

Part A - Warm-up Fold

Activity :

Take a square sheet. Fold one corner to any point on the opposite side.
Open and observe the crease pattern.

Explore :

- Do all folds look the same?
- What changes when the point moves?
- What stays the same?

Part B - Haga's first theorem

Activity :

Take a square sheet. Find a crease pattern which would get you a pythagorean triple. Prove that.

Explore:

How many such pythagorean triplets can you find in this same fold?

Part C - Folding a third

Activity:

Use the same crease pattern as in Part B. Find the other side lengths and mark a point which is exactly one third the side of the square (and not just an approximation)

Explore:

Prove that this fold will always be one third of the square length.

Part D - Folding any fraction

Activity:

Find a fold which would give you any fraction - say,

Explore:

Find all fractions that you can obtain in a single fold.

Part E - Midy's Theorem (Repeating Decimal Split Magic)

Activity:

1. Pick any fraction whose decimal expansion repeats (e.g., $1/7$, $1/13$, $1/17$).
2. Write one full repeating block.
3. Split it into 2 equal halves and add them.

Explore:

- Is the sum always a multiple of 9?
- Try 5 different examples.
- Can you explain this using place-value reasoning or modular arithmetic?
- What would happen if you split it into 3 equal parts and add them?