population of a town increased by 10% in one year and decreased by 10% the next year. It is now 59,400. What was it two years ago?

(1) 58,800 (2) 60,000
(3) 59,400 (4) 61,200

P7 The length of a rectangle is increased by 25% and its breadth is decreased by 20%. Its area:

(1) increases by 5% (2) decreases by 5%
(3) does not change (4) decreases by 1%

P8 Srinu spends 30% of his salary on rent, 25% of the remainder on food and 20% of what is left on travel. He saves ₹16,800. His salary is:

(1) ₹36,000 (2) ₹42,000
(3) ₹48,000 (4) ₹40,000

P9 In an election between two candidates, 4% of the votes polled were invalid. The winner got 58% of the valid votes and won by 4,800 votes. How many votes were polled?

(1) 30,000 (2) 31,500
(3) 31,250 (4) 32,000

P10 A's income is 20% more than B's, and B's income is 25% less than C's. If C earns ₹48,000 a month, A earns:

(1) ₹43,200 (2) ₹45,000
(3) ₹40,800 (4) ₹42,000

P11 In a college, 60% of the students are girls. 30% of the girls and 45% of the boys come by bus. What percent of all the students come by bus?

(1) 37.5% (2) 40%
(3) 34% (4) 36%

P12 A cricket team won 12 of its first 20 matches. How many more matches must it win in a row to raise its winning percentage to 75%?

(1) 8 (2) 10
(3) 12 (4) 15

P13 The price of a mobile phone is increased by 10%, then increased by 20%, and then reduced by 25%. Compared with the original price, the final price is:

(1) 1% less (2) 1% more
(3) the same (4) 5% more

P14 If 40% of A = 60% of B and 25% of B = 30% of C, then A : B : C is:

(1) 3 : 2 : 1 (2) 9 : 6 : 5
(3) 6 : 4 : 3 (4) 9 : 6 : 4

P15 Lakshmi gets a dearness allowance of 40% of her basic pay and Padma gets 60% of hers. Their total pay is equal. The ratio of Lakshmi's basic pay to Padma's is:

(1) 8 : 7 (2) 7 : 8
(3) 4 : 3 (4) 3 : 2

Level 3 · Group-I level

P16 A village has 25,000 people. Its population grows by 4% every year, but at the end of each year (after the growth) 400 people migrate to the city. What will its population be after 2 years?

(1) 26,240
(2) 26,224
(3) 26,200
(4) 26,256

P17 In a test, 65% of the candidates passed in Polity, 55% passed in Economy and 15% failed in both. If 280 candidates passed in both subjects, how many candidates took the test?

(1) 700
(2) 900
(3) 1,000
(4) 800

P18 A 50 kg watermelon is 90% water by weight. After drying in the sun, water is 80% of its weight. Its new weight is:

(1) 40 kg
(2) 45 kg
(3) 30 kg
(4) 25 kg

P19 A book has 300 pages, each with 30 lines of 40 letters. It is reprinted with 36 lines per page and 50 letters per line. The number of pages changes by:

(1) −20%
(2) −33⅓%
(3) −25%
(4) −40%

P20 The literacy rate of a district rose from 60% to 66%. Consider the statements:
I. The literacy rate rose by 6 percentage points.
II. The literacy rate rose by 10%.
Which of the statements is/are correct?

(1) I only
(2) II only
(3) Both I and II
(4) Neither I nor II

QUICK REVISION · PERCENTAGE

- Change ÷ **original** × 100. Points ≠ percent.
- Fractions: 1/8 = 12.5, 3/8 = 37.5, 1/6 = 16 2/3, 1/12 = 8 1/3, 1/7 ≈ 14.29, 1/9 ≈ 11.11, 1/11 ≈ 9.09.
- Chains: multiply the factors (× 9/10, × 4/5, × 3/4 …).
- Two changes: a + b + ab/100. +20 then −20 = −4.
- Product fixed: +1/n ↔ −1/(n + 1). +25% ↔ −20%; −20% ↔ +25%.
- Two parts: gap = (2p − 100)% of the total. Equal totals: the ratio flips.
- Groups: take 100. Success rate: k = (Rn − 100w)/(100 − R).
- Rates on the original each year: add them. Half-life: ÷ 2^n.
- Formulas in the options: put in easy numbers.

Answers and quick solutions

1 **(2)**	2 **(4)**	3 **(3)**	4 **(1)**	5 **(1)**	6 **(2)**	7 **(3)**	8 **(4)**	9 **(3)**	10 **(1)**
11 **(4)**	12 **(3)**	13 **(1)**	14 **(2)**	15 **(1)**	16 **(2)**	17 **(4)**	18 **(4)**	19 **(2)**	20 **(3)**

1. **(2) 705.** 62.5% = 5/8, and 1,128 ÷ 8 × 5 = 141 × 5 = 705 (Shortcut 1).
2. **(4) 9% decrease.** 30 − 30 + (30 × −30)/100 = −9, so a 9% decrease (Shortcut 4).
3. **(3) 16⅔%.** 20/(100 + 20) × 100 = 16⅔% (Shortcut 5). In fractions: +1/5 → −1/6.
4. **(1) 20%.** 16⅔% = 1/6. A fall of 1/6 is balanced by a rise of 1/(6 − 1) = 1/5 = 20% (Shortcut 5).
5. **(1) 600.** Pass mark = 196 + 14 = 210 = 35% of the maximum, so maximum = 210 × 100/35 = 600.
6. **(2) 60,000.** Net factor = 11/10 × 9/10 = 99/100, so the old population = 59,400 × 100/99 = 60,000 (Shortcut 3).
7. **(3) does not change.** 25 − 20 + (25 × −20)/100 = 0. In fractions: × 5/4 × 4/5 = 1 (Shortcuts 3 and 4).
8. **(4) ₹40,000.** Salary × 7/10 × 3/4 × 4/5 = Salary × 21/50 = 16,800, so salary = 16,800 × 50/21 = ₹40,000 (Shortcut 3).
9. **(3) 31,250.** The gap is 58% − 42% = 16% of the valid votes, so valid votes = 4,800 × 100/16 = 30,000. These are 96% of the votes polled: 30,000 × 100/96 = 31,250 (Shortcut 6).
10. **(1) ₹43,200.** A = 48,000 × 3/4 × 6/5 = 48,000 × 9/10 = ₹43,200 (Shortcut 3).
11. **(4) 36%.** Take 100 students: 30% of 60 girls = 18, 45% of 40 boys = 18; 18 + 18 = 36 out of 100 (Shortcut 8).
12. **(3) 12.** k = (75 × 20 − 100 × 12)/(100 − 75) = 300/25 = 12. Check: 24 wins out of 32 matches = 75% (Shortcut 9).
13. **(1) 1% less.** × 11/10 × 6/5 × 3/4 = 99/100, so 1% less than the original (Shortcut 3).
14. **(2) 9 : 6 : 5.** A : B = 60 : 40 = 3 : 2 and B : C = 30 : 25 = 6 : 5. Make B the same: A : B : C = 9 : 6 : 5 (Shortcut 7).
15. **(1) 8 : 7.** L × 140 = P × 160, so L : P = 160 : 140 = 8 : 7. The bigger allowance goes with the smaller basic pay (Shortcut 7).
16. **(2) 26,224.** Year 1: 25,000 × 1.04 = 26,000 − 400 = 25,600. Year 2: 25,600 × 1.04 = 26,624 − 400 = 26,224. Do the years one at a time when a fixed number is taken out (Shortcut 10).
17. **(4) 800.** Passed in at least one = 100 − 15 = 85%. Passed in both = 65 + 55 − 85 = 35%. So 35% = 280 and the total = 800 (Shortcut 8 with a Venn diagram).
18. **(4) 25 kg.** The solid part does not dry: 10% of 50 = 5 kg. After drying it is 20% of the weight, so the weight = 5 × 100/20 = 25 kg. Track the part that does not change.
19. **(2) −33⅓%.** Letters per page go from 30 × 40 = 1,200 to 36 × 50 = 1,800, i.e. × 3/2. The pages go × 2/3: 300 → 200, a change of −33⅓% (Shortcut 11).
20. **(3) Both I and II.** 66 − 60 = 6 percentage points; 6/60 × 100 = 10%. Both statements describe the same rise.

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11	Mensuration & geometry
12	Permutations, combinations & probability
13	Number & letter series, missing numbers
14	Analogy & odd one out
15	Coding–decoding & symbol substitution
16	Blood relations
17	Directions & distance
18	Seating, ranking & puzzles
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