

**(23) ASAS NOMBOR
(NUMBER BASES)**

(a) JADUAL ASAS NOMBOR (Comparison between number in bases ten, two, five and eight)

Asas 10	0	1	2	3	4	5	6	7	8	9	10
Asas 2	0 ₂	1 ₂	10 ₂	11 ₂	100 ₂	101 ₂	110 ₂	111 ₂	1000 ₂	1001 ₂	1010 ₂
Asas 5	0 ₅	1 ₅	2 ₅	3 ₅	4 ₅	10 ₅	11 ₅	12 ₅	13 ₅	14 ₅	20 ₅
Asas 8	0 ₈	1 ₈	2 ₈	3 ₈	4 ₈	5 ₈	6 ₈	7 ₈	10 ₈	11 ₈	12 ₈

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(b) NILAI DIGIT (The value of a digit of a number in bases two, eight and five)

Asas 2	2 ⁹	2 ⁸	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
	512	256	128	64	32	16	8	4	2	1
Asas 8						8 ⁴	8 ³	8 ²	8 ¹	8 ⁰
						4096	512	64	8	1
Asas 5					5 ⁵	5 ⁴	5 ³	5 ²	5 ¹	5 ⁰
					3125	625	125	25	5	1

Contoh 1 :
 543210
 110011_2
 \Rightarrow Nilai digit 1
 $= 1 \times 2^4 = 16$
 or
 $= 1 \times 16 = 16$

Contoh 2 :
 5210
 7502_8
 \Rightarrow Nilai digit 5
 $= 5 \times 8^2 = 320$
 or
 $= 5 \times 64 = 320$

Contoh 3 :
 210
 241_5
 \Rightarrow Nilai digit 4
 $= 4 \times 5^1 = 20$
 or
 $= 4 \times 5 = 20$

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(c) MENUKAR ASAS NOMBOR ASAS LAIN KE ASAS 10 (Changing numbers in base 2, base 8, base 5 \rightarrow base 10)

asas 2 \rightarrow asas 10	asas 8 \rightarrow asas 10	asas 5 \rightarrow asas 10
Contoh 1 : 10110_2 $= (1 \times 2^4) + (1 \times 2^2) + (1 \times 2^1)$ $= 22$	Contoh 2 : 1056_8 $= (1 \times 8^3) + (5 \times 8^1) + (6 \times 8^0)$ $= 558$	Contoh 3 : 324_5 $= (3 \times 5^2) + (2 \times 5^1) + (4 \times 5^0)$ $= 89$

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(d) MENUKAR ASAS 10 KE ASAS LAIN (Changing numbers in base 10 \rightarrow base 2, base 8, base 5 [type 1])

asas 10 \rightarrow asas 2 ($\div 2$) ~ cal.	asas 10 \rightarrow asas 8 ($\div 8$) ~ cal.	asas 10 \rightarrow asas 5 ($\div 5$)																																										
Contoh 1 : $12_{10} = ???_2$ <table style="margin-left: 20px;"> <tr><td>2</td><td>12</td><td>Baki / remainder</td></tr> <tr><td>2</td><td>6</td><td>0</td></tr> <tr><td>2</td><td>3</td><td>0</td></tr> <tr><td>2</td><td>1</td><td>1</td></tr> <tr><td></td><td>0</td><td>1</td></tr> </table> $= 1100_2$	2	12	Baki / remainder	2	6	0	2	3	0	2	1	1		0	1	Contoh 2 : $288_{10} = ???_8$ <table style="margin-left: 20px;"> <tr><td>8</td><td>288</td><td>baki</td></tr> <tr><td>8</td><td>36</td><td>0</td></tr> <tr><td>8</td><td>4</td><td>4</td></tr> <tr><td></td><td>0</td><td>4</td></tr> </table> $= 407_8$	8	288	baki	8	36	0	8	4	4		0	4	Contoh 3 : $144_{10} = ???_5$ <table style="margin-left: 20px;"> <tr><td>5</td><td>144</td><td>baki</td></tr> <tr><td>5</td><td>28</td><td>4</td></tr> <tr><td>5</td><td>5</td><td>3</td></tr> <tr><td>5</td><td>1</td><td>0</td></tr> <tr><td></td><td>0</td><td>1</td></tr> </table> $= 1034_5$	5	144	baki	5	28	4	5	5	3	5	1	0		0	1
2	12	Baki / remainder																																										
2	6	0																																										
2	3	0																																										
2	1	1																																										
	0	1																																										
8	288	baki																																										
8	36	0																																										
8	4	4																																										
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5	5	3																																										
5	1	0																																										
	0	1																																										

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(e) **MENUKAR ASAS 10 KE ASAS LAIN** Changing numbers in base 10 → base 2, base 8, base 5 [type 2]

asas 10 → asas 2 ~ cal.	asas 10 → asas 8 ~ cal.	asas 10 → asas 5
<p>Contoh 1 :</p> $2^5 + 2^2 + 1 = ???_2$ $\begin{array}{r} 2^5 \quad 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0 \\ 1 \quad 0 \quad 0 \quad 1 \quad 0 \quad 1_2 \\ \hline = 100101_2 \end{array}$	<p>Contoh 2 :</p> $2(8^3) + 5(8) + 7 = ???_8$ $\begin{array}{r} 8^3 \quad 8^2 \quad 8^1 \quad 8^0 \\ 2 \quad 0 \quad 5 \quad 7_8 \\ \hline = 2057_8 \end{array}$	<p>Contoh 3 :</p> $5^3 + 3 = ???_5$ $\begin{array}{r} 5^3 \quad 5^2 \quad 5^1 \quad 5^0 \\ 1 \quad 0 \quad 0 \quad 3_5 \\ \hline = 1003_5 \end{array}$

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(f) **Asas 2 ↔ asas 8** (kaedah kumpulan 3 digit)

asas 2 → asas 8 ~ cal.	asas 2 → asas 8 ~ cal.
<p>Contoh 1 :</p> $1011101_2 = ???_8$ $\begin{array}{r} \begin{array}{c} \bullet \\ 4 \end{array} 2 \begin{array}{c} \bullet \\ 2 \end{array} 1 \quad \begin{array}{c} \bullet \bullet \\ 4 \end{array} 2 \begin{array}{c} \bullet \\ 1 \end{array} \quad \begin{array}{c} \bullet \bullet \\ 4 \end{array} 2 \begin{array}{c} \bullet \\ 1 \end{array} \\ \hline 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad 0 \quad 1_2 \\ \hline 1 \quad 3 \quad 5_8 \\ \hline = 135_8 \end{array}$	<p>Contoh 2 :</p> $562_8 = ???_2$ $\begin{array}{r} \begin{array}{c} \bullet \\ 4 \end{array} 2 \begin{array}{c} \bullet \\ 2 \end{array} 1 \quad \begin{array}{c} \bullet \bullet \\ 4 \end{array} 2 \begin{array}{c} \bullet \\ 1 \end{array} \quad \begin{array}{c} \bullet \\ 4 \end{array} 2 \begin{array}{c} \bullet \\ 1 \end{array} \\ \hline 5 \quad 6 \quad 2_8 \\ \hline 1 \quad 0 \quad 1 \quad 1 \quad 1 \quad 0 \quad 1 \quad 0_2 \\ \hline = 101110010_2 \end{array}$

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(g) **asas 2 ↔ asas 5, asas 8 ↔ asas 5**

asas 2 ↔ asas 5	asas 8 ↔ asas 5
<ul style="list-style-type: none"> • asas 2 → asas 5 = asas 2 → asas 10 → asas 5 • asas 5 → asas 2 = asas 5 → asas 10 → asas 2 	<ul style="list-style-type: none"> • asas 8 → asas 5 = asas 8 → asas 10 → asas 5 • asas 5 → asas 8 = asas 5 → asas 10 → asas 8

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(h) **PENAMBAHAN DAN PENOLAKAN ASAS 2**
Addition and subtraction of two number in base two

$\begin{array}{r} 0_2 \\ + 0_2 \\ \hline 0_2 \end{array}$	$\begin{array}{r} 1_2 \\ + 0_2 \\ \hline 1_2 \end{array}$	$\begin{array}{r} 0_2 \\ + 1_2 \\ \hline 1_2 \end{array}$	$\begin{array}{r} 1_2 \\ + 1_2 \\ \hline 1 \quad 0_2 \end{array}$	$\begin{array}{r} 11_2 \\ + 1_2 \\ \hline 100_2 \end{array}$
$\begin{array}{r} 0_2 \\ - 0_2 \\ \hline 0_2 \end{array}$	$\begin{array}{r} 1_2 \\ - 0_2 \\ \hline 1_2 \end{array}$	$\begin{array}{r} 1_2 \\ - 1_2 \\ \hline 0_2 \end{array}$	$\begin{array}{r} 1 \quad 0_2 \\ - 1_2 \\ \hline 1_2 \end{array}$	$\begin{array}{r} 1 \quad 1 \quad 1_2 \\ - 1_2 \\ \hline 1 \quad 1_2 \end{array}$
<p>Contoh 1 : ~ cal.</p> $\begin{array}{r} 1 \quad 1 \quad 1 \\ 1 \quad 1 \quad 1 \quad 0 \quad 1_2 \\ + 1 \quad 1 \quad 1 \quad 0_2 \\ \hline 1 \quad 0 \quad 1 \quad 0 \quad 1 \quad 1_2 \end{array}$	<p>Contoh 2 : ~ cal.</p> $\begin{array}{r} 1 \quad 1 \quad 1 \quad 0 \quad 0 \quad 1_2 \\ - 1 \quad 1 \quad 1 \quad 0 \quad 1_2 \\ \hline 1 \quad 0 \quad 0 \quad 1 \quad 0 \quad 0_2 \end{array}$			

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