LESSON MAKER PRO

Classify and Connect

Build partitions and find equivalence classes.

HIGH SCHOOL · MA.912.LT.5.3

MA.912.LT.5.3 "Partition a set into disjoint subsets and determine an equivalence class given the equivalence relation on a set."

NAME _____ DATE _____

THE BIG IDEA

An equivalence relation puts elements that meet the same rule into groups. Each element belongs to exactly one group, so the groups do not overlap and together make a partition. An equivalence class is the group containing one chosen element.

WORKED EXAMPLE

Let S = {red, rose, blue, berry}. Two words are related when they begin with the same letter. Find the partition of S and the class [rose].

1. Sort the words by their first letter.
2. The r group is {red, rose}.
3. The b group is {blue, berry}.
4. These groups contain every word and do not overlap.

Answer: Partition: {{red, rose}, {blue, berry}}; [rose] = {red, rose}

PRACTICE 5 problems

1 Let A = {2, 3, 4, 5, 6, 7}. Two integers are related when they have the same parity. Find the partition of A.

ANSWER _____

2 Let B = {1, 2, 3, 4, 5, 6, 7, 8}. Two integers are related when they have the same remainder when divided by 3. Find [5].

ANSWER _____

3 Let C = {9, 10, 11, 12, 13, 14}. Two integers are related when their difference is divisible by 3. Find the partition of C and [10].

ANSWER _____

4 Let D = {-3, -2, -1, 0, 1, 2, 3}. Two integers are related when they have the same absolute value. Find the partition of D.

ANSWER _____

5 A partition of M is {{j, k}, {l, m, n}, {p}}. Find [m].

ANSWER _____

APPLY IT Show your work

1 A school podcast team has editors {Ava, Diego, Jalen, Mei, Noor, Priya}. Ava, Jalen, and Noor record on Monday. Diego, Mei, and Priya record on Wednesday. Two editors are related when they record on the same day. Write the partition and [Mei].

WORK SPACE

ANSWER _____

2 At a game design club, Amir and Dani each completed 1 play-test session, Bella and Esme each completed 2, and Cruz and Finn each completed 3. Two members are related when they completed the same number of sessions. Write the partition and [Esme].

WORK SPACE

ANSWER _____

CHALLENGE One step up

Let U = {-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5}. Two integers are related when their difference is divisible by 3. Write the partition of U and [2]. Explain why the groups form a partition.

WORK SPACE AND ANSWER

ANSWER KEY

Classify and Connect

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Let A = {2, 3, 4, 5, 6, 7}. Two integers are related when they have the same parity. Find the partition of A.	**{{2, 4, 6}, {3, 5, 7}}**
2	Let B = {1, 2, 3, 4, 5, 6, 7, 8}. Two integers are related when they have the same remainder when divided by 3. Find [5].	**[5] = {2, 5, 8}**
3	Let C = {9, 10, 11, 12, 13, 14}. Two integers are related when their difference is divisible by 3. Find the partition of C and [10].	**Partition: {{9, 12}, {10, 13}, {11, 14}}; [10] = {10, 13}**
4	Let D = {-3, -2, -1, 0, 1, 2, 3}. Two integers are related when they have the same absolute value. Find the partition of D.	**{{-3, 3}, {-2, 2}, {-1, 1}, {0}}**
5	A partition of M is {{j, k}, {l, m, n}, {p}}. Find [m].	**[m] = {l, m, n}**

PART 2 · APPLY IT

1. **{{Ava, Jalen, Noor}, {Diego, Mei, Priya}}; [Mei] = {Diego, Mei, Priya}** Group the editors by recording day. Mei is in the Wednesday group.
2. **{{Amir, Dani}, {Bella, Esme}, {Cruz, Finn}}; [Esme] = {Bella, Esme}** Group members by their number of completed sessions. Esme completed 2 sessions, so she belongs with Bella.

CHALLENGE

{{-5, -2, 1, 4}, {-4, -1, 2, 5}, {-3, 0, 3}}; [2] = {-4, -1, 2, 5}. Each integer has exactly one remainder when divided by 3, so it belongs to one group only, and all integers in U are included.

Accept equivalence classes and partition groups in any order. Within each set, element order does not matter.