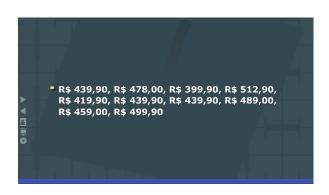
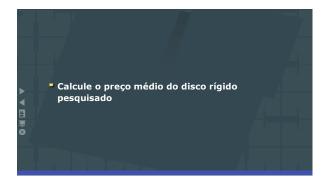


## Média Exemplo 1: os dados a seguir estão relacionados aos preços de determinado disco rígido externo de 1 TB encontrado em diferentes estabelecimentos comerciais





$$\overline{X} = \frac{\sum x_i}{n}$$

$$\sum x_i = 439,90 + 478,00 + 399,90 + 512,90 + 419,90 + 439,90 + 439,90 + 489,00 + 459,00 + 499,90$$

$$\overline{X} = \frac{4578,30}{10}$$

$$\overline{X} = 457,83$$

Exemplo 2: uma empresa de comércio eletrônico está fazendo um estudo em relação aos valores dos fretes de suas mercadorias ■ Na tabela a seguir, são apresentados os valores dos fretes e as respectivas quantidades de envios feitos a cada dia



Com base nessas informações, qual é o valor médio do frete das mercadorias da empresa?

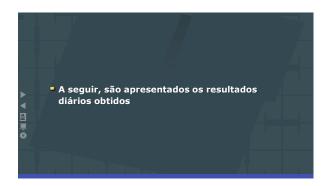
Frete (x <sub>i</sub> )	Quantidade (f <sub>i</sub> )	x <sub>i</sub> .f <sub>i</sub>
R\$ 12,9	5	R\$ 64,50
R\$ 17,5	12	R\$ 210,00
R\$ 19,8		R\$ 435,60
R\$ 19,9	45	R\$ 895,50
R\$ 21,1		R\$ 822,90
R\$ 23,4		R\$ 538,20
R\$ 27,7		R\$ 858,70
R\$ 32,3		R\$ 581,40
R\$ 39,9	) 7	R\$ 279,30
R\$ 45,1	11	R\$ 496,10
Total:	213	R\$ 5182,20

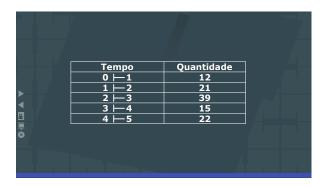
$$\overline{X} = \frac{\sum x_i \cdot f_i}{n}$$

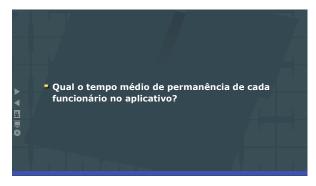
$$\overline{X} = \frac{5182,20}{213}$$

$$\overline{X} = 24,33$$

■ Exemplo 3: uma empresa de tecnologia desenvolveu um aplicativo de comunicação entre os funcionários de uma indústria e está monitorando o tempo diário em horas de uso deste aplicativo







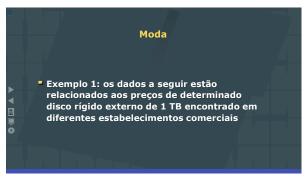
	Tempo	Quantidade	P <sub>mi</sub>	p <sub>mi</sub> .f <sub>i</sub>	
	0   1	12	0,5	6	
	1   2	21	1,5	31,5	
	2	39	2,5	97,5	
	3 ⊢4	15	3,5	52,5	
	4 ⊢5	22	4,5	99	
[ [	Total	109		286,5	

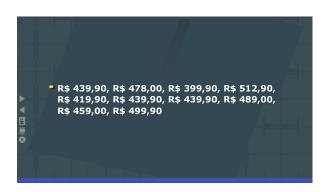
$$\overline{X} = \frac{\sum P_{m_i} f_i}{n}$$

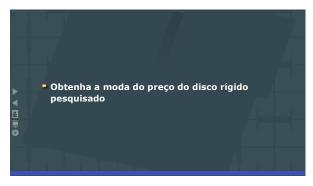
$$\overline{X} = \frac{286,5}{109}$$

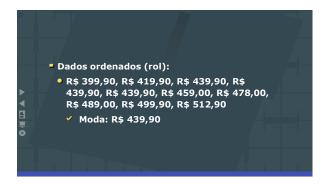
$$\overline{X} = 2,63$$



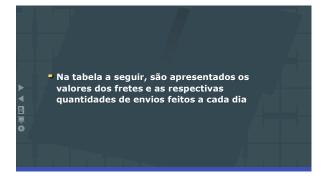




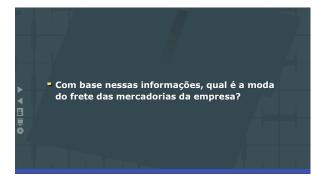


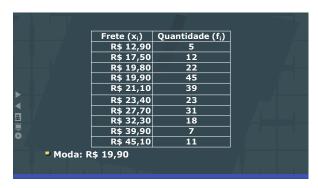


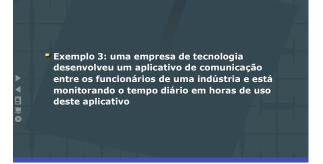
Exemplo 2: uma empresa de comércio eletrônico está fazendo um estudo em relação aos valores dos fretes de suas mercadorias



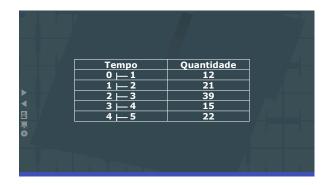


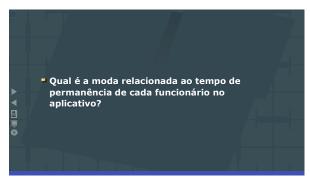






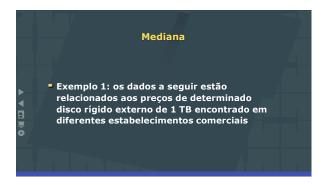




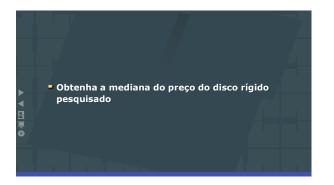


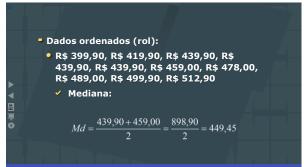
	Tempo		Quantidade	
	0 1 1		12	
	1		21	
	2		39	
	3 ⊢4		15	
	4 ⊢5		22	
× = = × × × × × × × × × × × × × × × × ×	$L_{i} + \frac{f_{post} \cdot A}{f_{ant} + f_{post}}$ $2 + \frac{15.1}{21 + 15}$	Mo =	$= 2 + \frac{15}{36}$ $= 2 + 0.416667$ $= 2.42$	4

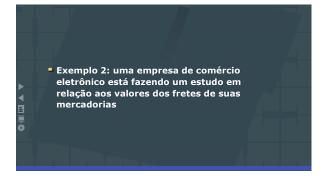


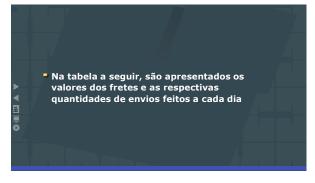


R\$ 439,90, R\$ 478,00, R\$ 399,90, R\$ 512,90, R\$ 419,90, R\$ 439,90, R\$ 439,90, R\$ 489,00, R\$ 459,00, R\$ 499,90







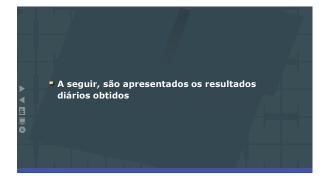


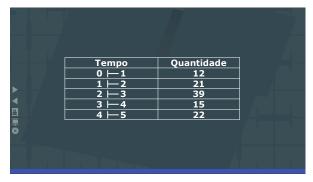
Frete (x <sub>i</sub> )	Quantidade (f <sub>i</sub> )	
R\$ 12,90	5	
R\$ 17,50	12	
R\$ 19,80	22	
R\$ 19,90	45	
R\$ 21,10	39	
R\$ 23,40	23	
R\$ 27,70	31	
R\$ 32,30	18	
R\$ 39,90	7	
R\$ 45,10	11	

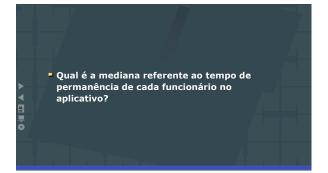
Com base nessas informações, qual é a mediana do frete das mercadorias da empresa?

	Frete (x <sub>i</sub> )	Quantidade (f <sub>i</sub> )	f <sub>a</sub>	
	R\$ 12,90	5	5	$\frac{213}{1065} = 1065$
	R\$ 17,50	12	17	$\frac{213}{2} = 106,5$
	R\$ 19,80	22	39	
	R\$ 19,90	45	84	107° posição
<b>&gt;</b>	R\$ 21,10	39	123	M. 2110
<b>■</b>	R\$ 23,40	23	146	Md = 21,10
80 106	R\$ 27,70	31	177	
<b>≅</b>	R\$ 32,30	18	195	
8	R\$ 39,90	7	202	
	R\$ 45,10	11	213	

Exemplo 3: uma empresa de tecnologia desenvolveu um aplicativo de comunicação entre os funcionários de uma indústria e está monitorando o tempo diário em horas de uso deste aplicativo

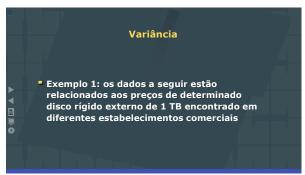


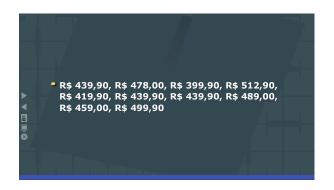


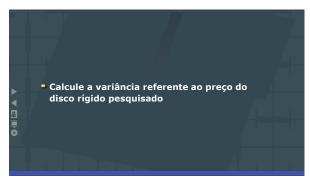


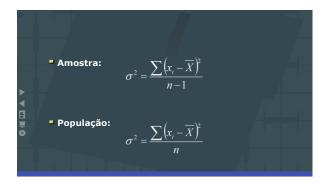
	Tempo	Quantidade	f <sub>a</sub>	100
	0 ⊢1	12	12	$\frac{109}{2}$ = 54,5
	1	21	33	2 2 ,,,
	2	39	72	550
	3	15	87	55° posição
	4	22	109	
▼ □ □ ▼	$Md = L_i + \frac{(n/2 - 1)^2}{3}$ $Md = 2 + \frac{(109/2)^2}{39}$	N	$dd = 2 + \frac{5}{2}$ $dd = 2 + 0,$ $dd = 2,55$	











$$\overline{X} = \frac{\sum x_i}{n}$$

$$\sum x_i = 439,90 + 478,00 + 399,90 + 512,90 +$$

$$419,90 + 439,90 + 439,90 + 489,00 + 459,00 + 499,90$$

$$\overline{X} = \frac{4578,30}{10}$$

$$\overline{X} = 457,83$$

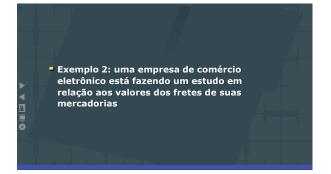
	$x_i$	$x_i - \overline{X}$	$(x_i - \overline{X})^2$	
	R\$ 399,90	-R\$ 57,93	R\$ 3.355,88	
	R\$ 419,90	-R\$ 37,93	R\$ 1.438,68	
	R\$ 439,90	-R\$ 17,93	R\$ 321,48	
	R\$ 439,90	-R\$ 17,93	R\$ 321,48	
<b>&gt;</b>	R\$ 439,90	-R\$ 17,93	R\$ 321,48	
◀ /	R\$ 459,00	R\$ 1,17	R\$ 1,37	
61	R\$ 478,00	R\$ 20,17	R\$ 406,83	
<b>₩</b>	R\$ 489,00	R\$ 31,17	R\$ 971,57	
â	R\$ 499,90	R\$ 42,07	R\$ 1.769,88	
	R\$ 512,90	R\$ 55,07	R\$ 3.032,70	
	Total:		R\$ 11.941,38	
		1	4	

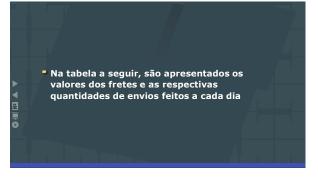
$$\sigma^{2} = \frac{\sum (x_{i} - \overline{X})^{2}}{n - 1}$$

$$\sigma^{2} = \frac{11941,38}{10 - 1}$$

$$\sigma^{2} = \frac{11941,38}{9}$$

$$\sigma^{2} = 1326,82$$



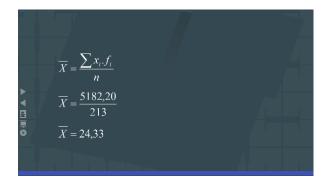


Frete (x <sub>i</sub> )	Quantidade (f <sub>i</sub> )	
R\$ 12,90	5	
R\$ 17,50	12	
R\$ 19,80	22	
R\$ 19,90	45	
R\$ 21,10	39	
R\$ 23,40	23	
R\$ 27,70	31	
R\$ 32,30	18	
R\$ 39,90	7	
R\$ 45,10	11	

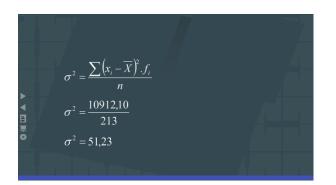
Com base nessas informações, qual é a variância referente ao frete das mercadorias da empresa?

Amostra: 
$$\sigma^2 = \frac{\sum (x_i - \overline{X})^2 . f_i}{n-1}$$
População: 
$$\sigma^2 = \frac{\sum (x_i - \overline{X})^2 . f_i}{n}$$

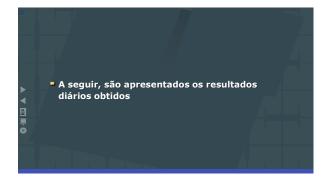
	Frete (x <sub>i</sub> )	Quantidade (f <sub>i</sub> )	x <sub>i</sub> .f <sub>i</sub>	
	R\$ 12,90	5	R\$ 64,50	
	R\$ 17,50	12	R\$ 210,00	
	R\$ 19,80	22	R\$ 435,60	
	R\$ 19,90	45	R\$ 895,50	
	R\$ 21,10	39	R\$ 822,90	
	R\$ 23,40	23	R\$ 538,20	
<u> </u>	R\$ 27,70	31	R\$ 858,70	
<u>=</u>	R\$ 32,30	18	R\$ 581,40	
$\frac{\overline{\alpha}}{\Theta}$	R\$ 39,90	7	R\$ 279,30	
	R\$ 45,10	11	R\$ 496,10	
	Total:	213	R\$ 5182,20	
			A STATE OF	Ī



Frete (x) Quantidade $(x_i - \overline{X})^i$ $(x_i - \overline{X})^j$	
R\$ 17,50 12 R\$ 46,65 R\$ 55 R\$ 19,80 22 R\$ 20,52 R\$ 45 R\$ 19,90 45 R\$ 19,62 R\$ 88 R\$ 21,10 39 R\$ 10,43 R\$ 40	f
R\$ 19,80 22 R\$ 20,52 R\$ 45 R\$ 19,90 45 R\$ 19,62 R\$ 88 R\$ 21,10 39 R\$ 10,43 R\$ 40	3,22
R\$ 19,90 45 R\$ 19,62 R\$ 88  R\$ 21,10 39 R\$ 10,43 R\$ 40	9,79
R\$ 21,10 39 R\$ 10,43 R\$ 40	1,46
	3,12
	6,88
R\$ 23,40 23 R\$ 0,86 R\$ 1	9,89
R\$ 27,70 31 R\$ 11,36 R\$ 35	2,06
R\$ 27,70 31 R\$ 11,36 R\$ 35 R\$ 32,30 18 R\$ 63,52 R\$ 114	3,38
R\$ 39,90 7 R\$ 242,42 R\$ 169	6,97
R\$ 45,10 11 R\$ 431,39 R\$ 474	5,32
Total: 213 R\$ 1091	2,10



Exemplo 3: uma empresa de tecnologia desenvolveu um aplicativo de comunicação entre os funcionários de uma indústria e está monitorando o tempo diário em horas de uso deste aplicativo



	7		
	Tempo	Quantidade	
	0 1	12	
	1	21	/
	2	39	
_	3	15	
<u>#</u>	4 ⊢5	22	
<b>⊗</b>			

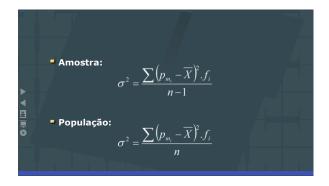
Qual a variância associada ao tempo de

▶ permanência de cada funcionário no

◄ aplicativo?

■

•



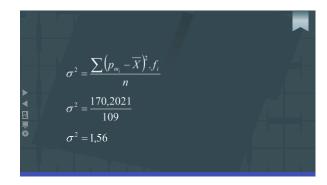
	Tempo	Quantidade	p <sub>mi</sub>	p <sub>mi</sub> .f <sub>i</sub>	
	0 1 1	12	0,5	6	
	1 1 − 2	21	1,5	31,5	
	2 1 − 3	39	2,5	97,5	
	3 ⊢4	15	3,5	52,5	
2	4 ⊢5	22	4,5	99	
106	Total	109		286,5	
<u>™</u> ₩					

$$\overline{X} = \frac{\sum p_{m_i} f_i}{n}$$

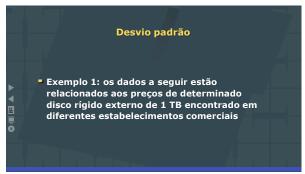
$$\overline{X} = \frac{286,5}{109}$$

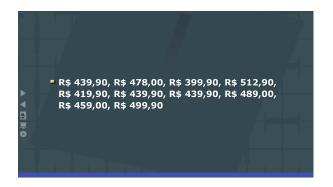
$$\overline{X} = 2,63$$

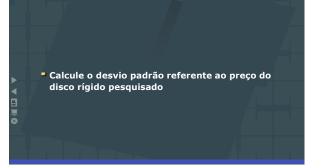
						7
	Tempo	Quantidade	p <sub>mi</sub>	$(p_{m_t} - \overline{X})^2$	$(p_{m_i} - \overline{X})^2 \cdot f_i$	
	0 1	12	0,5	4,5369	54,4428	
	1 1 − 2	21	1,5	1,2769	26,8149	
	2 -3	39	2,5	0,0169	0,6591	
<b>■</b>	3 1 4	15	3,5	0,7569	11,3535	
	4 1 5	22	4,5	3,4969	76,9318	
	Total	109			170,2021	
3						











Amostra: 
$$\sigma = \sqrt{\frac{\sum (x_i - \overline{X})^2}{n-1}}$$
População: 
$$\sigma = \sqrt{\frac{\sum (x_i - \overline{X})^2}{n}}$$

$$\overline{X} = \frac{\sum x_i}{n}$$

$$\sum x_i = 439,90 + 478,00 + 399,90 + 512,90 + 419,90 + 439,90 + 439,90 + 459,00 + 459,00 + 499,90$$

$$\overline{X} = \frac{4578,30}{10}$$

$$\overline{X} = 457,83$$

$x_i$	$x_i - \overline{X}$	$(x_i - \overline{X})^2$
R\$ 399,90	-R\$ 57,93	R\$ 3.355,88
R\$ 419,90	-R\$ 37,93	R\$ 1.438,68
R\$ 439,90	-R\$ 17,93	R\$ 321,48
R\$ 439,90	-R\$ 17,93	R\$ 321,48
R\$ 439,90	-R\$ 17,93	R\$ 321,48
R\$ 459,00	R\$ 1,17	R\$ 1,37
R\$ 478,00		R\$ 406,83
R\$ 489,00	R\$ 31,17	R\$ 971,57
R\$ 499,90		R\$ 1.769,88
R\$ 512,90	R\$ 55,07	R\$ 3.032,70
Total:		R\$ 11.941,38

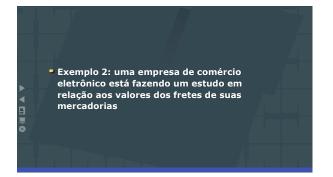
$$\sigma^{2} = \frac{\sum (x_{i} - \overline{X})^{2}}{n - 1}$$

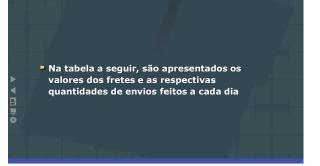
$$\sigma = \sqrt{1326,82}$$

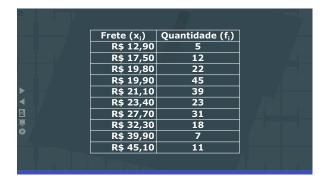
$$\sigma^{2} = \frac{11941,38}{10 - 1}$$

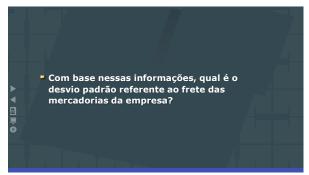
$$\sigma^{2} = \frac{11941,38}{9}$$

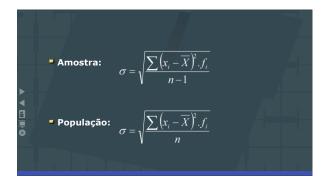
$$\sigma^{2} = 1326,82$$



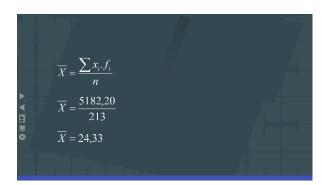








_				
	Frete (x <sub>i</sub> )	Quantidade (f <sub>i</sub> )	x <sub>i</sub> .f <sub>i</sub>	
	R\$ 12,90	5	R\$ 64,50	
T	R\$ 17,50	12	R\$ 210,00	
	R\$ 19,80	22	R\$ 435,60	
	R\$ 19,90	45	R\$ 895,50	
	R\$ 21,10	39	R\$ 822,90	
	R\$ 23,40	23	R\$ 538,20	
<u>#</u>	R\$ 27,70	31	R\$ 858,70	
_	R\$ 32,30	18	R\$ 581,40	
<del>=</del>	R\$ 39,90	7	R\$ 279,30	
	R\$ 45,10	11	R\$ 496,10	
	Total:	213	R\$ 5182,20	
1 1			41.1	



- L					
	Frete	Quantidade	$(x_i - \overline{X})^2$	$(x_i - \overline{X})^2 \cdot f$	
	(x <sub>i</sub> )	(f <sub>i</sub> )	$(x_i - A)$	$(x_i - X) \cdot J$	
	R\$ 12,90	5	R\$ 130,64	R\$ 653,22	
	R\$ 17,50	12	R\$ 46,65	R\$ 559,79	
	R\$ 19,80	•	R\$ 20,52	R\$ 451,46	
	R\$ 19,90	45	R\$ 19,62	R\$ 883,12	
<b>•</b>	R\$ 21,10	39	R\$ 10,43	R\$ 406,88	
<b>■</b>	R\$ 23,40	23	R\$ 0,86	R\$ 19,89	
96 106	R\$ 27,70	31	R\$ 11,36	R\$ 352,06	
<b>₩</b>	R\$ 32,30	18	R\$ 63,52	R\$ 1143,38	
8	R\$ 39,90	7	R\$ 242,42	R\$ 1696,97	
	R\$ 45,10	11	R\$ 431,39	R\$ 4745,32	
	Total:	213		R\$ 10912,10	

$$\sigma^{2} = \frac{\sum (x_{i} - \overline{X})^{2} \cdot f_{i}}{n} \qquad \sigma = \sqrt{51,23}$$

$$\sigma = 7,16$$

$$\sigma^{2} = \frac{10912,10}{213}$$

$$\sigma^{2} = 51,23$$

Exemplo 3: uma empresa de tecnologia desenvolveu um aplicativo de comunicação entre os funcionários de uma indústria e está monitorando o tempo diário em horas de uso deste aplicativo

