

CLASS 10

MATHS

NCERT SOLUTIONS

NCERT Solutions for Class 10 Maths Chapter 5: Arithmetic Progressions – Free PDF Download

Arithmetic Progressions is a large, formula-heavy chapter in the current 2026-27 CBSE Class 10 Maths syllabus, spread across three exercises (5.1, 5.2, 5.3) — the earlier optional Exercise 5.4 was removed in the NCERT rationalisation and is not part of the current syllabus. Below are complete, verified solutions t...

Contents

- Exercise 5.1
- Exercise 5.2
- Exercise 5.3
- CBSE Exam Weightage
- Class 10 Mathematics Chapter 5 – Notes and Extra Questions

Arithmetic Progressions is a large, formula-heavy chapter in the current 2026-27 CBSE Class 10 Maths syllabus, spread across three exercises (5.1, 5.2, 5.3) — the earlier optional Exercise 5.4 was removed in the NCERT rationalisation and is not part of the current syllabus. Below are complete, verified solutions to every question in all three exercises.

Exercise 5.1

Q1. In which of the following situations, does the list of numbers involved make an arithmetic progression, and why?

(i) The taxi fare after each km, when the fare is Rs 15 for the first km and Rs 8 for each additional km.
 Fares: 15, 23, 31, 39, ... Common difference = 8 throughout. **Yes, it is an AP.**

(ii) The amount of air present in a cylinder when a vacuum pump removes $\frac{1}{4}$ of the air remaining in the cylinder at a time.

If initial air = V , successive amounts are $V, \frac{3V}{4}, \frac{9V}{16}, \dots$ The difference between consecutive terms is not constant. **No, not an AP** (it is a GP).

(iii) The cost of digging a well, when it costs Rs 150 for the first metre and rises by Rs 50 for each subsequent metre.

Costs: 150, 200, 250, 300, ... Common difference = 50 throughout. **Yes, it is an AP.**

(iv) The amount of money in the account every year, when Rs 10,000 is deposited at compound interest at 8% per annum.

Amounts: 10000, $10000(1.08)$, $10000(1.08)^2$, ... each year's amount is a fixed multiple of the previous, not a fixed difference. **No, not an AP** (it is a GP).

Q2. Write the first four terms of the AP when a and d are given:

(i) $a=10, d=10 \rightarrow 10, 20, 30, 40$. (ii) $a=-2, d=0 \rightarrow -2, -2, -2, -2$. (iii) $a=4, d=-3 \rightarrow 4, 1, -2, -5$. (iv) $a=-1, d=\frac{1}{2} \rightarrow -1, -\frac{1}{2}, 0, \frac{1}{2}$. (v) $a=-1.25, d=-0.25 \rightarrow -1.25, -1.5, -1.75, -2.0$.

Q3. For the following APs, write the first term and the common difference:

(i) 3, 1, -1, -3, ... $\rightarrow a=3, d=-2$. (ii) -5, -1, 3, 7, ... $\rightarrow a=-5, d=4$. (iii) $\frac{1}{3}, \frac{5}{3}, \frac{9}{3}, \frac{13}{3}, \dots \rightarrow a=\frac{1}{3}, d=\frac{4}{3}$. (iv) 0.6, 1.7, 2.8, 3.9, ... $\rightarrow a=0.6, d=1.1$.

Q4. Which of the following are APs? If they form an AP, find d and write three more terms.

(i) 2, 4, 8, 16, ... — **Not an AP** (differences 2, 4 unequal). (ii) 2, $\frac{5}{2}, 3, \frac{7}{2}, \dots$ — **AP, $d=\frac{1}{2}$** ; next: 4, $\frac{9}{2}, 5$. (iii) -1.2, -3.2, -5.2, -7.2, ... — **AP, $d=-2$** ; next: -9.2, -11.2, -13.2. (iv) -10, -6, -2, 2, ... — **AP, $d=4$** ; next: 6, 10, 14. (v) 3, $3+\sqrt{2}, 3+2\sqrt{2}, 3+3\sqrt{2}, \dots$ — **AP, $d=\sqrt{2}$** ; next: $3+4\sqrt{2}, 3+5\sqrt{2}, 3+6\sqrt{2}$. (vi) 0.2, 0.22, 0.222, 0.2222, ... — **Not an AP** (differences 0.02, 0.002 unequal). (vii) 0, -4, -8, -12, ... — **AP, $d=-4$** ; next: -16, -20, -24. (viii) $-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \dots$ — **AP, $d=0$** ; next: $-\frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}$. (ix) 1, 3, 9, 27, ... — **Not an AP** (it's a GP). (x) $a, 2a, 3a, 4a, \dots$ — **AP, $d=a$** ; next: $5a, 6a, 7a$. (xi) $a, a^2, a^3, a^4, \dots$ — **Not an AP** (it's a GP). (xii) $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots = \sqrt{2}, 2\sqrt{2}, 3\sqrt{2}, 4\sqrt{2}$ — **AP, $d=\sqrt{2}$** ; next: $5\sqrt{2}, 6\sqrt{2}, 7\sqrt{2}$. (xiii) $\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12}, \dots$ — **Not an AP** (differences unequal). (xiv) $1^2, 3^2, 5^2, 7^2, \dots = 1, 9, 25, 49$ — **Not an AP** (differences 8, 16, 24).

unequal). (xv) $1^2, 5^2, 7^2, 73, \dots = 1, 25, 49, 73$ — **AP, $d=24$** ; next: 97, 121, 145.

Exercise 5.2

Q1. Fill in the blanks (a =first term, d =common difference, n =number of terms, a_n =nth term):

(i) $a=7, d=3, n=8, a_n=? \rightarrow a_n=7+7(3)=28$. (ii) $a=-18, n=10, a_n=0, d=? \rightarrow 0=-18+9d \rightarrow d=2$. (iii) $a=?, d=-3, n=18, a_n=-5 \rightarrow a=-5-17(-3)=46$. (iv) $a=-18.9, d=2.5, a_n=3.6, n=? \rightarrow 3.6=-18.9+(n-1)2.5 \rightarrow n=10$. (v) $a=3.5, d=0, n=105, a_n=? \rightarrow 3.5$.

Q2. Choose the correct choice and justify:

(i) 30th term of the AP 10, 7, 4, ... is: $a=10, d=-3. a_{30}=10+29(-3)=-77$. **Answer: (C) -77.**

(ii) 11th term of the AP $-3, -1/2, 2, \dots$ is: $a=-3, d=5/2. a_{11}=-3+10(5/2)=22$. **Answer: (B) 22.**

Q3. Find the missing terms:

(i) 2, __, 26 $\rightarrow$ middle term = **14**. (ii) __, 13, __, 3 $\rightarrow d=-5$, terms: **18, 13, 8, 3**. (iii) 5, __, __, $9\frac{1}{2}$ $\rightarrow d=1.5$, terms: **5, 6.5, 8, 9.5**. (iv) $-4, _, _, _, 6 \rightarrow d=2$, terms: **-4, -2, 0, 2, 4, 6**. (v) __, 38, __, __, __, $-22 \rightarrow d=-15$, terms: **53, 38, 23, 8, -7, -22**.

Q4. Which term of the AP 3, 8, 13, 18, ... is 78?

$a=3, d=5. 78=3+(n-1)5 \rightarrow n=16$ th term.

Q5. Find the number of terms:

(i) 7, 13, 19, ..., 205: $a=7, d=6 \rightarrow n=34$. (ii) $18, 15\frac{1}{2}, 13, \dots, -47$: $a=18, d=-2.5 \rightarrow n=27$.

Q6. Check whether -150 is a term of the AP 11, 8, 5, 2, ...

$a=11, d=-3. n-1=53.67$ (not an integer). **No, it is not a term.**

Q7. Find the 31st term of an AP whose 11th term is 38 and 16th term is 73.

$a+10d=38, a+15d=73 \rightarrow d=7, a=-32. a_{31}=-32+210=178$.

Q8. An AP has 50 terms; 3rd term is 12, last term is 106. Find the 29th term.

$a+2d=12, a+49d=106 \rightarrow d=2, a=8. a_{29}=8+56=64$.

Q9. If the 3rd and 9th terms of an AP are 4 and -8, which term is zero?

$a+2d=4, a+8d=-8 \rightarrow d=-2, a=8. 8+(n-1)(-2)=0 \rightarrow n=5$ th term.

Q10. The 17th term of an AP exceeds its 10th term by 7. Find d .

$7d=7 \rightarrow d=1$.

Q11. Which term of the AP 3, 15, 27, 39, ... will be 132 more than its 54th term?

$d=12. (n-54)(12)=132 \rightarrow n=65$ th term.

Q12. Two APs have the same d . The difference between their 100th terms is 100. What is the difference between their 1000th terms?

This difference is always constant (equal to the difference of first terms). **Also 100.**

Q13. How many three-digit numbers are divisible by 7?

First=105, Last=994, $d=7 \rightarrow n=128$.

Q14. How many multiples of 4 lie between 10 and 250?

First=12, Last=248, $d=4 \rightarrow n=60$.

Q15. For what n are the n th terms of 63,65,67,... and 3,10,17,... equal?

$63+2(n-1)=3+7(n-1) \rightarrow 65=5n \rightarrow n=13$.

Q16. Determine the AP whose 3rd term is 16 and 7th term exceeds the 5th term by 12.

$a+2d=16$; $2d=12 \rightarrow d=6$, $a=4$. **AP: 4, 10, 16, 22, ...**

Q17. Find the 20th term from the last term of the AP 3, 8, 13, ..., 253.

Reversing: $a=253$, $d=-5$. 20th from end = $253+19(-5)=158$.

Q18. The sum of the 4th and 8th terms of an AP is 24, and the sum of the 6th and 10th terms is 44. Find the first three terms.

$a+5d=12$; $a+7d=22 \rightarrow d=5$, $a=-13$. **First three terms: -13, -8, -3.**

Q19. Subba Rao started work in 1995 at annual salary Rs 5000, with an increment of Rs 200 every year. In which year did his income reach Rs 7000?

$a=5000$, $d=200$. $n=11$, i.e. the 11th year — **2005**.

Q20. Ramkali saved Rs 5 in week 1, increasing her weekly savings by Rs 1.75 each week. If in the n th week her savings become Rs 20.75, find n .

$a=5$, $d=1.75$. $n=10$.

Exercise 5.3

Q1. Find the sum of the following APs:

(i) 2, 7, 12, ..., to 10 terms: $a=2$, $d=5$, $n=10$. $S=(10/2)[4+45]=\mathbf{245}$. (ii) -37, -33, -29, ..., to 12 terms: $a=-37$, $d=4$. $S=(12/2)[-74+44]=\mathbf{-180}$. (iii) 0.6, 1.7, 2.8, ..., to 100 terms: $a=0.6$, $d=1.1$. $S=(100/2)[1.2+99(1.1)]=\mathbf{5505}$. (iv) $1/15, 1/12, 1/10, \dots$, to 11 terms: $a=1/15$, $d=1/60$. $S=(11/2)[2/15+10/60]=\mathbf{33/20}$.

Q2. Find the sums:

(i) $7+10\frac{1}{2}+14+\dots+84$: $a=7$, $d=3.5$. $n: 84=7+(n-1)3.5 \rightarrow n=23$. $S=(23/2)(7+84)=\mathbf{1046.5}$. (ii) $34+32+30+\dots+10$: $a=34$, $d=-2$, $n=13$. $S=(13/2)(34+10)=\mathbf{286}$. (iii) $-5+(-8)+(-11)+\dots+(-230)$: $a=-5$, $d=-3$. $n: -230=-5+(n-1)(-3) \rightarrow n=76$. $S=(76/2)(-5-230)=\mathbf{-8930}$.

Q3. In an AP:

(i) $a=5$, $d=3$, $a_n=50$, find n and S_n . $n=16$, $S_{16}=(16/2)(5+50)=\mathbf{440}$. (ii) $a=7$, $a_{13}=35$, find d and S_{13} . $d=(35-7)/12=7/3$, $S_{13}=(13/2)(7+35)=\mathbf{273}$. (iii) $a_{12}=37$, $d=3$, find a and S_{12} . $a=37-33=4$, $S_{12}=(12/2)(4+37)=\mathbf{246}$. (iv) $a_3=15$, $S_{10}=125$, find d and a_{10} . $a+2d=15$; $S_{10}=5(2a+9d)=125 \rightarrow 2a+9d=25$. Solving: $a=15-2d$, so $2(15-2d)+9d=25 \rightarrow 30+5d=25 \rightarrow d=-1$, $a=17$. $a_{10}=a+9d=17-9=\mathbf{8}$. (v) $d=5$, $S_9=75$, find a and a_9 . $S_9=9a+36d=75$. With $d=5$: $9a+180=75 \rightarrow a=-105/9=\mathbf{-35/3}$. $a_9=a+8d=-35/3+40=\mathbf{85/3}$. (vi) $a=2$, $d=8$, $S_n=90$, find n and a_n . $S_n=n/2[4+8(n-1)]=90 \rightarrow n[4+8n-8]=180 \rightarrow n(8n-4)=180 \rightarrow 8n^2-4n-180=0 \rightarrow 2n^2-n-45=0 \rightarrow n=(1+\sqrt{1+360})/4=(1+19)/4=5$. $n=\mathbf{5}$, $a_5=2+4(8)=\mathbf{34}$. (vii) $a=8$, $a_n=62$, $S_n=210$, find n and

$$d. S_n = n(a + a_n)/2 = n(70)/2 = 35n = 210 \rightarrow n = 6. 62 = 8 + 5d \rightarrow d = 54/5.$$

Q4. How many terms of the AP 9, 17, 25, ... must be taken to give a sum of 636?

$$a = 9, d = 8. S_n = n/2[18 + 8(n-1)] = 636 \rightarrow n(8n + 10) = 1272 \rightarrow 8n^2 + 10n - 1272 = 0 \rightarrow 4n^2 + 5n - 636 = 0 \rightarrow n = (-5 + \sqrt{(25 + 10176)})/8 = (-5 + 101)/8 = 12. n = 12.$$

Q5. The first term of an AP is 5, the last term is 45, and the sum is 400. Find the number of terms and d.

$$S = n(a + l)/2 \rightarrow 400 = n(50)/2 \rightarrow n = 16. 45 = 5 + 15d \rightarrow d = 8/3.$$

Q6. The first and last terms of an AP are 17 and 350; d=9. How many terms, and what is the sum?

$$350 = 17 + (n-1)9 \rightarrow n = 38. S = (38/2)(17 + 350) = 6973.$$

Q7. Find the sum of the first 22 terms of an AP in which d=7 and the 22nd term is 149.

$$a_{22} = a + 21(7) = 149 \rightarrow a = 2. S_{22} = (22/2)(2 + 149) = 1661.$$

Q8. Find the sum of the first 51 terms of an AP whose 2nd and 3rd terms are 14 and 18.

$$d = 4, a = 10. S_{51} = (51/2)[2(10) + 50(4)] = (51/2)(220) = 5610.$$

Q9. If the sum of the first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of the first n terms.

$$(7/2)(2a + 6d) = 49 \rightarrow a + 3d = 7. (17/2)(2a + 16d) = 289 \rightarrow a + 8d = 17. \text{ Subtracting: } 5d = 10 \rightarrow d = 2, a = 1. S_n = (n/2)[2 + (n-1)2] = n^2.$$

Q10. Show that $a_1, a_2, \dots, a_n, \dots$ form an AP where $a_n = 3 + 4n$. Also find the sum of the first 15 terms.

$$a_{n+1} - a_n = 4 \text{ (constant), so it is an AP with } a_1 = 7, d = 4. S_{15} = (15/2)[14 + 14(4)] = (15/2)(70) = 525. \text{ For } a_n = 9 - 5n: a_{n+1} - a_n = -5 \text{ (constant), AP with } a_1 = 4, d = -5. S_{15} = (15/2)[8 + 14(-5)] = (15/2)(-62) = -465.$$

Q11. If the sum of the first n terms of an AP is $4n - n^2$, find the first term, the sum of first two terms, the second term, and the 3rd, 10th and nth terms.

$$S_1 = 4(1) - 1 = 3, \text{ so } a_1 = 3. S_2 = 4(2) - 4 = 4, \text{ so sum of first two terms} = 4, \text{ giving } a_2 = S_2 - S_1 = 1. d = a_2 - a_1 = -2. a_3 = a_1 + 2d = -1. a_{10} = 3 + 9(-2) = -15. a_n = S_n - S_{n-1} = (4n - n^2) - (4(n-1) - (n-1)^2) = 5 - 2n.$$

Q12. Find the sum of the first 40 positive integers divisible by 6.

$$6, 12, 18, \dots a = 6, d = 6, n = 40. S = (40/2)[12 + 39(6)] = 4920.$$

Q13. Find the sum of the first 15 multiples of 8.

$$a = 8, d = 8, n = 15. S = (15/2)[16 + 14(8)] = 960.$$

Q14. Find the sum of the odd numbers between 0 and 50.

$$1, 3, 5, \dots, 49. a = 1, d = 2, n = 25. S = (25/2)(1 + 49) = 625.$$

Q15. A contractor faces a penalty of Rs 200 for the first day of delay, increasing by Rs 50 each subsequent day. How much must he pay if the delay is 30 days?

$$a = 200, d = 50, n = 30. S = (30/2)[400 + 29(50)] = 27,750.$$

Q16. Rs 700 is used for 7 cash prizes, each Rs 20 less than the preceding one. Find the value of each prize.

$$S_4 = 700, n = 7. 700 = (7/2)[2a + 6(-20)] \rightarrow 200 = 2a - 120 \rightarrow a = 160. \text{ Prizes: } 160, 140, 120, 100, 80, 60, 40.$$

Q17. Three sections of each class (I to XII) plant as many trees as their class number. How many trees in total?

Per class: $3 \times \text{class number}$. Total = $3(1+2+\dots+12)=3 \times 78=234$ trees.

Q18. A spiral of 13 semicircles has radii 0.5, 1.0, 1.5, ... cm. Find the total length ($\pi=22/7$).

Length of a semicircle of radius $r = \pi r$. Total = $\pi(0.5+1.0+\dots+13 \text{ terms})$. $a=0.5, d=0.5, n=13$. Sum of radii = $(13/2)[1+12(0.5)] = (13/2)(7) = 45.5$. Total length = $\pi \times 45.5 = (22/7) \times 45.5 = 143$ cm.

Q19. 200 logs are stacked with 20 in the bottom row, 19 in the next, and so on. How many rows, and how many logs in the top row?

$a=20, d=-1$. $S_n=200$: $n/2[40+(n-1)(-1)]=200 \rightarrow n(41-n)=400 \rightarrow n^2-41n+400=0 \rightarrow n=16$ or $n=25$ (rejected since only 20 logs exist per max row, n cannot exceed 20). **$n=16$ rows**; top row = $a+15d=20-15=5$ logs.

Q20. In a potato race, potatoes are placed 3m apart in a line, the first 5m from the bucket. A competitor picks up one potato at a time, running to the bucket and back. Find the total distance run for 10 potatoes.

Distances for each round trip: $2 \times 5, 2 \times 8, 2 \times 11, \dots$ (10 terms), i.e., 10, 16, 22, ... $a=10, d=6, n=10$. $S = (10/2)[20+9(6)] = 370$ m.

CBSE Exam Weightage

This chapter falls under **Unit II: Algebra** in the CBSE Class 10 Maths board exam syllabus. This unit typically carries around **20 marks (25%)** of the 80-mark theory paper, based on CBSE's published unit-wise weightage (Question Paper Design). CBSE sets weightage at the unit level rather than chapter-by-chapter, so the exact share from this specific chapter can vary a little between years and sample papers.

Class 10 Mathematics Chapter 5 – Notes and Extra Questions

Along with these NCERT Solutions, students can also use the [Class 10 Mathematics Chapter 5 Extra Questions](#) and [Class 10 Mathematics Chapter 5 Revision Notes](#) for quick revision and extra practice.