

# REPROGRAMACIÓN



## FÓRMULA PARA DETERMINAR LA TASA DE INTERES EFECTIVA EQUIVALENTE PARA EL PERIODO DEL PAGO

(Ejemplo : 7, 15, 30, 35, 45, 60, 90, etc. días)

$$Teq = \left[ \left( 1 + i \right)^{\frac{n}{360}} - 1 \right]$$

### Conceptos:

- Teq (Tasa de interés)** = Tasa de interés efectiva equivalente para el periodo de pago.  
**i (Tasa de interés)** = Tasa de Interés Compensatorio Efectiva Anual.  
**n (Tasa de interés)** = Número de cuotas a pagar por el cliente, en un periodo de 360 días.

## FÓRMULA PARA DETERMINAR LA TCEA

Para determinar el costo efectivo del crédito se tiene que calcular la tasa de retorno, para lo cual se considera el monto del préstamo solicitado y los valores de las cuotas.

$$\begin{aligned} \text{TIR Mensual} &= (\text{Monto solicitado}, C1, C2, C3, C4, C5, \dots, N) \\ \text{TCEA} &= \left( \left( 1 + \text{TIR} \right)^{\frac{n}{360}} - 1 \right) \times 100 \end{aligned}$$

### Conceptos:

- TCEA** = Tasa de Costo Efectiva Anual.  
**TIR** = Tasa de Interés de Retorno.  
**n** = Número de Cuotas en un periodo de 360 días (12).

### EJEMPLO 1

Reprogramación de crédito microempresa - aplicación de tasa equivalente y reconocimiento de intereses en la primera cuota de la reprogramación.

#### Enunciado

Un cliente solicita reprogramar su crédito microempresa dado el contexto actual, por lo cual requiere 90 días para el pago de la cuota.

CRONOGRAMA ORIGINAL				
Monto	4,000	F. desembolso	20/03/2019	Cuota 283.12
TEA original	35.00%			
		Seg mensual	0.100%	

Días	Nro	Fecha	Saldo inicial	Capital	Interés	Seguros	Cuota
							-4,000.00
31	1	20/04/2019	4,000.00	174.40	104.72	4.00	283.12
30	2	20/05/2019	3,825.60	182.41	96.88	3.83	283.12
31	3	20/06/2019	3,643.19	184.10	95.38	3.64	283.12
30	4	20/07/2019	3,459.09	192.06	87.60	3.46	283.12
31	5	20/08/2019	3,267.03	194.32	85.53	3.27	283.12
31	6	20/09/2019	3,072.71	199.61	80.44	3.07	283.12
31	7	21/10/2019	2,873.10	205.03	75.22	2.87	283.12
30	8	20/11/2019	2,668.07	212.88	67.57	2.67	283.12
30	9	20/12/2019	2,455.19	218.48	62.18	2.46	283.12
31	10	20/01/2020	2,236.71	222.32	58.56	2.24	283.12
31	11	20/02/2020	2,014.39	228.37	52.74	2.01	283.12
29	12	20/03/2020	1,786.02	237.63	43.70	1.79	283.12
31	13	20/04/2020	1,548.39	241.03	40.54	1.55	283.12
30	14	20/05/2020	1,307.36	248.70	33.11	1.31	283.12
31	15	20/06/2020	1,058.66	254.35	27.71	1.06	283.12
30	16	20/07/2020	804.31	261.75	20.37	1.00	283.12
31	17	20/08/2020	542.56	267.92	14.20	1.00	283.12
32	18	21/09/2020	274.64	274.64	7.42	1.00	283.06
			0.00			TIR	2.68%
						TCEA	37.41%

#### 1. Hallando la Tasa de Interés equivalente para el periodo:

(Ejem: 7, 15, 30, 35, 45, 60, 90, etc. días)

$$Teq = \left[ \left( 1 + \frac{i}{360} \right)^n - 1 \right]$$

$$Teq = [(((1 + 35.00\%)^{30/360}) - 1)]$$

$$Teq = 2.5324\%$$

#### 2. Cálculo de Intereses y Seguro

$$Int. = Saldo \times \left[ \left( 1 + \frac{i}{360} \right)^n - 1 \right]$$

#### Cálculo de los intereses Cuota 12

Saldo = 1,786.02  
 Tasa\* = 21.42%  
 Días = 90

Int. =  $[(1 + 21.42\%)^{(90/360)} - 1] \times 1,786.02$   
 Int. = 88.79

\* Tasa calculada para mantener las cuotas reprogramadas.

#### Cálculo del Seguro de la cuota 12

$$Seg. = Saldo \times Tasa \text{ Seg. Des.} \times N^\circ \text{ Meses}$$

Saldo = 1,786.02

Tasa Seg. = 0.10%

Meses = 3

$$Seg. = 1,786.02 \times 0.10\% \times 3$$

$$Seg. = 5.37$$

CRONOGRAMA 1era REPROGRAMADO				
Monto	4,000	F. desembolso	20/03/2019	Cuota 283.12
TEA original	35.00%			
TEA 2	21.42%	Seg mensual	0.100%	

Días	Nro	Fecha	Saldo inicial	Capital	Interés	Seguros	Cuota
							-4,000.00
31	1	20/04/2019	4,000.00	174.40	104.72	4.00	283.12
30	2	20/05/2019	3,825.60	182.41	96.88	3.83	283.12
31	3	20/06/2019	3,643.19	184.10	95.38	3.64	283.12
30	4	20/07/2019	3,459.09	192.06	87.60	3.46	283.12
31	5	20/08/2019	3,267.03	194.32	85.53	3.27	283.12
31	6	20/09/2019	3,072.71	199.61	80.44	3.07	283.12
31	7	21/10/2019	2,873.10	205.03	75.22	2.87	283.12
30	8	20/11/2019	2,668.07	212.88	67.57	2.67	283.12
30	9	20/12/2019	2,455.19	218.48	62.18	2.46	283.12
31	10	20/01/2020	2,236.71	222.32	58.56	2.24	283.12
31	11	20/02/2020	2,014.39	228.37	52.74	2.01	283.12
90	12	20/05/2020	1,786.02	188.96	88.79	5.37	283.12
31	15	20/06/2020	1,597.06	254.61	26.91	1.60	283.12
30	16	20/07/2020	1,342.45	259.89	21.89	1.34	283.12
31	17	20/08/2020	1,082.56	263.80	18.24	1.08	283.12
32	18	21/09/2020	818.76	267.87	14.25	1.00	283.12
29	19	20/10/2020	550.89	273.44	8.68	1.00	283.12
31	20	20/11/2020	277.45	277.45	4.68	1.00	283.13
			0.00			TIR	2.68%
						TCEA	37.41%

### EJEMPLO 2

Ejemplo de reprogramación de crédito microempresa - Segunda Reprogramación Aumento de cuota.

#### Enunciado

Un cliente solicita reprogramar su crédito microempresa dado el contexto actual, por lo cual requiere 90 días para el pago de la cuota.

CRONOGRAMA ORIGINAL				
Monto	4,000	F. desembolso	20/03/2019	Cuota 283.12
TEA original	35.00%			
		Seg mensual	0.100%	

Días	Nro	Fecha	Saldo inicial	Capital	Interés	Seguros	Cuota
							-4,000.00
31	1	20/04/2019	4,000.00	174.40	104.72	4.00	283.12
30	2	20/05/2019	3,825.60	182.41	96.88	3.83	283.12
31	3	20/06/2019	3,643.19	184.10	95.38	3.64	283.12
30	4	20/07/2019	3,459.09	192.06	87.60	3.46	283.12
31	5	20/08/2019	3,267.03	194.32	85.53	3.27	283.12
31	6	20/09/2019	3,072.71	199.61	80.44	3.07	283.12
31	7	21/10/2019	2,873.10	205.03	75.22	2.87	283.12
30	8	20/11/2019	2,668.07	212.88	67.57	2.67	283.12
30	9	20/12/2019	2,455.19	218.48	62.18	2.46	283.12
31	10	20/01/2020	2,236.71	222.32	58.56	2.24	283.12
31	11	20/02/2020	2,014.39	228.37	52.74	2.01	283.12
29	12	20/03/2020	1,786.02	237.63	43.70	1.79	283.12
31	13	20/04/2020	1,548.39	241.03	40.54	1.55	283.12
30	14	20/05/2020	1,307.36	248.70	33.11	1.31	283.12
31	15	20/06/2020	1,058.66	254.35	27.71	1.06	283.12
30	16	20/07/2020	804.31	261.75	20.37	1.00	283.12
31	17	20/08/2020	542.56	267.92	14.20	1.00	283.12
32	18	21/09/2020	274.64	274.64	7.42	1.00	283.06
			0.00				
						<b>TIR</b>	<b>2.68%</b>
						<b>TCEA</b>	<b>37.41%</b>

### 1. Hallando la Tasa de Interés equivalente para el periodo:

(Ejem: 7, 15, 30, 35, 45, 60, 90, etc. días)

$$Teq = \left[ \left( 1 + i \right)^{\frac{n}{360}} - 1 \right]$$

$$Teq = \left[ \left( (1 + 35.00\%)^{30/360} \right) - 1 \right]$$

$$Teq = 2.5324\%$$

### 2. Cálculo de Intereses y Seguro

$$Int. = Saldo \times \left[ \left( 1 + i \right)^{\frac{n}{360}} - 1 \right]$$

#### Cálculo de los intereses Cuota 12

Saldo = 1,786.02

Tasa\* = 21.42%

Días = 90

$$Int. = \left[ (1 + 21.42\%)^{(90/360)} - 1 \right] \times 1,786.02$$

$$Int. = 88.79$$

\* Tasa calculada para mantener las cuotas reprogramadas.

#### Cálculo del Seguro de la cuota 12

$$Seg. = Saldo \times Tasa \text{ Seg. Des.} \times N^{\circ} \text{ Meses}$$

Saldo = 1,786.02

Tasa Seg. = 0.10%

Meses = 3

$$Seg. = 1,786.02 \times 0.10\% \times 3$$

$$Seg. = 5.37$$

#### CRONOGRAMA 1era REPROGRAMADO

Monto	4,000	F. desembolso	20/03/2019	Cuota	283.12
TEA original	35.00%				
TEA 2	21.42%	Seg mensual	0.100%		

Ahora el cliente realiza una segunda reprogramación aumentando el plazo a 151 días. Por lo cual estos son los nuevo cálculos.

### 2. Cálculo de Intereses y Seguro

$$Int. = Saldo \times \left[ \left( 1 + i \right)^{\frac{n}{360}} - 1 \right]$$

#### Cálculo de los intereses Cuota 12

Saldo = 1,786.02

Tasa\* = 21.42%

Días = 151

$$Int. = \left[ (1 + 21.42\%)^{(151/360)} - 1 \right] \times 1,786.02$$

$$Int. = 151.46$$

\* Tasa calculada para mantener las cuotas reprogramadas.

#### Cálculo del Seguro de la cuota 12

$$Seg. = Saldo \times Tasa \text{ Seg. Des.} \times N^{\circ} \text{ Meses}$$

Saldo = 1,786.02

Tasa Seg. = 0.10%

Meses = 5

$$Seg. = 1,786.02 \times 0.10\% \times 5$$

$$Seg. = 8.95$$

#### CRONOGRAMA 2da REPROGRAMADO

Monto	4,000	F. desembolso	20/03/2019	Cuota	283.12
TEA original	35.00%				
Tasa equiv.	21.42%	Seg mensual	0.100%		

Días	Nro	Fecha	Saldo inicial	Capital	Interés	Seguros	Cuota
							-4,000.00
31	1	20/04/2019	4,000.00	174.40	104.72	4.00	283.12
30	2	20/05/2019	3,825.60	182.41	96.88	3.83	283.12
31	3	20/06/2019	3,643.19	184.10	95.38	3.64	283.12
30	4	20/07/2019	3,459.09	192.06	87.60	3.46	283.12
31	5	20/08/2019	3,267.03	194.32	85.53	3.27	283.12
31	6	20/09/2019	3,072.71	199.61	80.44	3.07	283.12
31	7	21/10/2019	2,873.10	205.03	75.22	2.87	283.12
30	8	20/11/2019	2,668.07	212.88	67.57	2.67	283.12
30	9	20/12/2019	2,455.19	218.48	62.18	2.46	283.12
31	10	20/01/2020	2,236.71	222.32	58.56	2.24	283.12
31	11	20/02/2020	2,014.39	228.37	52.74	2.01	283.12
<b>151</b>	<b>12</b>	<b>20/07/2020</b>	<b>1,786.02</b>	<b>132.72</b>	<b>151.46</b>	<b>8.95</b>	<b>293.13</b>
31	17	20/08/2020	1,653.30	263.62	27.86	1.65	293.13
32	18	21/09/2020	1,389.68	267.56	24.18	1.39	293.13
29	19	20/10/2020	1,122.12	274.33	17.68	1.12	293.13
31	20	20/11/2020	847.79	277.84	14.29	1.00	293.13
31	21	21/12/2020	569.95	282.53	9.60	1.00	293.13
30	22	20/01/2021	287.42	287.42	4.69	1.00	283.06
			0.00				
						<b>TIR</b>	<b>2.80%</b>
						<b>TCEA</b>	<b>39.33%</b>



## 2. Cálculo de Intereses y Seguro

$$\text{Int.} = \text{Saldo} \times \left[ \left( 1 + \frac{i}{360} \right)^n - 1 \right]$$

### Cálculo de los intereses Cuota 10

Saldo = 114,791.86  
 Tasa\* = 13.73%  
 Días = 121

Int. =  $[(1+13.73\%)^{(121/360)}-1]*114,791.86]$   
 Int. = 5,072.11

\* Tasa calculada para mantener las cuotas reprogramadas.

### Cálculo del Seguro de la cuota 10

**Seg. = Saldo x Tasa Seg. Des. x N° Meses**  
 Saldo = 114,791.86  
 Tasa Seg. = 0.05%  
 Meses = 4

Seg. = 114,791.86 x 0.05% x 4  
 Seg. = 229.60

### CRONOGRAMA - 1era reprogramación

Monto	119,600	F. desembolso	30/05/2019	Cuota	1,966.47
TEA original	14.47%				
Tasa equiv.	13.73%	Seg mensual	0.05%		

Días	Nro	Fecha	Saldo inicial	Capital	Interés	Seguros	Cuota
							-119,600.00
32	1	01/07/2019	119,600.00	401.49	1,445.38	119.60	1,966.47
31	2	01/08/2019	119,198.51	511.62	1,395.25	59.60	1,966.47
32	3	02/09/2019	118,686.89	472.79	1,434.34	59.34	1,966.47
29	4	01/10/2019	118,214.10	613.39	1,293.97	59.11	1,966.47
32	5	02/11/2019	117,600.71	486.45	1,421.22	58.80	1,966.47
30	6	02/12/2019	117,114.26	581.53	1,326.38	58.56	1,966.47
31	7	02/01/2020	116,532.73	544.15	1,364.05	58.27	1,966.47
30	8	01/02/2020	115,988.58	594.85	1,313.63	57.99	1,966.47
30	9	02/03/2020	115,393.73	601.87	1,306.90	57.70	1,966.47
121	10	01/07/2020	114,791.86	-3,312.81	5,072.11	229.60	1,988.90
31	11	01/08/2020	118,104.67	614.31	1,315.54	59.05	1,988.90
31	12	01/09/2020	117,490.36	621.45	1,308.70	58.75	1,988.90
30	13	01/10/2020	116,868.91	670.91	1,259.56	58.43	1,988.90
32	14	02/11/2020	116,198.00	594.50	1,336.30	58.10	1,988.90
29	15	01/12/2020	115,603.50	726.92	1,204.18	57.80	1,988.90
32	16	02/01/2021	114,876.58	610.36	1,321.10	57.44	1,988.90
30	17	01/02/2021	114,266.22	700.26	1,231.51	57.13	1,988.90
28	18	01/03/2021	113,565.96	790.16	1,141.96	56.78	1,988.90
31	19	01/04/2021	112,775.80	676.32	1,256.19	56.39	1,988.90
32	20	03/05/2021	112,099.48	643.69	1,289.16	56.05	1,988.90
29	21	01/06/2021	111,455.79	772.20	1,160.97	55.73	1,988.90
30	22	01/07/2021	110,683.59	740.66	1,192.90	55.34	1,988.90
32	23	02/08/2021	109,942.93	669.57	1,264.36	54.97	1,988.90
30	24	01/09/2021	109,273.36	756.56	1,177.70	54.64	1,988.90

Días	Nro	Fecha	Saldo inicial	Capital	Interés	Seguros	Cuota
30	25	01/10/2021	108,516.80	765.09	1,169.55	54.26	1,988.90
32	26	02/11/2021	107,751.71	695.86	1,239.16	53.88	1,988.90
29	27	01/12/2021	107,055.85	820.23	1,115.14	53.53	1,988.90
33	28	03/01/2022	106,235.62	675.65	1,260.13	53.12	1,988.90
29	29	01/02/2022	105,559.97	836.56	1,099.56	52.78	1,988.90
28	30	01/03/2022	104,723.41	883.50	1,053.04	52.36	1,988.90
31	31	01/04/2022	103,839.91	780.33	1,156.65	51.92	1,988.90
31	32	02/05/2022	103,059.58	789.41	1,147.96	51.53	1,988.90
30	33	01/06/2022	102,270.17	835.54	1,102.22	51.14	1,988.90
30	34	01/07/2022	101,434.63	844.96	1,093.22	50.72	1,988.90
31	35	01/08/2022	100,589.67	818.16	1,120.45	50.29	1,988.90
31	36	01/09/2022	99,771.51	827.67	1,111.34	49.89	1,988.90
30	37	01/10/2022	98,943.84	873.06	1,066.37	49.47	1,988.90
32	38	02/11/2022	98,070.78	812.03	1,127.83	49.04	1,988.90
29	39	01/12/2022	97,258.75	927.18	1,013.09	48.63	1,988.90
32	40	02/01/2023	96,331.57	832.90	1,107.83	48.17	1,988.90
30	41	01/02/2023	95,498.67	911.91	1,029.24	47.75	1,988.90
28	42	01/03/2023	94,586.76	990.50	951.11	47.29	1,988.90
31	43	01/04/2023	93,596.26	899.55	1,042.55	46.80	1,988.90
31	44	02/05/2023	92,696.71	910.02	1,032.53	46.35	1,988.90
30	45	01/06/2023	91,786.69	953.77	989.24	45.89	1,988.90
30	46	01/07/2023	90,832.92	964.52	978.96	45.42	1,988.90
31	47	01/08/2023	89,868.40	942.94	1,001.03	44.93	1,988.90
31	48	01/09/2023	88,925.46	953.92	990.52	44.46	1,988.90
31	49	02/10/2023	87,971.54	965.01	979.90	43.99	1,988.90
31	50	02/11/2023	87,006.53	976.25	969.15	43.50	1,988.90
29	51	01/12/2023	86,030.28	1,049.75	896.13	43.02	1,988.90
32	52	02/01/2024	84,980.53	969.12	977.29	42.49	1,988.90
30	53	01/02/2024	84,011.41	1,041.45	905.44	42.01	1,988.90
29	54	01/03/2024	82,969.96	1,083.17	864.25	41.48	1,988.90
31	55	01/04/2024	81,886.79	1,035.84	912.12	40.94	1,988.90
31	56	02/05/2024	80,850.95	1,047.89	900.58	40.43	1,988.90
30	57	01/06/2024	79,803.06	1,088.92	860.08	39.90	1,988.90
30	58	01/07/2024	78,714.14	1,101.19	848.35	39.36	1,988.90
31	59	01/08/2024	77,612.95	1,085.57	864.52	38.81	1,988.90
32	60	02/09/2024	76,527.38	1,070.56	880.08	38.26	1,988.90
29	61	01/10/2024	75,456.82	1,165.18	785.99	37.73	1,988.90
32	62	02/11/2024	74,291.64	1,097.38	854.37	37.15	1,988.90
30	63	02/12/2024	73,194.26	1,163.44	788.86	36.60	1,988.90
31	64	02/01/2025	72,030.82	1,150.54	802.34	36.02	1,988.90
30	65	01/02/2025	70,880.28	1,189.54	763.92	35.44	1,988.90
28	66	01/03/2025	69,690.74	1,253.28	700.77	34.85	1,988.90
31	67	01/04/2025	68,437.46	1,192.37	762.31	34.22	1,988.90
31	68	02/05/2025	67,245.09	1,206.25	749.03	33.62	1,988.90
31	69	02/06/2025	66,038.84	1,220.29	735.59	33.02	1,988.90
29	70	01/07/2025	64,818.55	1,281.31	675.18	32.41	1,988.90
31	71	01/08/2025	63,537.24	1,249.40	707.73	31.77	1,988.90
31	72	01/09/2025	62,287.84	1,263.95	693.81	31.14	1,988.90
30	73	01/10/2025	61,023.89	1,300.70	657.69	30.51	1,988.90
33	74	03/11/2025	59,723.19	1,250.62	708.42	29.86	1,988.90
28	75	01/12/2025	58,472.57	1,371.69	587.97	29.24	1,988.90
32	76	02/01/2026	57,100.88	1,303.68	656.67	28.55	1,988.90
31	77	02/02/2026	55,797.20	1,339.49	621.51	27.90	1,988.90
28	78	02/03/2026	54,457.71	1,414.07	547.60	27.23	1,988.90
30	79	01/04/2026	53,043.64	1,390.70	571.68	26.52	1,988.90
31	80	02/05/2026	51,652.94	1,387.72	575.35	25.83	1,988.90
30	81	01/06/2026	50,265.22	1,422.03	541.74	25.13	1,988.90



Días	Nro	Fecha	Saldo inicial	Capital	Interés	Seguros	Cuota
30	71	01/06/2026	52,276.32	1,423.10	563.41	26.14	2,012.65
30	72	01/07/2026	50,853.21	1,439.16	548.07	25.43	2,012.65
31	73	01/08/2026	49,414.06	1,437.54	550.41	24.71	2,012.65
31	74	01/09/2026	47,976.52	1,454.26	534.40	23.99	2,012.65
30	75	01/10/2026	46,522.26	1,487.99	501.40	23.26	2,012.65
33	76	03/11/2026	45,034.26	1,455.96	534.18	22.52	2,012.65
28	77	01/12/2026	43,578.31	1,552.66	438.20	21.79	2,012.65
32	78	02/01/2027	42,025.64	1,508.34	483.30	21.01	2,012.65
30	79	01/02/2027	40,517.30	1,555.71	436.68	20.26	2,012.65
28	80	01/03/2027	38,961.59	1,601.39	391.78	19.48	2,012.65
31	81	01/04/2027	37,360.20	1,577.82	416.15	18.68	2,012.65
31	82	02/05/2027	35,782.37	1,596.19	398.57	17.89	2,012.65
30	83	01/06/2027	34,186.18	1,627.12	368.44	17.09	2,012.65
30	84	01/07/2027	32,559.06	1,645.46	350.91	16.28	2,012.65
33	85	03/08/2027	30,913.60	1,630.51	366.69	15.46	2,012.65
29	86	01/09/2027	29,283.09	1,692.98	305.03	14.64	2,012.65
30	87	01/10/2027	27,590.11	1,701.51	297.35	13.80	2,012.65
32	88	02/11/2027	25,888.60	1,701.99	297.72	12.94	2,012.65
29	89	01/12/2027	24,186.61	1,748.62	251.94	12.09	2,012.65
33	90	03/01/2028	22,438.00	1,735.28	266.15	11.22	2,012.65
29	91	01/02/2028	20,702.71	1,786.65	215.65	10.35	2,012.65
29	92	01/03/2028	18,916.06	1,806.15	197.04	9.46	2,012.65
31	93	01/04/2028	17,109.90	1,813.52	190.58	8.55	2,012.65
31	94	02/05/2028	15,296.39	1,834.62	170.38	7.65	2,012.65
30	95	01/06/2028	13,461.76	1,860.84	145.08	6.73	2,012.65
30	96	01/07/2028	11,600.92	1,881.82	125.03	5.80	2,012.65
31	97	01/08/2028	9,719.10	1,899.53	108.26	4.86	2,012.65
31	98	01/09/2028	7,819.56	1,921.64	87.10	3.91	2,012.65
31	99	02/10/2028	5,897.92	1,944.00	65.70	2.95	2,012.65
31	100	02/11/2028	3,953.92	1,966.64	44.04	1.98	2,012.65
29	101	01/12/2028	1,987.28	1,987.28	20.70	1.00	2,008.98
			0.00			<b>TIR</b>	<b>1.14%</b>
						<b>TCEA</b>	<b>14.62%</b>