

## Explore Screen

Re-discover how an area model can be used to justify the product of two numbers, that the product/area can be partitioned into smaller products/areas, and that the total area is the sum of the partial areas.

**CLEAR** the area rectangle

**PARTITION** the area rectangle

**COORDINATE** the calculation with the area model

**CHANGE** the dimensions

**SHOW/HIDE** total area

**SHOW** partial products on the area rectangle

Area Model Algebra

## Generic Screen

Apply the area model to justify the product of two integers using a generic model.

**EDIT** the partitions

**SEE** the detailed area calculation

**CHANGE** the number of partitions

Area Model Algebra

## Variables Screen

Use the generic area model to multiply algebraic expressions and justify the distributive property.

**EDIT** the partitions; include a variable

$x^2$   $x$

**SHOW/HIDE** factored form

**SHOW/HIDE** expanded form

Area Model Algebra

## Game Screen

Test your understanding of the area model by finding missing partial products, dimensions, or total area.

**Level 1:** Find 1 partial product or total area

**Level 2:** Find 2 partial products or 1 partial product and total area

**Level 3:** Find 2 partial dimensions or 1 partial dimension and 1 partial product

**Level 4:** Find 2 partial dimensions or 1 partial dimension and 1 partial product

**Level 5:** Factor a  $1 \times 2$  or  $1 \times 3$  expression

**Level 6:** Factor a  $2 \times 2$  expression

**VIEW** status of the game level

**FIND** missing information stated

**START OVER** to reset progress

**SUBMIT** answers using the edit buttons or number spinners

Area Model Algebra

## Design Notes

- On the Explore screen, the area rectangle drag handle is useful for initial exploration, and the number spinners are useful for more precise configurations.
- On the Explore screen, multiplying numbers less than 10 in the 100x100 grid will result in very small areas displayed on the area grid.
- Multiplication of  $5 \times 7$  will not lead to as rich of a discussion as  $15 \times 7$  or  $15 \times 17$ . Encourage students to justify why partitioning dimensions larger than 10 is useful, and describe a useful partition strategy.

## Suggestions for Use

- Use the area model for justifying multiplication of algebraic expressions.
- Use an area model to determine a strategy for factoring an algebraic expression.

## Sample Challenge Prompts

- How is partitioning numbers similar to partitioning expressions?
- Look at each line of the calculation. Where is that represented in the area model?
- Given a total area, find the dimensions. Can you find other dimensions that produce the same total area?

See all published activities for Area Model Algebra [here](#).

For more tips on using PhET sims with your students, see [Tips for Using PhET](#).