SOLUTIONS

Name: …… Stream……

GAYAZA HIGH SCHOOL

S.2 MATH WORKSHEET NINE

NUMBER BASES

Question.1: Covert the following to base ten

1.	346_{seven} $= (3 \times 7^2) + (4 \times 7^1) + (6 \times 7^0) = 181$
2.	2210_{three} $= (2 \times 3^3)(2 \times 3^2) + (1 \times 3^1) + (0 \times 3^0) = 75$
3.	$530 \cdot 12_{six}$ $= (5 \times 6^2) + (3 \times 6^1) + (0 \times 6^0) + (1 \times 6^{-1}) + (2 \times 6^{-2}) = 198 + \frac{2}{9} = 198\frac{2}{9}$ ≈ 198.2222
4.	$6205 \cdot 45_{seven}$ $= (6 \times 7^3)(2 \times 7^2) + (0 \times 7^1) + (5 \times 7^0) + (4 \times 7^{-1}) + (5 \times 7^{-2}) = 2161 + \frac{33}{49}$ $= 2161\frac{33}{49} \approx 2161.6735$

Question.2 Convert the following as required

1.	198_{ten} *to base five* 5 | 198 | 3 5 | 39 | 4 5 | 7 | 2 | 1 | $198_{ten} = 1243_{Five}$
2.	864_{eight} *to base ten* $= (8 \times 8^2) + (6 \times 8^1) + (4 \times 8^0) = 564$
3.	361_{seven} *to base four* $= (3 \times 7^2) + (6 \times 7^1) + (1 \times 7^0) = 190$

	4	190	2
	4	47	3
	4	11	3
		2	

$\mathbf{361_{Seven} = 190_{ten} = 2332_{four}}$

4. 1001001001_{two} *to base six*

$= (\mathbf{1 \times 2^9}) + (\mathbf{1 \times 2^6}) + (\mathbf{1 \times 2^3}) + (\mathbf{1 \times 2^0}) = \mathbf{585}$

6	585	3
6	97	1
6	16	4
	2	

$\mathbf{1001001001_{two} = 585_{ten} = 2413_{six}}$

5. 2020_{ten} *to binary*

2	2020	0
2	1010	0
2	505	1
2	252	0
2	126	0
2	63	1
2	31	1
2	15	1
2	7	1
2	3	1
	1	

$\mathbf{2020_{ten} = 11111100100_{two}}$

6. 816_{nine} *to binary*

$= (\mathbf{8 \times 9^2}) + (\mathbf{1 \times 9^1}) + (\mathbf{6 \times 9^0}) = \mathbf{663}$

2	663	1
2	331	1
2	165	1
2	82	0
2	41	1
2	20	0
2	10	0
2	5	1
2	2	0
	1	

$$\mathbf{816_{nine} = 663_{ten} = 1010010111_{two}}$$

Question: *Find the value of* ***n*** *in the following equations:*

1. $\mathbf{45_n = 1112_{three}}$

$$(4 \times n^1) + (5 \times n^0) = (1 \times 3^3) + (1 \times 3^2) + (1 \times 3^1) + (2 \times 3^0)$$

$$4n + 5 = 41$$

$$4n = 36$$

$$n = 9$$

$$\therefore \boldsymbol{n = Nine}$$

2. $\mathbf{21_n = 19_{ten}}$

$$(2 \times n^1) + (1 \times n^0) = 19$$

$$2n + 1 = 19$$

$$2n = 18$$

$$n = 9$$

$$\therefore \boldsymbol{n = Nine}$$

3. $\mathbf{303_n = 410_{six}}$

$$(3 \times n^2) + (0 \times n^1) + (3 \times n^0) = (4 \times 6^2) + (1 \times 6^1) + (0 \times 6^0)$$

$$3n^2 + 3 = 144 + 6$$

$$3n^2 = 147$$

$$n^2 = 49$$

$$n = \sqrt{49} = 7$$

$$\therefore \boldsymbol{n = seven}$$

4.	$\boldsymbol{202_n = 37_{nine}}$ $(2 \times n^2) + (0 \times n^1) + (2 \times n^0) = (3 \times 9^1) + (7 \times 9^0)$ $2n^2 + 2 = 34$ $2n^2 = 32$ $n^2 = 16$ $n = \sqrt{16} = 4$ $\therefore \boldsymbol{n = Four}$
5.	$\boldsymbol{112_n + 304_n = 421_n}$ $(1 \times n^2) + (1 \times n^1) + (2 \times n^0) + (3 \times n^2) + (0 \times n^1) + (4 \times n^0)$ $= (4 \times n^2) + (2 \times n^1) + (1 \times n^0)$ $n^2 + n + 2 + 3n^2 + 4 = 4n^2 + 2n + 1$ $n = 5$ $\therefore \boldsymbol{n = Five}$

THE END.