

Abdulla Aljunibi



ALGEBRA

the displacement, velocity and time can be expressed in the following formula:

$$\text{Displacement} = \text{Velocity} \times \text{Time}$$

LINEAR EQUATIONS

$$2x + 3 = 9$$

$$2x + \cancel{3} - \cancel{3} = 9 - 3$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$x = 3$$

$$3w - 1 = 14$$

$$\frac{3w}{3} = \frac{15}{3}$$

$$w = 5$$

$$\frac{4x}{2} = 8(2)$$

$$4x = 8 \times 2$$

$$\frac{4x}{4} = \frac{16}{4}$$

$$x = 4$$

$$\frac{2x}{3} = 6 \quad (3) \frac{2x}{3} \times 3 = 6(3)$$

$$2x = 18$$

$$x = 9$$

QUADRATIC EQUATIONS



$$x^2 - 2x - 15$$

$$(x-5)(x+3)$$

$$x=5 \quad x=-3$$

$$x^2 - 2x - 15$$

Diagram showing the factoring process for $x^2 - 2x - 15$. The terms x^2 , $-2x$, and -15 are circled. Arrows indicate the process of finding factors: $5+3=8$ and $5-3=2$.

$$(x-5)(x+3)$$

$$x-5=0 \quad x+3=0$$

$$x=5 \quad x=-3$$

$$x^2 + 5x + 6$$

$$(x+2)(x+3)$$

$$x=-2 \quad x=-3$$

$$x^2 + 5x + 6$$

$$(x+2)(x+3)$$

$$x+2=0 \quad x+3=0$$

$$x=-2 \quad x=-3$$

$$x^2 - 2x - 8$$

$$(x-4)(x+2)$$

$$x=4, \quad x=-2$$

SIMULTANEOUS EQUATIONS ✓

$$\begin{array}{r} 2x + y = 4 \\ 2x - y = 0 \\ \hline \end{array}$$

$$\frac{4x}{4} = \frac{4}{4}$$

$$x = 1$$

STEP 2 solve for y

$$2(1) + y = 4$$

$$2 + y = 4$$

$$y = 4 - 2$$

$$y = 2$$

$$3x + 2y = 12$$

$$4x - y = 5$$

$$3x + 2y = 12$$

$$2(4x - y = 5)$$

$$3x + 2y = 12$$

$$8x - 2y = 10$$

$$\frac{11x}{11} = \frac{22}{11} \quad x = 2$$

$$\begin{array}{r} 2x + y = 4 \\ 2x - y = 4 \\ \hline \end{array}$$

$$\frac{2x}{2} = \frac{4}{2}$$

$$x = 2$$

$$2(2) - y = 4$$

$$4 - y = 4$$

$$4 - 4 = 4$$

$$0 = y$$

$$3(2) + 2y = 12$$

$$6 + 2y = 12$$

$$\frac{2y}{2} = \frac{6}{2}$$

$$y = 3$$

LOGARITHMS

$$\begin{aligned}\log_4 16 &= 2 \\ &= 4^2 = 16\end{aligned}$$

$$\begin{aligned}\log_4 16 &= 2 \\ 4^2 &= 16\end{aligned}$$

$$\begin{aligned}\log_3 x &= 9 \\ &= 3^9 = x\end{aligned}$$

$$\begin{aligned}\log_3 x &= 9 \\ 3^9 &= x\end{aligned}$$

$$\begin{aligned}\log_2 8 &= x \\ 2^x &= 8\end{aligned}$$

NUMBER BASES

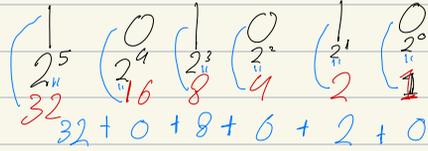
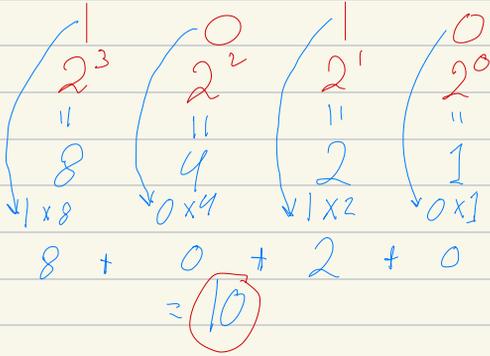
THE BINARY NUMBER SYSTEM

Convert binary to decimal

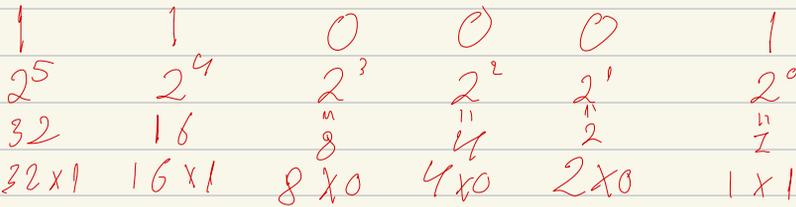
Base = 2

$$\overline{1\ 0\ 1\ 0\ 0}_2 = D$$

$$1\ 0\ 1\ 0_2 = D = 10_{10}$$



$$1\ 1\ 0\ 0\ 0\ 1_2 = D = 49_{10}$$



$$32 + 16 + 0 + 0 + 0 + 1 = 49_{10}$$

Convert octal to decimal

$$370_8 = D_{10} = 248_{10}$$

3		7		0
8^2		8^1		8^0
64		8		1
3×64		7×8		0×1
192	+	56	+	0 =
				192
				$+ 56$
				<u>248</u>

$$1071_8 = D_{10} = 569_{10}$$

1		0		7		1
8^3		8^2		8^1		8^0
512		64		8		1
1×512	+	0×64	+	7×8	+	1×1
= 512	+	0	+	56	+	1
= 569 ₁₀						

Convert hexadecimal to decimal

A=10,B=11,C=12,D=13, E=14,F=15

$$23E_{16} = D_{10} = 579_{10}$$

$$\begin{array}{r}
 2 \\
 16^2 \\
 256 \\
 2 \times 256 + \\
 \hline
 512 \\
 \times 2 \\
 \hline
 512
 \end{array}
 +
 \begin{array}{r}
 3 \\
 16^1 \\
 16 \\
 16 \times 3 + \\
 \hline
 48 \\
 \times 3 \\
 \hline
 48
 \end{array}
 +
 \begin{array}{r}
 E \\
 16^0 \\
 14 \\
 14 \times 1 = \\
 14
 \end{array}
 = 579_{10}$$

$$F7D_{16} = D$$

$$\begin{array}{r}
 F \\
 16^2 \\
 256 \\
 15 \times 256 + \\
 \hline
 3840 \\
 + 15 \\
 \hline
 3840
 \end{array}
 +
 \begin{array}{r}
 7 \\
 16^1 \\
 16 \\
 16 \times 7 + \\
 \hline
 112 \\
 \times 7 \\
 \hline
 112
 \end{array}
 +
 \begin{array}{r}
 D \\
 16^0 \\
 13 \\
 13 \times 1 = \\
 13
 \end{array}$$

$$3840 + 112 + 13 = 3965$$

convert decimal to binary

$$26_{10} = B_2$$

$$26 = 11010$$

1	2	4	8	16	32
0	1	0	1	1	

←

$$14_{10} \text{ to } B_2 = 1110$$

1	2	4	8	16
0	1	1	1	

←

$$2 + 4 + 8 = 14$$

$$35_{10} \text{ to } B_2 = 100011$$

1	2	4	8	16	32	64
1	1	0	0	0	1	

←

Convert decimal to octal



394_{10} to $OCTAL_8$

$$\begin{array}{r} 49 \\ \hline 8 \overline{) 394} \\ \underline{-32} \downarrow \\ 74 \\ \underline{-72} \\ 2 \end{array}$$

$$\begin{array}{r} 6 \\ \hline 8 \overline{) 49} \\ \underline{48} \\ 1 \end{array}$$

$$\begin{array}{r} 0 \\ \hline 8 \overline{) 0} \\ \underline{-0} \\ 6 \end{array}$$



Convert decimal to hexadecimal

$$860_{10} \text{ to Hex}_{16} = 35C$$

16 تقابل خمس مرات في الـ 86

$$\begin{array}{r}
 16 \overline{) 860} \\
 \underline{80} \\
 56 \\
 \underline{48} \\
 12
 \end{array}$$

Diagram showing the division process with arrows indicating the steps: 860 divided by 16 gives 53 with a remainder of 12. The remainder 12 is then converted to the hexadecimal digit C.

- 16
- 32
- 48
- 64
- 80

$$\begin{array}{r}
 16 \overline{) 4813} \\
 \underline{48} \\
 13
 \end{array}$$

Diagram showing the division of 4813 by 16, resulting in a remainder of 13.

$$\begin{array}{r}
 16 \overline{) 3} \\
 \underline{0} \\
 3
 \end{array}$$

Diagram showing the division of 3 by 16, resulting in a remainder of 3.

