







love it



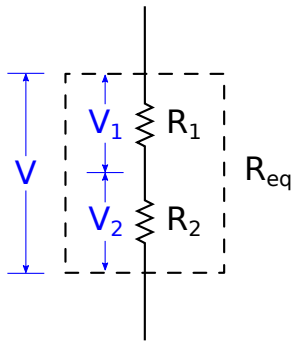




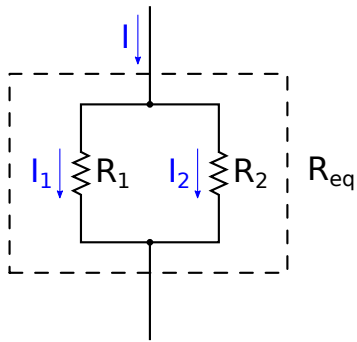




$$P_{\text{diss}} = I^2 R = \frac{V^2}{R}$$



Series
(a)

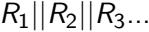


Parallel
(b)

BR 99

Repeal RI + RI + RI + .

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$



$$V_1 = \frac{R_1}{R_1 + R_2} V$$

$$V_2 = \frac{R_2}{R_1 + R_2} V$$

$$A_1 = \frac{R_2}{R_1 + R_2} A_1$$

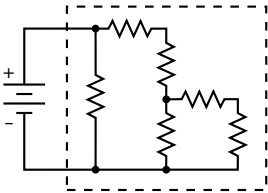
$$h_2 = \frac{R_1}{R_1 + R_2}$$























Σ v_i $=$ 0

loop

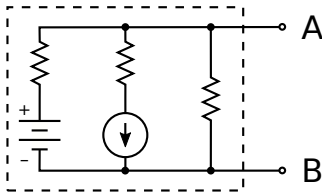


+	-
	
	

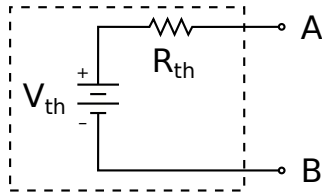
Σ

$$I_i = 0$$

junction



(a)



(b)



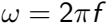




















$$X_C = - \frac{j}{\omega C}$$









$$\operatorname{Re}(V e^{j(\omega t + \phi_v)}) \equiv V \cos(\omega t + \phi_v)$$



$$\operatorname{Re}\left(e^{j(\omega t + \phi_i)}\right) = \cos(\omega t + \phi_i)$$















Revised 10/1/20

Reborn



PLEASE VISIT [www.donors.org](#)

$$\langle P \rangle = \frac{V}{2} \cos(\phi_v - \phi_i) = \frac{V^2}{2} \cos(\phi_v - \phi_i)$$

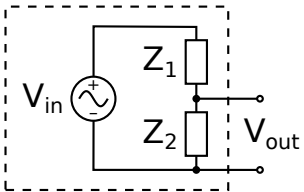
cos² w t



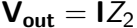








win 1234567890



$$v_{out} = \frac{z_2}{z_1 + z_2} v_{in}$$



v_{out}

$=$

$\sqrt{v_{out} * v_{out}}$



$$\tan \phi = \frac{\operatorname{Im} \left(\frac{Z_2}{Z_1 + Z_2} \right)}{\operatorname{Re} \left(\frac{Z_2}{Z_1 + Z_2} \right)}$$



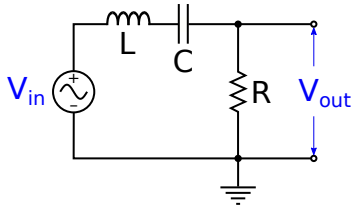
$$A_v = \frac{V_{out}}{V_{in}} = \frac{|V_{out}|}{|V_{in}|} = \left| \frac{Z_2}{Z_1 + Z_2} \right| = \sqrt{\left(\frac{Z_2}{Z_1 + Z_2} \right)^* \left(\frac{Z_2}{Z_1 + Z_2} \right)}$$



A_v

$=$

$\frac{1}{\sqrt{2}}$





$$Z_1 = j \left(\omega L - \frac{1}{\omega C} \right)$$

$$\frac{V_{out}}{V_{in}} = \sqrt{\frac{R^2}{R^2 + (\omega L - 1/\omega C)^2}}$$



$$\frac{Z_2}{Z_1 + Z_2} = \frac{R}{R + j\left(\omega L - \frac{1}{\omega C}\right)} = \frac{R^2 - jR\left(\omega L - \frac{1}{\omega C}\right)}{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$$

$$\tan \phi = \frac{\frac{1}{\omega C} - \omega L}{R}$$

voilà

Wavelength

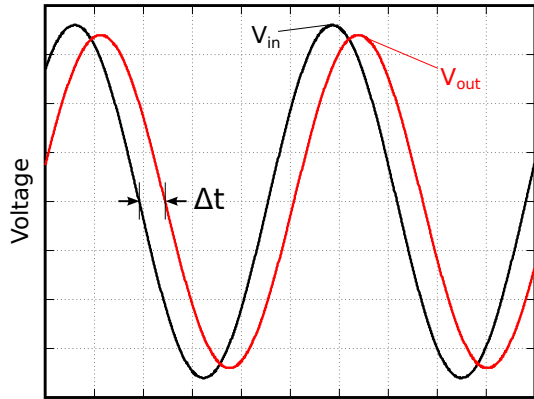


$$\Delta t = - \frac{\phi}{\omega} = - \frac{\phi}{2\pi f} = - \frac{\phi}{2\pi} T$$

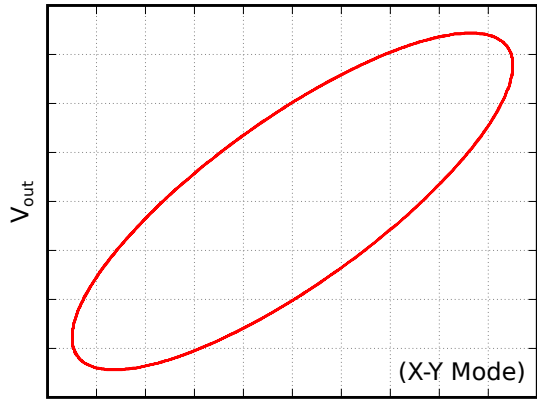


WAVE

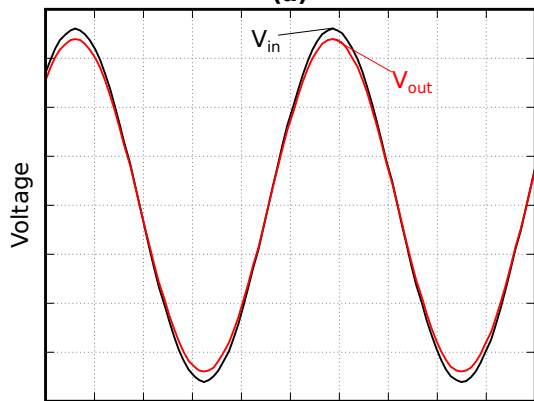




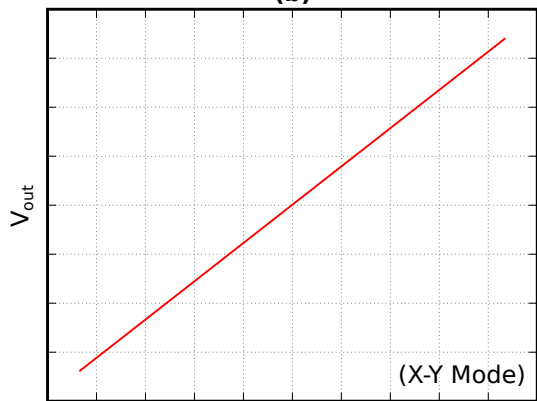
(a)



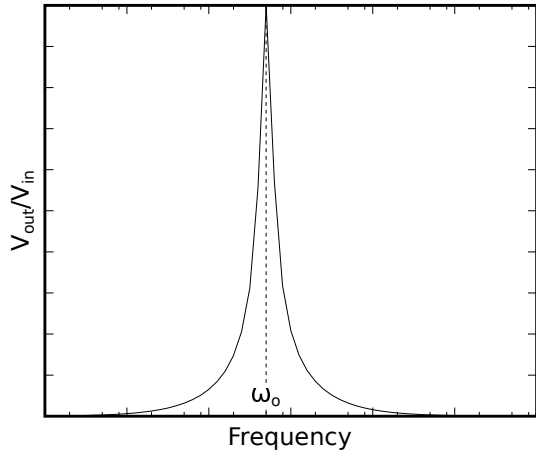
(b)



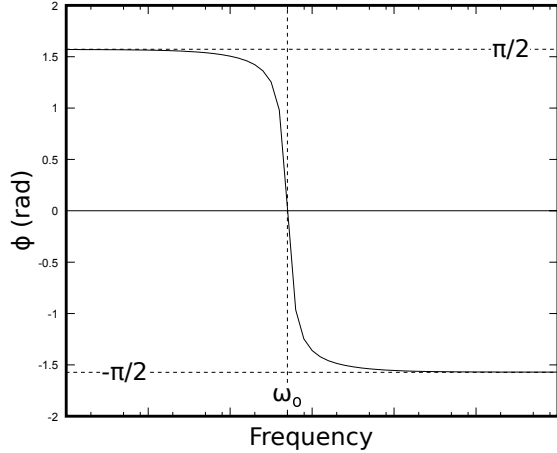
(c)



(d)



(a)



(b)

over

—

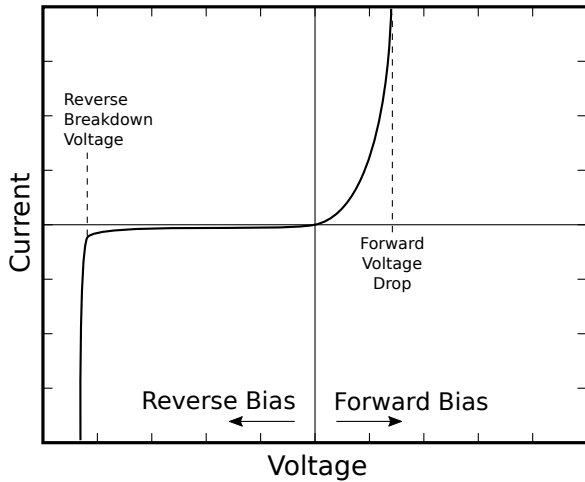
or





$$\omega_0 = \frac{1}{\sqrt{LC}}$$

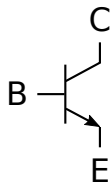






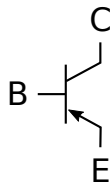






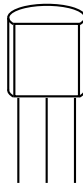
NPN

(a)



PNP

(b)



E B C

(c)





$$I_C = I_0 \left(e^{\frac{V_{BE}}{kT/e}} - 1 \right)$$

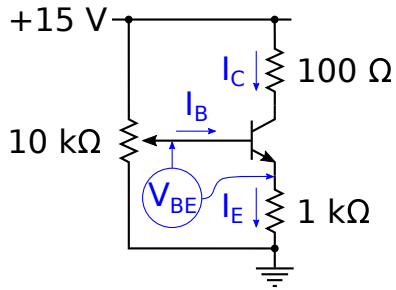


A pixelated, grayscale image of the letters '100'. The '1' is on the left, followed by a small space, then the '0', and finally another '0' on the right. The image has a low-resolution, dithered appearance with various shades of gray and black pixels.

A 15x15 grid of squares in various shades of gray, arranged in a complex, symmetrical pattern resembling a stylized 'X' or a cross with intricate details. The pattern is composed of many small squares, some of which are darker than others, creating a sense of depth and texture. The overall shape is roughly cross-like, with the arms of the cross extending towards the corners of the grid. The central part of the cross is the darkest, while the outer edges are lighter. There are also some lighter gray squares scattered throughout the pattern, particularly in the corners and along the arms of the cross.

A pixelated, grayscale image of the number '10' followed by a horizontal line. The '1' is a simple vertical bar with a small horizontal base. The '0' is a circle with a thick, pixelated border. The horizontal line is a single, thick, dark gray bar. The entire image has a low-resolution, dithered appearance.

A large, pixelated, black and white graphic of the number '10'. The '1' is on the left, and the '0' is on the right. The '0' has a white center, giving it a hollow appearance. The entire graphic is composed of square pixels in various shades of gray, creating a dithered or halftone effect.







$$r_e = \frac{dV_{BE}}{dI_C} = \frac{kT/e}{I_C}$$

Learn from the best



W E

SE

Q E





0

=

1

2

3

4





W E S O R

0

=

1

2

3

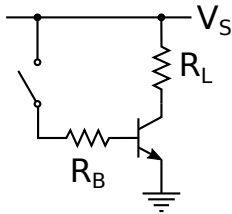
4



[illegible]



es 25 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1





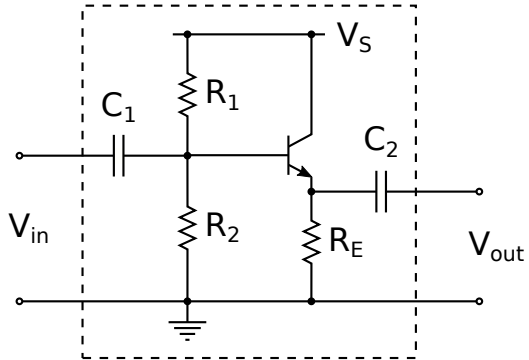
















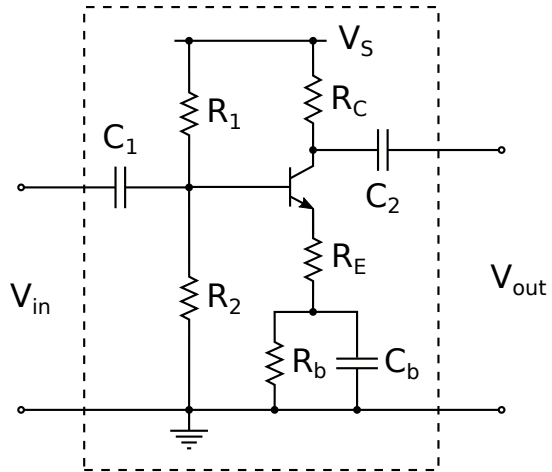


W E * O E W

APPRESENTATION







$$A_v = -\frac{R_C}{R_E}$$









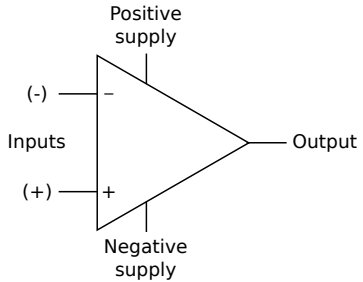




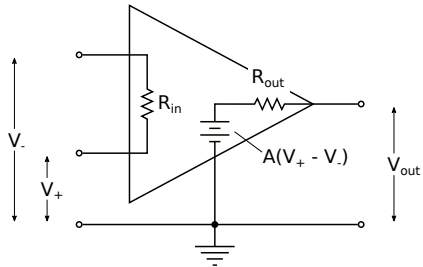
AR1|AR2|AR3|AR4|AR5|AR6|AR7|AR8|AR9|AR10



REAR + REAR



(a)



(b)



WAVE LOVE

100% **over** 100%







2020



1

0

9

1

0

5



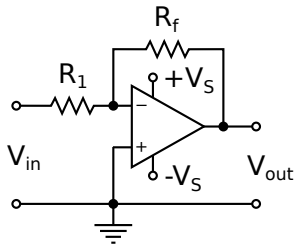
Rin = Oo Aa Oo , Roat = O

V + = V s
V s

VOLUME 1

A pixelated, black and white image of the text "Vovovov". The letters are thick and blocky, with a jagged, pixelated appearance. The 'V's are formed by a series of connected pixels, giving them a hand-drawn or digital-art feel. The 'o's are simple circles made of pixels. The overall style is reminiscent of early computer graphics or low-resolution digital art.







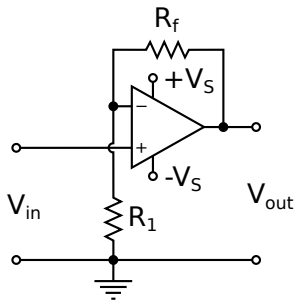
$$I = \frac{V_{in}}{R_1} = \frac{-V_{out}}{R_f}$$

$$A_v = -\frac{R_f}{R_1}$$



Q2

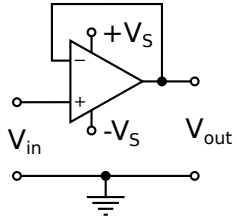




$$V_{in} = \frac{R_1}{R_1 + R_f} V_{out}$$

$$A_v = 1 + \frac{R_f}{R_1}$$

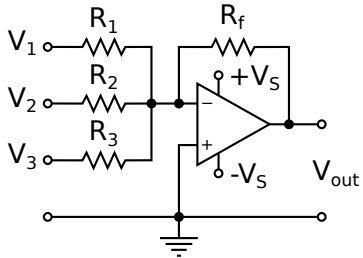
Real + Real













V1



R1



V2



R2



V3



R3



V_{out}

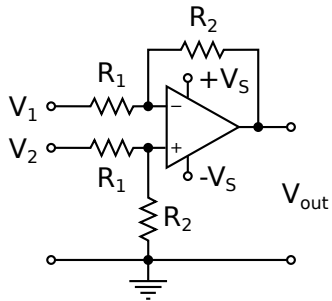


R_f



$$V_{out} = - \left(\frac{R_1}{R_f} V_1 + \frac{R_2}{R_f} V_2 + \frac{R_3}{R_f} V_3 \right)$$







V_1

—

V_L

R_1

V_2

$-$

V_+

R_1

$$V_L - V_{out}$$



$$R_2$$





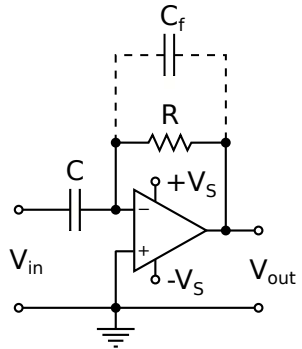
$$V_+ = \frac{R_2}{R_1 + R_2} V_2$$



$$V_{out} = -\frac{R_2}{R_1}(V_1 - V_2)$$













V_{in} $=$ $\frac{Q}{C}$

1

=

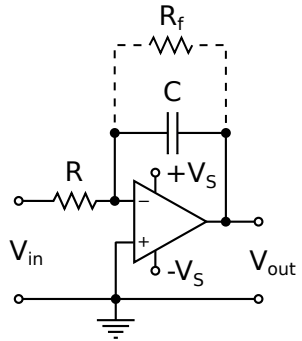
dQ

—

dt

$$V_{out} = -RC \frac{dV_{in}}{dt}$$





I

$=$

$\frac{V_{in}}{R}$

$$V_{out} = - \frac{Q}{C}$$

$$Q = \int dQ = \frac{1}{R} \int V_{in} dt + \text{constant}$$

$$v_{out} = -\frac{1}{RC} \int v_{in} dt + C$$



DC
Voltage
Source



Resistor



Capacitor



Inductor



DC
Current
Source



Potentiometer



Ground



Diode



AC
Source



NPN
Transistor



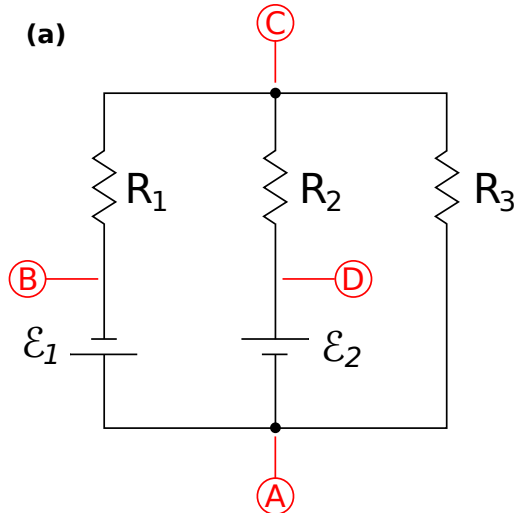
PNP
Transistor



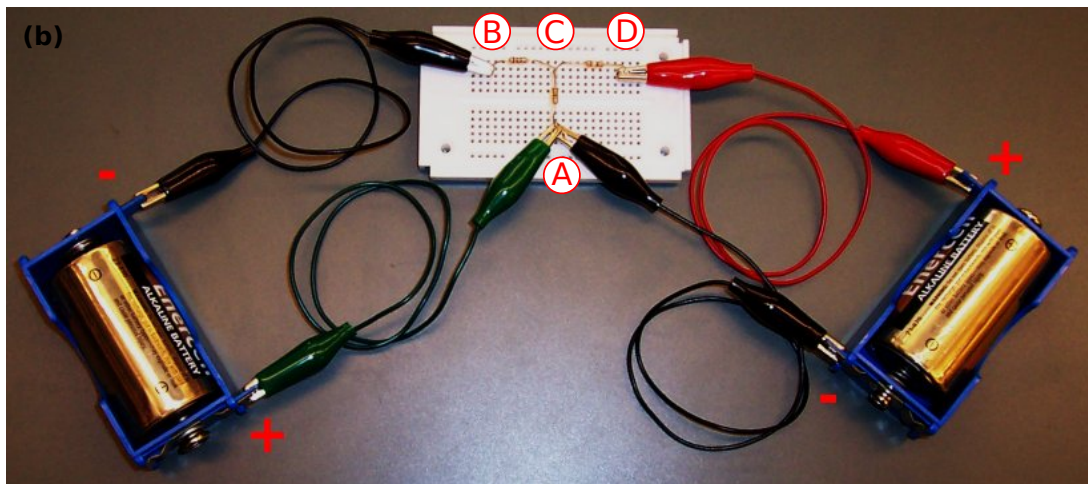
Op Amp

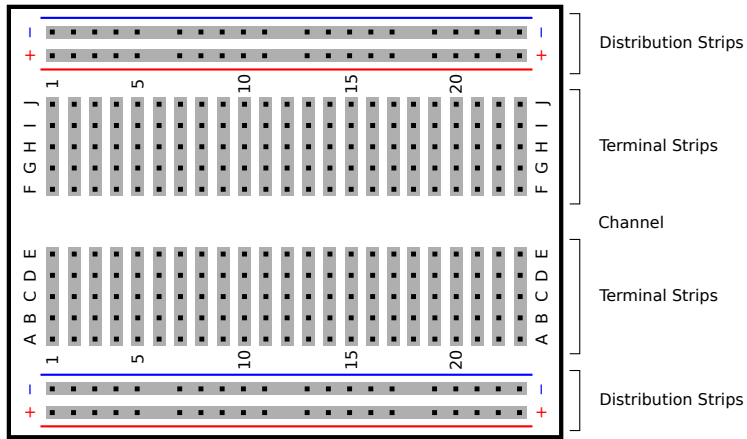


(a)



(b)



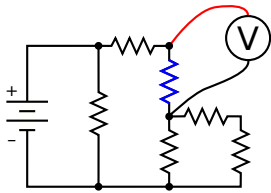


color	black	brown	red	orange	yellow	green	blue	violet	gray	white
digit	0	1	2	3	4	5	6	7	8	9
multiplier	1	10	100	1k	10k	100k	1M	10M	100M	1000M

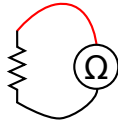
$$\begin{aligned}
 R &= [\text{band1}][\text{band2}] \times 10^{[\text{band3}]} \quad \pm \quad 5\% \text{ (gold)} \\
 &\quad \pm \quad 10\% \text{ (silver)}
 \end{aligned}$$

Residuals
= 64 x 10² = 6400

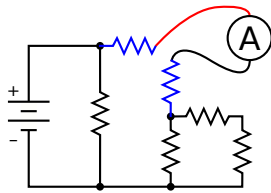
1200



(a)



(b)



(c)

T H E N E W S

T H A N K S

$$dB = 10 \log \left(\frac{\text{Thing}_2}{\text{Thing}_1} \right)$$

Learnings



Therapy





$$10 \log \left(\frac{P_{out}}{P_{in}} \right) = 10 \log \left(\frac{1}{2} \right) = 10(-0.3010) = -3.01$$

4 = 1000000



