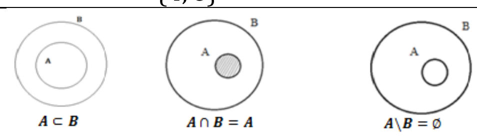
10th Maths –Quarterly Exam-2017-Answer key

Sec-I

1	a	$\{p, q\}$
2	c	5
3	d	0
4	a	$\frac{a}{b}$
5	a	k^2
6	a	has infinitely many solutions
7	c	$x+1$
8	a	$(x-5)(x-3)$
9	d	$m=n$
10	b	4×4
11	a	$4:3$
12	b	2 sq.units
13	d	40^0
14	b	$4:9$
15	a	$\cos\theta$

Sec- II

16.	$(B \cup C) = \{2,4,6\} \cup \{1,2,3,4,5,6\}$ $= \{1,2,3,4,5,6\}$ $A \cap (B \cup C) = \{\mathbf{4},\mathbf{6},7,8,9\} \cap \{1,2,3,\mathbf{4},5,\mathbf{6}\}$ $= \{4,6\}$
17.	
18.	$F_1 = 1, F_2 = 1, F_3 = 2, F_4 = 3, F_5 = 5$
19.	$a = 1, r = 2, \therefore n = 11$ Then, the 11th term of the given geometric sequence is 1024
20.	Cost of a pencil $x = 4$ Cost of a eraser $y = 2$
21.	The zero of the divisor is +3 Quotient $x^2 + 4x + 5$, Remainder 12
22.	The required rational expression $= \frac{2x^3+2x^2+5}{x^2+2}$
23.	$a_{11} = \frac{1}{2}, a_{12} = 2, a_{21} = \frac{1}{2},$ $a_{22} = 1, a_{31} = \frac{3}{2}, a_{32} = 0$ Required Matrix $A = \begin{pmatrix} \frac{1}{2} & 2 \\ \frac{1}{2} & 1 \\ \frac{3}{2} & 0 \end{pmatrix}$

24.	$A = \begin{pmatrix} 1 & -2 \\ -16 & 6 \end{pmatrix}$ The additive inverse of A $\begin{pmatrix} -1 & 2 \\ 16 & -6 \end{pmatrix}$
25.	Centroid $(4, -2)$
26.	Since the side CD is parallel to x axis, the slope of CD, $m = 0$
27.	$(5, -4), m = \frac{2}{3}$ Required equation $2x - 3y - 22 = 0$
28.	$\mathrm{cosec}^2(90-\theta) - \cot^2(90-\theta)$ $= \sec^2\theta - \tan^2\theta$ $= 1 + \tan^2\theta - \tan^2\theta = 1$
29.	$\frac{AB}{QR} = \frac{PB}{PR}$ $QR = \frac{3\times 6}{2} = 9$ c.m
30. a	Range $= \{\frac{-1}{2}, -1, 1, \frac{1}{2}\}$, $f = \left\{\left(-2, \frac{1}{-2}\right), \left(-1, \frac{1}{-1}\right), \left(1, \frac{1}{1}\right), \left(2, \frac{1}{2}\right)\right\}$ However $\frac{-1}{2}, \frac{1}{2} \notin A$. Hence it is not a function from A to A
30. b	$\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \frac{\sin\theta(1-2\sin^2\theta)}{\cos\theta(2\cos^2\theta - 1)}$ $= \left(\frac{\sin\theta}{\cos\theta}\right)\left(\frac{\sin^2\theta + \cos^2\theta - 2\sin^2\theta}{2\cos^2\theta - (\sin^2\theta + \cos^2\theta)}\right)$ $= (\tan\theta)\left(\frac{\cos^2\theta - \sin^2\theta}{\cos^2\theta - \sin^2\theta}\right) = \tan\theta$

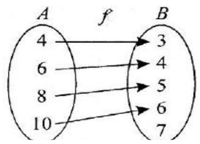
Sec-III

31.	$B \cap C = \{15,20\}$ $A \setminus (B \cap C) = \{10,25,30,35,40,45,50\}$….(1) $A \setminus B = \{25,35,40,45,50\}$ $A \setminus C = \{10,25,30,40,50\}$ $(A \setminus B) \cup (A \setminus C) =$ $\{10,25,30,35,40,45,50\}$..(2) From (1) and (2) , we get $A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C)$
32.	F, H and C represent the set of students who play foot ball, hockey and cricket respectively. $n(F) = 65, n(H) = 45, n(C) = 42,$ $n(F \cap H) = 20, n(F \cap C) = 25, n(H \cap C) = 15,$ $n(F \cap H \cap C) = 8$ $n(F \cup H \cup C) = 100$ Hence the number of students in the group $= 100$.

33. $f(x) = \frac{1}{2}x + 1$

$f(4) = 3\,, f(6) = 4, f(8) = 5, f(10) = 6$

(i) An arrow diagram



(ii) Set of ordered pairs

$f = \{(4,3), (6,4\,), (8,5), (10,6)\}$

(iii) Table

x	4	6	8	10
$f(x)$	3	4	5	6

34. The natural numbers between 300 and 500 which are divisible by 11 are 308, 319, 330, …495

$a = 308,\ l = 495,\ d = 11$

$n = 18$

$\therefore S_{18} = 7227$

35. $S_n = 4 + 44 + 444 + \cdots$ to n terms

$= 4(1 + 11 + 111 + \cdots$ to n terms

$= \frac{4}{9}(9 + 99 + 999 + \cdots$ to n terms

$= \frac{4}{9}\left[\frac{10(10^n - 1)}{9} - n\right]$

$S_n = \left\{\frac{40(10^n - 1)}{81} - \frac{4n}{9}\right\}$

36. $p(x) = 2x^3 - 3x^2 - 3x + 2$

$x + 1$ is a factor of $p(x)$

$p(x) = (x + 1)(2x^2 - 5x + 2)$

$2x^2 - 5x + 2 = (x - 2)(2x - 1)$

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

37. Let $f(x) = x^4 + 3x^3 - x - 3$ and $g(x) = x^3 + x^2 - 5x + 3$

Here degree of $f(x) >$ degree of $g(x)$. $\therefore$ Divisor is $x^3 + x^2 - 5x + 3$

Division of $x^4 + 3x^3 + 0x^2 - x - 3$ by $x^3 + x^2 - 5x + 3$: quotient $x + 2$

$x^4 + x^3 - 5x^2 + 3x$

$2x^3 + 5x^2 - 4x - 3$

$2x^3 + 2x^2 - 10x + 6$

$3x^2 + 6x - 9$

$\Longrightarrow x^2 + 2x - 3 \longrightarrow$ remainder$(\neq 0)$

Division of $x^3 + x^2 - 5x + 3$ by $x^2 + 2x - 3$: quotient $x - 1$

$x^3 + 2x^2 - 3x$

$-x^2 - 2x + 3$

$-x^2 - 2x + 3$

$0 \longrightarrow$ remainder

Therefore, GCD $(f(x)\,,\,g(x)) = x^2 + 2x - 3$.

38. one man can complete $\frac{1}{x}$ part of the work in one day and one boy can complete $\frac{1}{y}$ part of the work in one day.

The amount of work done by 8 men and 12 boys in one day is $\frac{1}{10}$

Thus we have $\frac{8}{x} + \frac{12}{y} = \frac{1}{10}$

The amount of work done by 6 men and 8 boys in one day is $\frac{1}{14}$

Thus we have $\frac{6}{x} + \frac{8}{y} = \frac{1}{14}$

Let $a = \frac{1}{x}$ and $b = \frac{1}{y}$

$a = \frac{1}{140}, b = \frac{1}{280}$

That is $x = \frac{1}{a} = 140\,,\quad y = \frac{1}{b} = 280$

Hence, one man can finish the work individually in 140days and one boy can finish the work individually in 280 days.

39 $B + C = \begin{pmatrix} -1 & 6 \\ 1 & 10 \end{pmatrix}$

$A(B + C) = \begin{pmatrix} -1 & 38 \\ 5 & 34 \end{pmatrix}$…………………(1)

$AB + AC = \begin{pmatrix} 6 & 29 \\ 26 & 23 \end{pmatrix} + \begin{pmatrix} -7 & 9 \\ -21 & 11 \end{pmatrix}$

$= \begin{pmatrix} -1 & 38 \\ 5 & 34 \end{pmatrix}$…………………………(2)

From (1) and (2)

$A(B + C) = AB + AC$

40. $A^2 - 4A + 5I_2$

$= \begin{pmatrix} -1 & -4 \\ 8 & 7 \end{pmatrix} - 4\begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix} + 5\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

$= \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} = O$

41. $A = \frac{1}{2}\{35 + 51\} = 43$ sq.units

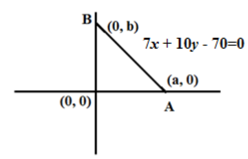
42. To find a, b

$\frac{x}{a} + \frac{y}{b} = 1$

$7x + 10y - 70 = 0$

$\frac{7x}{70} + \frac{10y}{70} = 1$

$\frac{x}{10} + \frac{y}{7} = 1$



$a = 10, b = 7$

Points (0,0), (10,0), (0, 7)

Area = 35 sq.units

43. If a straight line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the two sides in the same ratio.

Given: In a triangle ABC, a straight line l parallel to BC, intersects AB at D and AC at E.

To prove: $\frac{AD}{DB} = \frac{AE}{EC}$

Construction: Join BE, CD. Draw $EF \perp AB$ and $DG \perp CA$

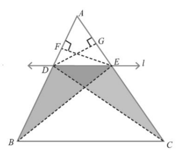
Proof : Since, $EF \perp AB$, EF is the height of triangles ADE and DBE

$\text{Area}(\Delta ADE) = \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times AD \times EF$ and

$\text{Area}(\Delta DBE) = \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times DB \times EF$



$\therefore \frac{\text{Area }(\Delta ADE)}{\text{Area }(\Delta DBE)} = \frac{\frac{1}{2}\times AD \times EF}{\frac{1}{2}\times DB \times EF} = \frac{AD}{DB}$......(1)

Similarly, we get

$\therefore \frac{\text{Area }(\Delta ADE)}{\text{Area }(\Delta DCE)} = \frac{\frac{1}{2}\times AE \times DG}{\frac{1}{2}\times EC \times DG} = \frac{AE}{EC}$...... (2)

But ΔDBE and ΔDCE are on the same base DE and between the same parallel straight lines BC and DE

$\text{Area}(\Delta DBE) = \text{Area}(\Delta DCE)$..............(3)

From (1),(2) and (3), we obtain $\frac{AD}{DB} = \frac{AE}{EC}$.

Hence the theorem

44. $m^2 - n^2 = (\tan\theta + \sin\theta)^2 - (\tan\theta - \sin\theta\, 2$

$= 4\tan\theta \sin\theta$..................(1)

$4\sqrt{mn} = 4\sqrt{(\tan\theta + \sin\theta)(\tan\theta - \sin\theta)}$

$= 4\tan\theta \sin\theta$.............(2)

From (1)and (2) $m^2 - n^2 = 4\sqrt{mn}$

45. a $a = a, b = ar, c = ar^2, d = ar^3$

$(b-c)^2 + (c-a)^2 + (d-b)^2 =$
$(ar - ar^2)^2 + (ar^2 - a)^2 + (ar^3 - ar)^2$
$= (a-d)^2$

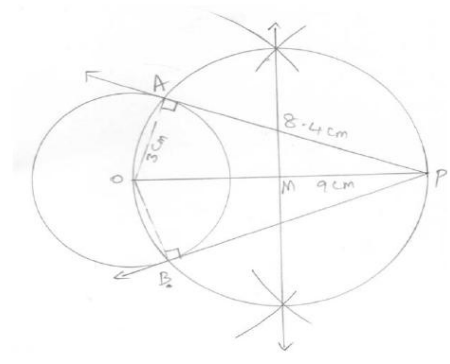
45. b $\frac{1}{P-Q} - \frac{2Q}{P^2-Q^2} = \frac{1}{P-Q} - \frac{2Q}{(P+Q)(P-Q)}$

$= \frac{P+Q-2Q}{(P+Q)(P-Q)} = \frac{P-Q}{(P+Q)(P-Q)} = \frac{1}{P+Q}$

$= \frac{1}{\frac{x}{x+y}+\frac{y}{x+y}} = \frac{1}{\frac{x+y}{x+y}} = 1$

Section-III

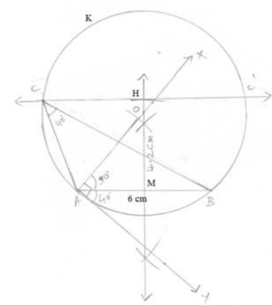
46. a



Verification:

$PA = \sqrt{9^2 - 3^2} = \sqrt{81-9} = \sqrt{72} = 8.4$ cm

46. b



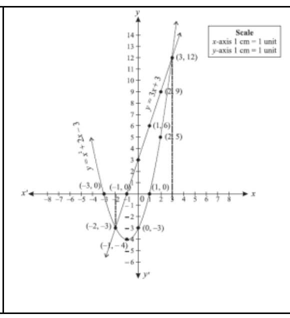
47. a $y = x^2 + 2x - 3$

,Points

$(-3,0), (-2,-3), (-1,-4), (0,-3), (1,0), (2,5), (3,2)$

Solve $y = 3x + 3$ Points $(-2,-3)$,
$(-1,0), (0,3)(1,6), (2,9)$

Solution set $\{-2,3\}$



47. b Let us form the following table

Deposit Rs. x	100	200	300	400	500	600	700
S.I. earned Rs. y	10	20	30	40	50	60	70

From the table $y = \frac{1}{10}x$

The graph is a **straight line.** So <u>direct variation.</u>

i)The interest for the deposit of Rs.650 is Rs.65

$y = \frac{650}{10} = 65$ (650, 65)

ii)The amount to be deposited to earn an interest of Rs.45 is Rs.450

$45 = \frac{x}{10} \Rightarrow x = 450$ (450, 45)