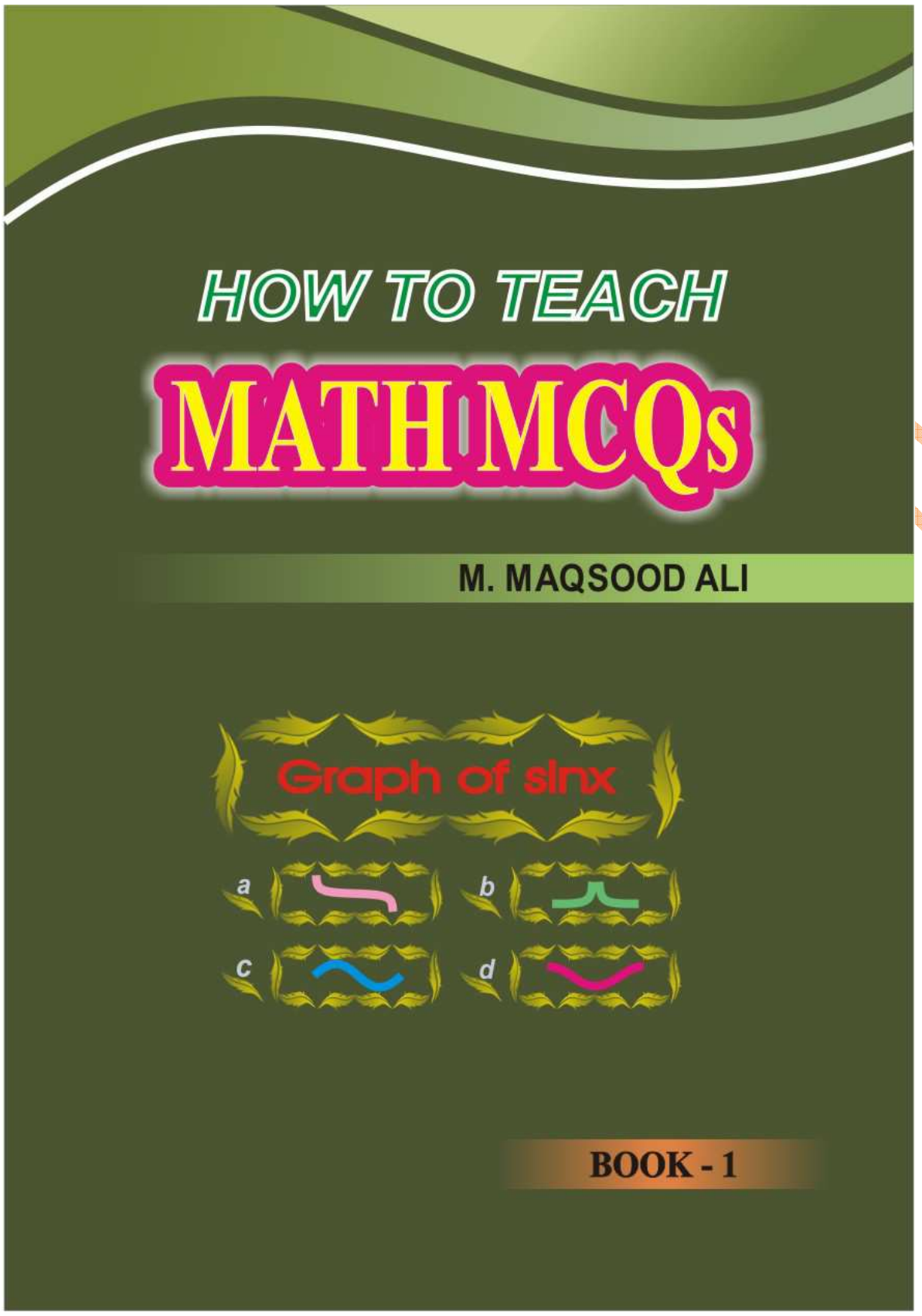
HOW TO TEACH
MATH MCQs
M. MAQSOOD ALI
Graph of sinx
a
b
c
d
BOOK - 1

Chapter 7

SEQUENCE AND SERIES

ARITHMETIC PROGRASSIONS (AP):

$$a, a+d, a+2d, a+3d, \cdots$$

where

a : First term a

d : Common difference

Formulas:

(1) nth TERM:

$$T_n = a + (n-1)d$$

(2) SUM OF n TERMS:

$$(i)\ S_n = \frac{n}{2}\{2a + (n-1)d\} \qquad (ii)\ S_n = \frac{n}{2}\{a + l\}$$

where l is the last term.

(3) ARITHMETIC MEAN (A.M.):

(I) One A.M. between a and b:

$$A = \frac{a+b}{2}$$

(ii) n A.M.'s between a and b:

$$a, A_1, A_2, \cdots, A_n, b$$

where

$$A_1 = \frac{na+b}{n+1}\ , A_2 = \frac{(n-1)a+2b}{n+1}\ , \cdots, A_n = \frac{a+nb}{n+1}$$

GEOMETRIC PROGRASSIONS (GP)

$$a, ar, ar^2, ar^3, \cdots$$

where

a : First term a

d : Common ratio

Formulas:

(1) **nth TERM**:

$$T_n = a\, r^{n-1}$$

(2) **SUM OF n TERMS**:

$(a) \quad r < 1$	$(b) \quad r > 1$
(i) $S_n = \dfrac{a(1-r^n)}{1-r}$ (ii) $S_n = \dfrac{a-rl}{1-r}$	(i) $S_n = \dfrac{a(r^n-1)}{r-1}$ (ii) $S_n = \dfrac{rl-a}{r-1}$

where l is the last term.

(3) **GEOMETRIC MEAN (G.M.):**

(I) One G.M. between a and b:

$$G = \pm\sqrt{ab}$$

(ii) n G.M.'s between a and b:

$$a, G_1, G_2, \cdots, G_n, b$$

where

$$G_1 = a\left(\frac{b}{a}\right)^{\frac{1}{n+1}}, G_2 = a\left(\frac{b}{a}\right)^{\frac{2}{n+1}}, \cdots, G_n = a\left(\frac{b}{a}\right)^{\frac{n}{n+1}}$$

HARMONIC PROGRATIONS (HP):

$$\frac{1}{a}, \frac{1}{a+d}, \frac{1}{a+2d}, \frac{1}{a+3d}, \cdots$$

Formulas:

(1) **nth TERM:**

To find the nth term of HP, convert HP into AP.

(2) **HARMONIC MEAN (H.M.):**

(I) One H.M. between a and b:

$$H = \frac{2ab}{a+b}$$

(ii) n H.M.'s between a and b:

$$a, H_1, H_2, \cdots, H_n, b$$

where $H_1 = \frac{(n+1)ab}{a+nb}$, $H_2 = \frac{(n+1)ab}{2a+(n-1)b}$, $\cdots$, $H_n = \frac{(n+1)ab}{na+b}$

MCQ- 1:

What is the 8th term of the sequence $3, 8, 13, \cdots$?

(a) 26 (b) 32 (c) 38 (d) 46

Solution:

$3, 8, 13, \cdots$

$8-3=5$, $13-8=5$

It is an AP.

$$T_n = a + (n-1)d$$

$$T_8 = 3 + (8-1)(5)$$

$$= 38$$

The answer is (c).

MCQ- 2:

Which term of the AP $6, 13, 20, \cdots$ is 69?

(a) 12 (b) 10 (c) 8 (d) 15

Solution:

$$6, 13, 20, \cdots 69$$

$$d = 13 - 6 = 7$$

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The answer is (d).

MCQ- 5:

How many A.M.'s are there between 2 and 65, if the 4^{th} mean is 14?

(a) 16 (b) 20 (c) 18 (d) 24

Solution:

$$A_4 = \frac{(n-3)a + 4b}{n+1}$$

$$14 = \frac{(n-3)(2) + 4(65)}{n+1}$$

$$14n + 14 = 2n - 6 + 260$$

$$12n = 240$$

$$n = 20$$

The answer is (b).

MCQ- 6:

What is the sum of 20 terms of an AP, whose first and 20^{th} terms are 6 and 82 respectively?

(a) 880 (b) 660 (c) 540 (d) 410

Solution:

20^{th} term is the last term of the series.

$a = 6 \quad , \quad l = 82 \quad , \quad n = 20$

$$S_n = \frac{n}{2}(a + l)$$

$$S_{20} = \frac{20}{2}(6 + 82)$$

$$= 880$$

The answer is (a).

MCQ- 7:

What is the sum to 10 terms of AP, $-2, -6, -10, \cdots$?

(a) -320 (b) -200 (c) -240 (d) 160

Solution:

$$-2, -6, -10, \cdots$$

$$d = -6 - (-2) = -4$$

$$a = -2$$

$$S_n = \frac{n}{2}\{2a + (n-1)d\}$$

$$S_{10} = \frac{10}{2}\{2(-2) + (10-1)(-4)$$

$$= \frac{10}{2}\{-4 + (9)(-4)\}$$

$$= 5(-40)$$

$$= -200$$

The answer is (b).

MCQ- 8:

What is the 10^{th} term of the sequence $5, 25, 125, \cdots$?

(a) 5^{10} (b) 5^{9} (c) 5^{12} (d) 5^{11}

Solution:

$$5, 25, 125, \cdots$$

$$r = \frac{25}{5} = 5 \quad , \quad r = \frac{125}{25} = 5$$

It is a GP.

$$T_n = a\, r^{n-1}$$

$$T_{10} = 5 \times 5^9$$
$$= 5^{10}$$

The answer is (a).

MCQ- 9:

Which term of the GP $2, 6, 18, \cdots$ is 4374?

(a) 7 (b) 8 (c) 9 (d) 10

Solution:

$$2, 6, 18, \cdots\ 4374$$

$$r = \frac{6}{2} = 3$$

$$a = 2 \quad , \quad n = ? \quad , \quad T_n = 4374$$

$$T_n = ar^{n-1}$$

$$4374 = 2 \times 3^{n-1}$$
$$3^{n-1} = 2187$$
$$3^{n-1} = 3^7$$
$$n - 1 = 7$$
$$n = 8$$

The answer is (a).

MCQ- 10:

What is the value of x if $4, x, 9$ is a GP?

(a) ± 6 (b) $13/2$ (c) ± 8 (d) 7

Solution:

$$4, x, 9$$

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MCQ- 14:

What is the 51st term of the sequence $\frac{1}{5}, \frac{1}{9}, \frac{1}{13}, \cdots$?

(a) 1/304 (b) 1/260 (c) 1/205 (d) 1/108

Solution:

$$\frac{1}{5}, \frac{1}{9}, \frac{1}{13}, \cdots$$

It is an HP.

The reciprocal of the terms are

$$5, 9, 13, \cdots$$

It is an AP.

$$a = 5 \quad , \quad n = 51$$

$$d = 9 - 5 = 4$$

$$T_n = a + (n-1)d$$

$$T_{51} = 5 + (51-1)(4)$$

$$= 205$$

5^{th} term of HP is

$$1/205$$

The answer is (c).

MCQ- 15:

The last term of HP $\frac{1}{2}, \frac{1}{8}, \frac{1}{14}, \cdots$ is $\frac{1}{128}$. How many terms are there in the sequence?

(a) 22 (b) 36 (c) 62 (d) 18

Solution:

$$\frac{1}{2}, \frac{1}{8}, \frac{1}{14}, \cdots, \frac{1}{128}$$

It is HP

Reciprocal of the terms.

$$2, 8, 14, \cdots, 128$$

It is an AP.

$a = 2$, , $T_n = 128$, $n = ?$

$$d = 8 - 2 = 6$$

$$T_n = a + (n-1)d$$

$$128 = 2 + (n-1)(6)$$

$$n - 1 = \frac{128 - 2}{6}$$

$$n = 22$$

The answer is (a).

Shortcut:

$$n - 1 = \frac{last\ term - first\ term}{common\ difference}$$

$$n - 1 = \frac{128 - 2}{6}$$

$$n = 22$$

MCQ- 16:

What is the H.M. between 3 and 12?

(a) 4.8 (b) 6 (c) 7.5 (d) 5.5

Solution:

$$a = 3 \ , \quad b = 12$$

$$H.M = \frac{2ab}{a+b}$$

$$H.M = \frac{2.3.12}{3+12}$$

$$= \frac{2.3.12}{15}$$

$$= 4.8$$

The answer is (a).

MCQ- 17:

$x =?$, if $2, x, 8$ is a HP?

$(a)\ 5.6 \qquad (b)\ \frac{16}{7} \qquad (c)\ \frac{6}{5} \qquad (d)\ 3.2$

Solution:

$$2, x, 8$$

x is the H.M. between 2 and 8.

$$a = 2 \ , \ b = 8$$

$$H.M = \frac{2ab}{a+b}$$

$$x = \frac{2 \times 2 \times 8}{2+8}$$

$$x = 3.2$$

The answer is (d).

MCQ- 18:

x =? , if $5, 8, x$ *is* a HP.

(a) 12 (b) 20 (c) 11 (d) 24/5

Solution:

$5, 8, x$

It is a HP.

8 is the H.M.between 5 and x.

$a = 5$, $b = x$

$$H.M = \frac{2ab}{a+b}$$

$$8 = \frac{2.5.x}{5+x}$$

$$40 + 8x = 10x$$

$$2x = 40$$

$$x = 20$$

The answer is (b).

EXERCISE

In all of the following MCQs:

a : First term , d : Common difference , T_n : nth term

r : Common ratio , l : Last term

(1) What is the nth term of an AP?

(a) $a-(1-n)d$ (b) $a+(n+1)d$

(c) $d+(n-1)a$ (d) $a(n-1)d$

(2) what is the nth term of a GP?

(a) $a^n r^{n-1}$ (b) $a+r^{n-1}$ (c) ar^{n+1} (d) $\frac{a}{r^{1-n}}$

(3) What is the sum of first n terms of an AP?

(a) $\frac{n}{2}\{2a+(n+1)d\}$ (b) $\frac{n}{2}\{2a-(1-n)d\}$

(c) $\frac{n}{2}\{a+(n-1)d\}$ (d) $\frac{n}{2}\{2a+nd\}$

(4) What is the sum of first n terms of an AP?

(a) $n(a-1)$ (b) $\frac{n}{2}(a+l)$ (c) $n(a+l)$ (d) $\frac{n}{2}(a-l)$

(5) What is the sum of first n terms of a GP?

(a) $\frac{a(r^n-1)}{r-1}$ (b) $\frac{a(r^n+1)}{r+1}$ (c) $\frac{ar^n-1)}{1-r}$ (d) $\frac{ar^n}{1-r}$

(6) What is the Arithmetic mean of a a and b?

(a) $\frac{a+b}{2}$ (b) $\frac{a-b}{2}$ (c) $\frac{ab}{2}$ (d) $\pm\sqrt{ab}$

(7) What is the geometric mean of a a and b?

(a) $\frac{a+b}{2}$ (b) $\frac{ab}{2}$ (c) $\pm\sqrt{ab}$ (d) $\pm\sqrt{\frac{a}{b}}$

(8) What is the harmonic mean of a a and b?

(a) $\frac{a-b}{2ab}$ (b) $\frac{2ab}{a-b}$ (c) $\frac{a+b}{ab}$ (d) $\frac{2ab}{a+b}$

(9) What is the sum of first n terms of an GP?

(a) $\frac{a+rl}{1-r}$ (b) $\frac{a-rl}{1-r}$ (c) $\frac{a+rl}{1+r}$ (d) $\frac{1-r}{a-rl}$

(10) What is the sum of infinite number of terms of a GP, $|r|<1$?

(a) $\frac{1}{1-r}$ (b) $\frac{r}{1-a}$ (c) $\frac{a}{1-r}$ (d) $\frac{a}{r-1}$

(11) $1, 2, \frac{2}{3}, \frac{1}{2}, \cdots$ is a _____progression.

(a) arithmetic (b) geometric (c) harmonic (d) None

(12) $1-\frac{1}{3}+\frac{1}{9}-\cdots$ is a _____.

(a) arithmetic series (b) harmonic progression

(c) geometric sequence (d) geometric series

(13) What is the 9^{th} term of the sequence $3+6+9+\cdots$?

(a) 30 (b) 21 (c) 27 (d) 18

(14) How many terms have the sequence $2+6+10+\cdots+42$?

(a) 10 (b) 11 (c) 12 (d) 14

(15) How many terms have the GP $1, 2, 4, \cdots$ and last term is 32?

(a) 6 (b) 5 (c) 16 (d) 15

(16) A HP $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \cdots$ has eleven terms.What is the last term?

(a) $\frac{1}{30}$ (b) $\frac{1}{25}$ (c) 23 (d) $\frac{1}{23}$

(17) What is the sum of eleven terms $5, \cdots, 35$ which is an AP?

(a) 118 (b) 220 (c) 232 (d) 68

(18) What is the sum of geometric sequence $1, 3, 9, \cdots, 243$?

(a) 562 (b) 380 (c) 364 (d) 424

(19) The sum of the geometric series $2 + 4 + 8 + \cdots is\ 254$. What is the last term?

(a) 128 (b) 64 (c) 112 (d) 160

(20) What is the geometric mean of 4 and 16?

(a) 10 (b) ± 64 (c) ± 8 (d) ± 6

(21) $3, g, 27$ is a GP, what is the value of g?

(a) ± 21 (b) ± 15 (c) ± 6 (d) ± 9

(22) $4, a, 16$ is an AP, what is the value of a?

(a) 8 (b) 10 (c) 12 (d) 6

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