Find Calculate the | IBNR | for **AY 2024** using a frequency-severity method.

Given

AY	EP (000s)	on-level factor	indicated ultimate counts	selected severity	
2021	52,000	1.220	470	?	
2022	60,300	1.140	480	?	
2023	68,700	1.080	550	?	
2024	78,300	1.040	?	?	
2025	?	?	?	21,920	*severity for AY 2025 was determined independently*

annual trend for exposures (premium trend)	n/a
annual trend for counts	-1%
annual trend for severity	6%

cumulative reported claims for **AY 2024**	6,733,800

This problem has 2 differences from a more typical application of the frequency-severity method #2

A   The exposure base is earned premium and you're given on-level factors instead of an exposure trend.
B   The question doesn't ask about the most recent AY. It asks about the **next-to-last** AY.

Before doing any calculations, let's think ahead about what we're going to need. We want the IBNR but we'll first calculate
the ultimate then just subtract the reported to date for AY 2024. For the frequency-severity method, we have for **AY 2024**:

Step 3	ultimate	=	exposure	x	frequency	x	severity	
		=	78,300	x	0.755%	x	20,679	*<-- calculations shown below in steps 1 & 2*
		=	12,231,617					

	IBNR	=	ultimate	-	reported	
		=	12,231,617	-	6,733,800	
		=	5,497,817		*<-- final answer*	

The details of how the frequency & severity are calculated are shown below:

Step 1a   trend the counts and exposures (EP) first to **2025** to get frequency at the **2025** level: *(trended counts) / (OLEP)*

AY	counts	trd fctr	EP	OLF **	trended frequency	
2021	470	0.99^4	52,000	1.220	0.712%	* OLEP = On-Level Earned Premium
2022	480	0.99^3	60,300	1.140	0.678%	** OLF = On-Level Factor
2023	550	0.99^2	68,700	1.080	0.727%	
2024	?	n/a	78,300	1.040	?	
2025	?	n/a	?	n/a	**0.719%**	*<-- select avg(2021, 2023) because 2022 is an outlier*

Step 1b   detrend frequency from step 1a **back to 2024**

					back out count trend		back out OLF
frequency @ 2024	=	frequency @ 2025	/		0.99^1	x	1.040
	=	**0.719%**	/		0.99^1	x	1.040
	=	0.755%					

Step 2   detrend given severity **back to 2024**

severity @ 2024	=	severity @ 2025	/	(1 + severity trend)^1
	=	21,920	/	1.06^1
	=	20,679		

Step 3   *(Go back to the top for the final answer)*

Find   Calculate the | IBNR | for **AY 2024** using a frequency-severity method.

Given

AY	EP (000s)	on-level factor	indicated ultimate counts	selected severity
2021	66,000	1.250	660	?
2022	77,200	0.990	690	?
2023	81,100	0.980	730	?
2024	88,400	0.990	?	?
2025	?	?	?	24,750

severity for AY 2025 was determined independently

annual trend for exposures (premium trend)	n/a
annual trend for counts	-2%
annual trend for severity	8%

cumulative reported claims for **AY 2024**	7,248,800

This problem has 2 differences from a more typical application of the frequency-severity method #2

A   The exposure base is earned premium and you're given on-level factors instead of an exposure trend.
B   The question doesn't ask about the most recent AY. It asks about the **next-to-last** AY.

Before doing any calculations, let's think ahead about what we're going to need. We want the IBNR but we'll first calculate
the ultimate then just subtract the reported to date for AY 2024. For the frequency-severity method, we have for **AY 2024**:

Step 3	ultimate	=	exposure	x	frequency	x	severity	
		=	88,400	x	0.875%	x	22,917	*<-- calculations shown below in steps 1 & 2*
		=	17,720,688					

	IBNR	=	ultimate		-	reported	
		=	17,720,688		-	7,248,800	
		=	10,471,888		*<-- final answer*		

The details of how the frequency & severity are calculated are shown below:

Step 1a   trend the counts and exposures (EP) first to **2025** to get frequency at the **2025** level: *(trended counts) / (OLEP)*

AY	counts	trd fctr	EP	OLF **	trended frequency	
2021	660	0.98^4	66,000	1.250	0.738%	** OLEP = On-Level Earned Premium*
2022	690	0.98^3	77,200	0.990	0.850%	*** OLF = On-Level Factor*
2023	730	0.98^2	81,100	0.980	0.882%	
2024	?	n/a	88,400	0.990	?	
2025	?	n/a	?	n/a	0.866%	*<-- select avg(2023, 2024) because 2021 is an outlier*

Step 1b   detrend frequency from step 1a **back to 2024**

					back out count trend		back out OLF
frequency @ 2024	=	frequency @ 2025	/		0.98^1	x	0.990
	=	0.866%	/		0.98^1	x	0.990
	=	0.875%					

Step 2   detrend given severity **back to 2024**

severity @ 2024	=	severity @ 2025	/	(1 + severity trend)^1
	=	24,750	/	1.08^1
	=	22,917		

Step 3   *(Go back to the top for the final answer)*