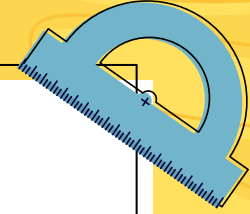


$$B^3 = CD + DA$$
$$B^3 = (D - C \sin B)$$
$$B^3 = D^2 - 3A \cos B^3 + A \sin B$$
$$B^3 = D^2 - 4A \cos B^3 + C \sin B$$
$$B^3 = C^3 - A^2 - 3 \cos B$$

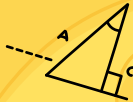


EPSILON SCHOOL

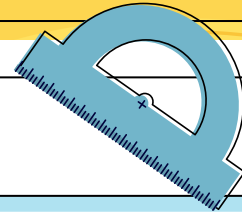
Sharvi, Sophie, Medhansh



$$x_2^4 + x_3^2 = (x_2 + x_3)$$



AGENDA



PROBLEM STATEMENT

01

02

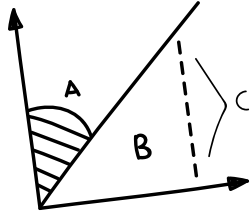
BACKGROUND

PROCESS/DATA ANALYSIS

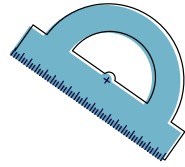
03

04

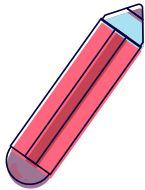
CONCLUSION



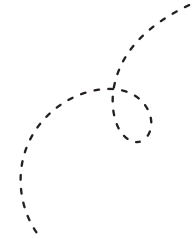
01



$$(-3\sqrt{2}) - 4(3) (-3M+2)$$

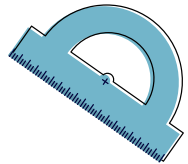



PROBLEM STATEMENT




$$\frac{3 \sin 4/8}{\sqrt{3 \cdot 2 \cdot 4 + 2}}$$

The Epsilon School of Math and Science is planning to receive 140 more students than their graduating class the previous year. In order to accommodate for this increase, they plan on hiring 7 new teachers to maintain the size of their classes. **What department should these faculty be assigned to achieve this in the fairest manner?**



$$C = \sin^2\left(\frac{2}{3}\right)$$

$$= \sin^3 \times 0.747$$
$$= 7,38$$



$$A^3 C^2 4^B = 9^3 + 5^B + 7^C$$
$$5^C = 54718,32.$$


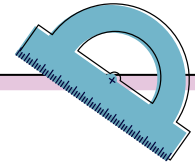


02

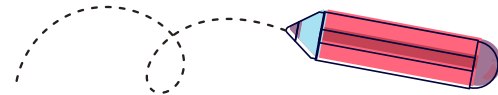
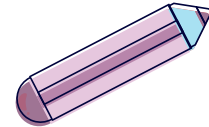
BACKGROUND



ESSENTIAL INFO



- 1) Total student population goes from 490 to 630
- 2) 140 more incoming sophomores than the graduating senior population (+ dropouts)
- 3) 5% of incoming class drops out prior to graduation
- 4) Foreign language teachers can teach multiple languages
- 5) 7 new teachers must be hired



SEPTEMBER 2024 ENROLLMENTS PT 1

Department	10th	11th	12th
Art	31	33	99
Biology	198	95	319
Chemistry	59	126	294
English	183	155	490
French	41	32	122
German	19	22	51

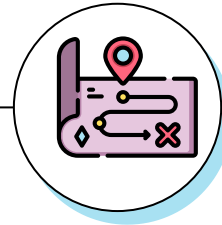
SEPTEMBER 2024 ENROLLMENTS PT 2

Department	10th	11th	12th
Spanish	51	26	110
Mathematics	184	201	647
Music	50	56	155
Physics	50	58	291
Social Studies	183	131	373

ASSUMPTIONS

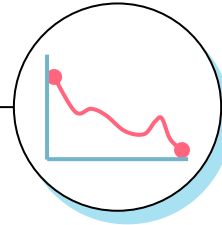
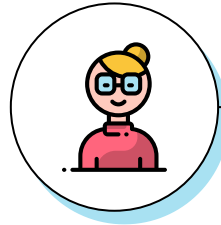
$$\begin{aligned}B^3 &= CD + DA \\B^3 &= (D - C \sin B) \\B^3 &= D^2 - 3A \cos B^2 + A \sin B \\B^3 &= D^2 - 4A \cos B^3 + C \sin B \\B^3 &= C^2 - A^2 - 3 \cos B\end{aligned}$$

Course selection follows
a grade-based trend



Epsilon School is in
Massachusetts, so each
student takes one
English course

Every teacher teaches
five periods a day



The dropout rate for
10th grade is 1%, 11th is
2%, and 12th is 2%

CONSIDERATIONS

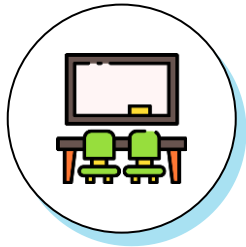
$$A^3 C^2 4^B = 9^3 + 5^8 + 7^C$$

$$5^C = 54718,32.$$



CLASS SIZE

A reasonable class size is about 15-20 students



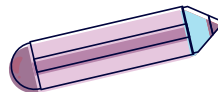
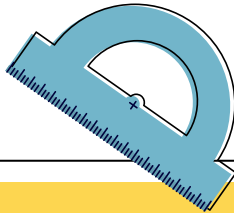
MUSIC+ARTS

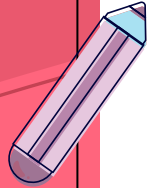
Music and art class sizes will deviate from average



STUDENT-TEACHER RATIO

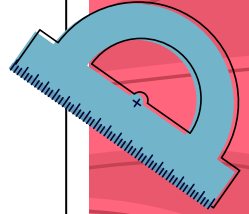
Fairness = Maintaining student-teacher ratio



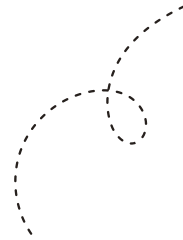


03

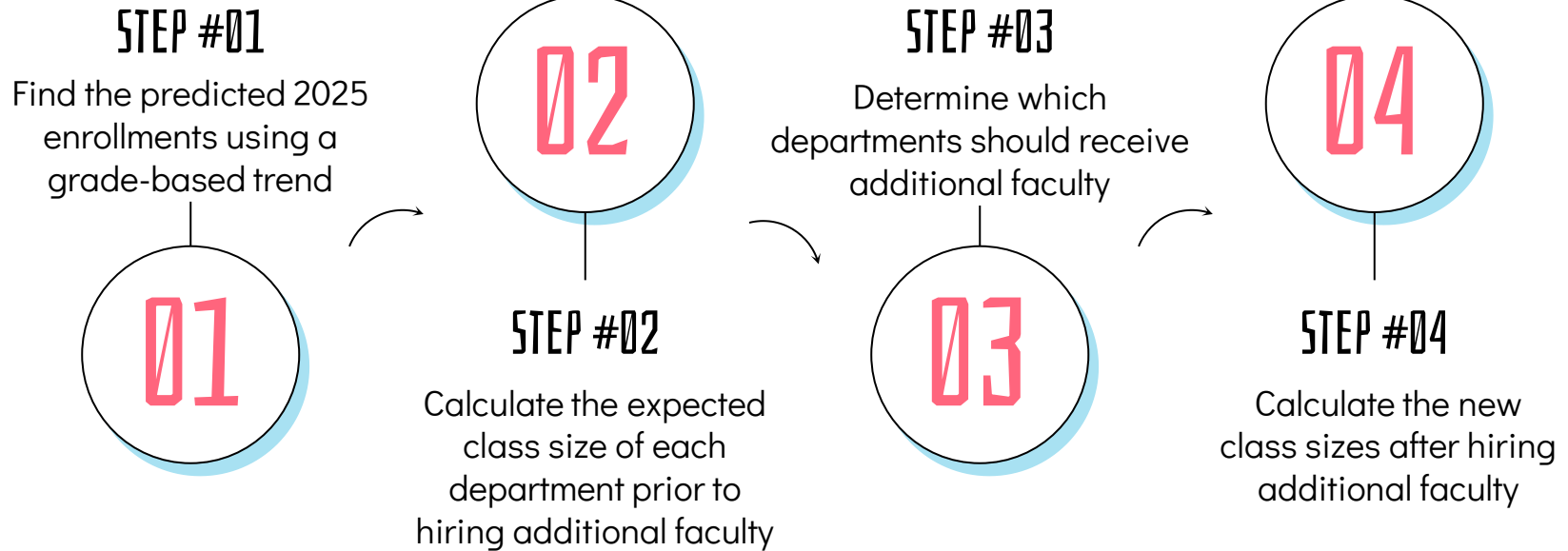
PROCESS



$$\begin{aligned}x_1 + 2A &= 3\sqrt{5+2AB} \\ &= 9\sqrt{12}\end{aligned}$$



PROCESS OVERVIEW



**SEPTEMBER 2024 AVG.
CLASS SIZES PT 1**

Department	Total Enrollments	# of Teachers	Avg. class size = Enrollments/(5×Teachers)
Art	99	1	19.8
Biology	319	4	15.95
Chemistry	294	3	19.6
English	490	5	19.6
French	122	1.2	20.33
German	51	0.6	17

**SEPTEMBER 2024 AVG.
CLASS SIZES PT 2**

Department	Total Enrollments	# of Teachers	Avg. class size = Enrollments/(5×Teachers)
Spanish	110	1.2	18.33
Mathematics	647	6	21.57
Music	155	1	31
Physics	291	3	19.4
Social Studies	373	5	14.92

ABOUT THE LANGUAGE TEACHERS...

$$(-3\sqrt{2}) - 4(3)(-3M+2)$$

Teacher 1:

GERMAN

GERMAN

GERMAN

SPANISH

SPANISH

Teacher 2:

SPANISH

SPANISH

SPANISH

SPANISH

FRENCH

Teacher 3:

FRENCH

FRENCH

FRENCH

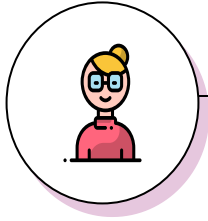
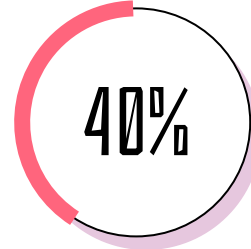
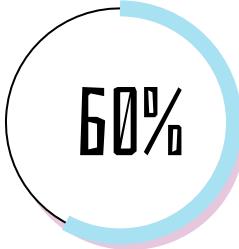
FRENCH

FRENCH

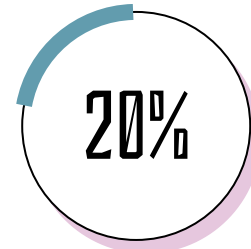
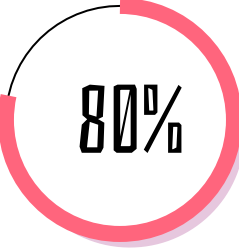
ABOUT THE LANGUAGE TEACHERS CONT.



TEACHER 1



TEACHER 2



TEACHER 3



So, there are 1.2 French teachers, 0.6 German teachers, and 1.2 Spanish teachers (3 teachers in total)

TAKING DROPOUTS INTO ACCOUNT

Class	10th (1%)	11th (2%)	12th (2%)
Rising Sophomores	$152 + 140 + 5 \text{ dropouts} = 297$		
Rising Juniors	183	$183 \times 0.99 = 181$	
Rising Seniors	$155 / 0.99 = 157$	155	$157 \times .97 = 152$

$157 - 152 = 5$ total rising senior dropouts

SEPTEMBER 2025 PROJECTED ENROLLMENTS PT 1

calculated by multiplying total # of students in current class by % of previous year's students who took a course in a particular department

Department	10th	11th	12th
Art	50	39	35
Biology	321	111	26
Chemistry	96	147	109
English	297	181	152
French	67	37	49
German	31	25	10

**SEPTEMBER 2025
PROJECTED
ENROLLMENTS PT 2**

Department	10th	11th	12th
Spanish	83	30	33
Mathematics	299	235	262
Music	81	65	49
Physics	81	68	183
Social Studies	297	153	59

**SEPTEMBER 2025 AVG.
CLASS SIZES WITHOUT
NEW FACULTY PT 1**

Department	Total Enrollments	# of Teachers	Avg. class size = Enrollments/(5×Teachers)
Art	124	1	24.8
Biology	458	4	22.9
Chemistry	352	3	23.4
English	630	5	25.2
French	153	1.2	25.5
German	66	0.6	22

**SEPTEMBER 2025 AVG.
CLASS SIZES WITHOUT
NEW FACULTY PT 2**

Department	Total Enrollments	# of Teachers	Avg. class size = Enrollments/(5×Teachers)
Spanish	146	1.2	24.33
Mathematics	796	6	26.53
Music	194	1	38.8
Physics	332	3	22.13
Social Studies	509	5	20.36

WHICH DEPARTMENTS NEED ADDITIONAL FACULTY?



CHEMISTRY

The average class size is currently 23.4



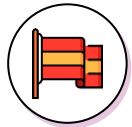
ENGLISH

The average class size is currently 25.2



FRENCH

The average class size is currently 25.5



SPANISH

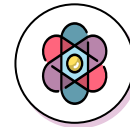
The average class size is currently 24.33



MATH

The average class size is currently 26.53, so we decided to add 2 additional teachers

$$A^3 C^2 4^B = 9^3 + 5^B + 7^C$$
$$5^C = 54718,32.$$



BIOLOGY

The average class size is similar to physics' class size, but we prioritized biology because it has more students overall.

Although the music and art departments have larger avg class sizes, they typically can afford to be larger and will not receive additional faculty.

NEW LANGUAGE DEPARTMENT

$$(-3\sqrt{2}) - 4(3)(-3M+2)$$

Teacher 1:

GERMAN

GERMAN

GERMAN

SPANISH

SPANISH

Teacher 2:

SPANISH

SPANISH

SPANISH

SPANISH

FRENCH

Teacher 3:

FRENCH

FRENCH

FRENCH

FRENCH

FRENCH

Teacher
4:

FRENCH

FRENCH

FRENCH

SPANISH

SPANISH

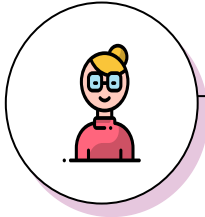
NEW LANGUAGE DEPARTMENT CONT.



TEACHER 1

60%

40%



TEACHER 2

80%

20%



TEACHER 3

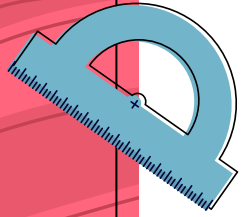
100%

NEW
TEACHER

40%

60%

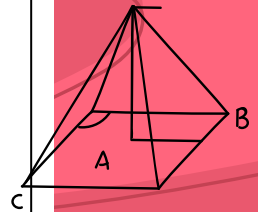
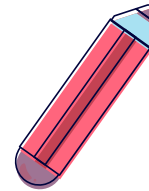
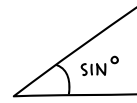
So, there are now 1.8 French teachers, 0.6 German teachers, and 1.6 Spanish teachers (4 teachers in total)



$$\begin{aligned} C &= \frac{B^3 + C^2 + A}{3BA} \\ &= \frac{C^3 + 5CA}{2CA} \\ &= C^4 + 2 + D \\ &= 3C4 \end{aligned}$$

CONCLUSION

04



**SEPTEMBER 2025 AVG.
CLASS SIZES WITH NEW
FACULTY PT 1**

Department	Total Enrollments	# of Teachers	Avg. class size = Enrollments/(5×Teachers)
Art	124	1	24.8
Biology	458	4+1	18.32
Chemistry	352	3+1	17.6
English	630	5+1	21
Language (French, German, Spanish)	365	3+1	17, 22, 18.25

**SEPTEMBER 2025 AVG.
CLASS SIZES WITH NEW
FACULTY PT 2**

Department	Total Enrollments	# of Teachers	Avg. class size = Enrollments/(5×Teachers)
Mathematics	796	6+2	19.9
Music	194	1	38.8
Physics	332	3+1	16.6
Social Studies	509	5	20.36

SOLUTION

(ADDITIONAL FACULTY FOR
EACH DEPARTMENT)

Art: 0

Biology: 1

Chemistry: 1

English: 1

Language: 1

Mathematics: 2

Music: 0

Physics: 1

Social Studies: 0

THANK YOU



Do you have any questions?

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$$\begin{aligned} X^3 &= C^3 + D^1 \\ 35 &= C^4 \sin^2 \\ &= 62 \sin^4 \\ &= 57.75 \end{aligned}$$

