

## First Mid-term Test - 2022

Standard X

Mathematics - Key Answer

Tiruvallur District.

I

Part - A

1) c) 3

2) a) (8, 6)

3) c) one-to-one function (ஒரு-ஒரு-பொருள் செயல்)

4) a) 1

5) d) 11

6) a) 0

7) c)  $\angle B = \angle D$

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II

Part - B

8)  $A = \{3, 5\}$      $B = \{2, 4\}$

9) Domain (வழிவழி) =  $\{0, 1, 2, 3, 4, 5\}$

Range (பெயர்) =  $\{3, 4, 5, 6, 7, 8\}$

10)  $f(x) = 2x - 3$

$$\frac{f(0) + f(1)}{2} = \frac{-3 - 1}{2} = \frac{-4}{2} = -2$$

$$11) \quad 412 = 340(1) + 72$$

$$340 = 72(4) + 52$$

$$72 = 52(1) + 20$$

$$52 = 20(2) + 12$$

$$20 = 12(1) + 8$$

$$12 = 8(1) + 4$$

$$8 = 4(2) + 0$$

HCF of 340 and 412 is 4.  
(சமூகம்)

12)

$$2 \overline{) 13824}$$

$$2 \overline{) 6912}$$

$$2 \overline{) 3456}$$

$$2 \overline{) 1728}$$

$$2 \overline{) 864}$$

$$2 \overline{) 432}$$

$$2 \overline{) 216}$$

$$2 \overline{) 108}$$

$$2 \overline{) 54}$$

$$3 \overline{) 27}$$

$$3 \overline{) 9}$$

3

$$13824 = 2^a \times 3^b$$

$$= 2^9 \times 3^3$$

$$\therefore a = 9,$$

$$b = 3.$$

13)

3, 6, 9, 12, ... III

$$a = 3$$

$$d = 3$$

$$l = III$$

$$h = \frac{l - a}{d} + 1$$

$$h = \frac{111 - 3}{3} + 1 = \frac{108}{3} + 1$$

$$= 36 + 1$$

$$\underline{\underline{h = 37}}$$

14) 9, 3, 1, ...

$$a = 9 \quad r = \frac{t_2}{t_1} = \frac{3}{9} = \frac{1}{3}$$

$$t_8 = ar^{8-1}$$

$$= 9 \left(\frac{1}{3}\right)^{8-1} = 9 \frac{1}{3^7} = 3^2 \cdot \frac{1}{3^7}$$

$$t_8 = \frac{1}{3^5} = \frac{1}{243}$$

Part - c

III

15)

$$A = \{1, 2, 3, 4, 5, 6, 7\}$$

$$B = \{2, 3, 5, 7\}$$

$$C = \{2\}$$

LHS

$$A \cap B = \{2, 3, 5, 7\}$$

$$(A \cap B) \times C = \{(2, 2) (3, 2) (5, 2) (7, 2)\} \text{--- ①}$$

RHS

$$A \times B = \{(1, 2) (1, 3) (1, 5) (1, 7) (2, 2) (2, 3) (2, 5)$$

$$(2, 7) (3, 2) (3, 3) (3, 5) (3, 7) (4, 2) (4, 3)$$

$$(4, 5) (4, 7) (5, 2) (5, 3) (5, 5) (5, 7)$$

$$(6, 2) (6, 3) (6, 5) (6, 7) (7, 2) (7, 3) (7, 5) (7, 7)\}$$

$$A \times C = \{(1, 2) (2, 2) (3, 2) (4, 2) (5, 2) (6, 2)$$

$$(7, 2)\}$$

$$(A \times B) \cap (A \times C) = \{(1, 2) (2, 2) (3, 2) (4, 2) (5, 2)$$

From ① &amp; ②

$$(A \cap B) \times C \neq (A \times B) \cap (A \times C)$$

16)

$$f(x) = 3x - 1$$

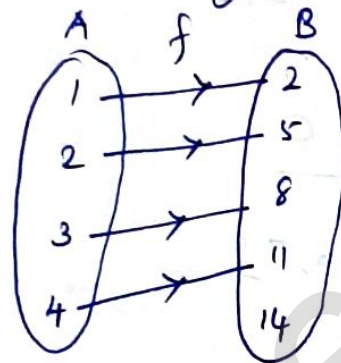
$$f(1) = 3(1) - 1 = 2$$

$$f(2) = 3(2) - 1 = 5$$

$$f(3) = 3(3) - 1 = 8$$

$$f(4) = 3(4) - 1 = 11$$

அடிப்படையில்  
Arrow diagram



அடிப்படையில்  
Graphical form

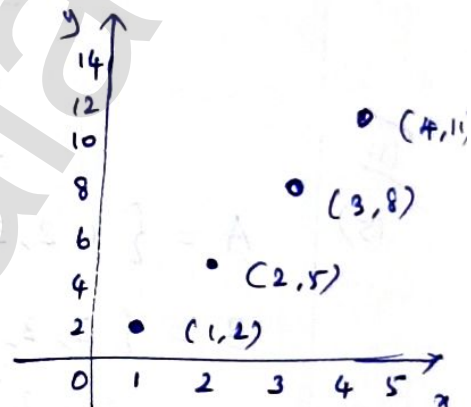


Table form அடிப்படையில்

x :	1	2	3	4
y :	2	5	8	11

Set of ordered pairs அடிப்படையில்  
Form

$$f = \{ (1, 2), (2, 5), (3, 8), (4, 11) \}$$

(17)

$$f(x) = 2x + 3$$

$$g(x) = 1 - 2x$$

$$h(x) = 3x$$

LHS

$$g \circ h = g[h(x)]$$

$$= g(3x)$$

$$= 1 - 2(3x)$$

$$g \circ h = 1 - 6x$$

$$f \circ (g \circ h) = f[g \circ h]$$

$$= f(1 - 6x)$$

$$= 2(1 - 6x) + 3$$

$$= 2 - 12x + 3$$

$$= 5 - 12x \quad \text{--- (1)}$$

RHS

$$f \circ g = f(g(x))$$

$$= f(1 - 2x)$$

$$= 2(1 - 2x) + 3$$

$$= 2 - 4x + 3$$

$$= 5 - 4x$$

From (1) &amp; (2)

LHS = RHS

$$(f \circ g) \circ h = (f \circ g)[h(x)]$$

$$= f \circ g(3x)$$

$$= 5 - 4(3x)$$

$$= 5 - 12x \quad \text{--- (2)}$$

(18)

$$a_8 = \frac{8^2 - 1}{8 + 3}$$

$$\therefore a_n = \frac{n^2 - 1}{n + 3}$$

$$= \frac{64 - 1}{11} = \frac{63}{11}$$

$$a_{15} = \frac{15^2}{2(15) + 1} = \frac{225}{31} \quad \therefore a_n = \frac{n^2}{2n + 1}$$

(19)

Three consecutive terms  $a-d, a, a+d$   
 மூன்று தொடர்ச்சியான மூன்று சொற்கள்

$$\text{Sum (கூடுதல்)} = 27$$

$$a - d + a + a + d = 27$$

$$3a = 27$$

$$\boxed{a = 9}$$

$$\text{Product (கூடுதல்)} = 288$$

$$(a - d) a (a + d) = 288$$

$$9(9^2 - d^2) = 288$$

$$81 - d^2 = \frac{288}{9}$$

$$81 - d^2 = 32$$

$$-d^2 = -49$$

$$\boxed{d = \pm 7}$$

When

$$a = 9, d = 7 \text{ மூலம்}$$

$$a - d = 9 - 7 = 2$$

$$a = 9$$

$$a + d = 9 + 7 = 16$$

2, 9, 16

When  $a = 9$ ,  $d = -7$  σ<sub>10</sub>

$$a - d = 9 - (-7) = 16$$

$$a = 9$$

$$\underline{16, 9, 2}$$

$$a + d = 9 + (-7) = 2$$

Three consecutive terms (or) σ<sub>10</sub> σ<sub>10</sub>

$$\underline{2, 9, 16} \text{ (or) } \underline{16, 9, 2}$$

20)

$$5 + 55 + 555 + \dots + n \text{ terms}$$

$$= 5 [1 + 11 + 111 + \dots + n \text{ terms}]$$

$$= \frac{5}{9} [9 + 99 + 999 + \dots + n \text{ terms}]$$

$$= \frac{5}{9} [(10-1) + (100-1) + (1000-1) + \dots + n \text{ terms}]$$

$$= \frac{5}{9} [(10 + 100 + 1000 + \dots + n \text{ terms}) - (1 + 1 + 1 + \dots + n \text{ terms})]$$

$$= \frac{5}{9} \left[ \frac{10(10^n - 1)}{10 - 1} - n \right]$$

$$= \frac{50}{9} (10^n - 1) - \frac{5n}{9}$$

21)

$$15^2 + 16^2 + 17^2 + \dots + 28^2$$

$$= (1^2 + 2^2 + \dots + 28^2) - (1^2 + 2^2 + \dots + 14^2)$$

$$= \frac{28 \times (28+1) \times [2(28)+1]}{6} - \frac{14(14+1)[2(14)+1]}{6}$$

$$= 7714 - 1015$$

$$= \underline{\underline{6699}}$$

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**Example 4.10** Construct a triangle similar to a given triangle  $PQR$  with its sides equal to  $\frac{3}{5}$  of the corresponding sides of the triangle  $PQR$  (scale factor  $\frac{3}{5} < 1$ )

**Solution** Given a triangle  $PQR$  we are required to construct another triangle whose sides are  $\frac{3}{5}$  of the corresponding sides of the triangle  $PQR$ .

### Steps of construction

1. Construct a  $\triangle PQR$  with any measurement.
2. Draw a ray  $QX$  making an acute angle with  $QR$  on the side opposite to vertex  $P$ .
3. Locate 5 (the greater of 3 and 5 in  $\frac{3}{5}$ ) points,  $Q_1, Q_2, Q_3, Q_4$  and  $Q_5$  on  $QX$  so that  $QQ_1 = Q_1Q_2 = Q_2Q_3 = Q_3Q_4 = Q_4Q_5$ .
4. Join  $Q_5R$  and draw a line through  $Q_3$  (the third point, 3 being smaller of 3 and 5 in  $\frac{3}{5}$ ) parallel to  $Q_5R$  to intersect  $QR$  at  $R'$ .
5. Draw line through  $R'$  parallel to the line  $RP$  to intersect  $QP$  at  $P'$ .

Then,  $\triangle P'QR'$  is the required triangle each of whose sides is three-fifths of the corresponding sides of  $\triangle PQR$ .

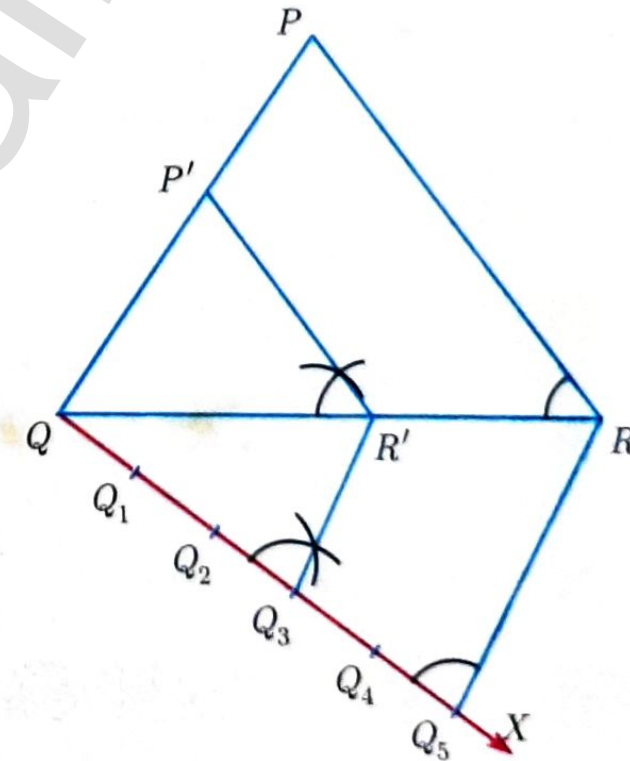
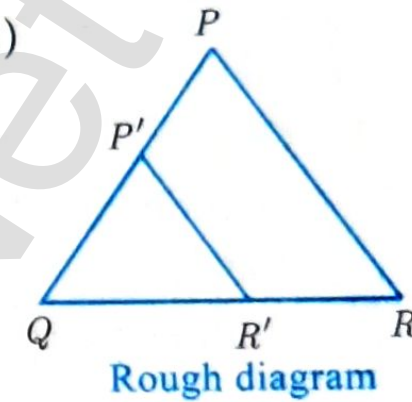


Fig. 4.25



## FIRST MIDTERM TEST - 2022

Standard X

Reg.No.

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Marks: 50

Time: 1.30 hrs.

## MATHEMATICS

## Part - A

I. Choose the correct answer:

7 x 1 = 7

- If  $n(A \times B) = 6$  and  $A = \{1, 3\}$  then  $n(B)$  is
  - 1
  - 2
  - 3
  - 6
- If  $\{(a, 8), (6, b)\}$  represents an identity function then the value of  $a$  and  $b$  respectively
  - (8, 6)
  - (8, 8)
  - (6, 8)
  - (6, 6)
- Let  $A = \{1, 2, 3, 4\}$  and  $B = \{4, 8, 9, 10\}$ . A function  $f: A \rightarrow B$  given by  $f\{(1, 4), (2, 8), (3, 9), (4, 10)\}$  is a
  - many-one function
  - identity function
  - one-to-one function
  - into function
- $7^{4k} \equiv \underline{\hspace{2cm}} \pmod{100}$ 
  - 1
  - 2
  - 3
  - 4
- Given  $F_1 = 1, F_2 = 3$  and  $F_n = F_{n-1} + F_{n-2}$  then  $F_5$  is
  - 3
  - 5
  - 8
  - 11
- If 6 times of 6<sup>th</sup> term of an A.P is equal to 7 times of 7<sup>th</sup> term, then the 13<sup>th</sup> term of an A.P. is
  - 0
  - 6
  - 7
  - 13
- If in triangle ABC and EDF,  $\frac{AB}{DE} = \frac{BC}{FD}$  then they will be similar, when
  - $\angle B = \angle E$
  - $\angle A = \angle D$
  - $\angle B = \angle D$
  - $\angle A = \angle F$

## Part - B

II. Answer any 5 of the following :

5 x 2 = 10

- If  $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$  then find A and B.
- A Relation R is given by the set  $\{(x, y) / y = x + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$ . Determine its domain and range.
- A function  $f$  is defined by  $f(x) = 2x - 3$ , find  $\frac{f(0) + f(1)}{2}$
- Use Euclid's Division Algorithm to find HCF of 340 and 412.
- If  $13824 = 2^a \times 3^b$ , then find  $a$  and  $b$ .
- Find the number of terms in the A.P 3, 6, 9, 12, ..... 111
- Find the 8<sup>th</sup> term of the G.P. 9, 3, 1, .....

