

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

Explore Generic Variables Game

PHIET

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 1x2 or 1x3 expression

Level 6: Factor a 2x2 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

Explore Generic Variables Game

PHIET

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 5×7 will not lead to as rich of a discussion as 15×7 or 15×17 . 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?

Customization Options

Query parameters allow for customization of the simulation, and can be added by appending a '?' to the sim URL, and separating each query parameter with a '&'. The general URL pattern is:

`...html?queryParameter1&queryParameter2&queryParameter3`

For example, in Area Model Algebra, if you only want to include the 1st and 2nd screens (screens=1, 2), with the 2nd screen open by default (initialScreen=2) use:
https://phet.colorado.edu/sims/html/area-model-algebra/latest/area-model-algebra_all.html?screens=1,2&initialScreen=2

To run this in Spanish (locale=es), the URL would become:
https://phet.colorado.edu/sims/html/area-model-algebra/latest/area-model-algebra_all.html?locale=es&screens=1,2&initialScreen=2

⚙ Indicates this customization can be accessed from the Preferences menu within the simulation.

Query Parameter and Description	Example Links
<code>gameLevels</code> - specifies which levels appear in the game.	<code>gameLevels=1, 2</code>
<code>screens</code> - specifies which screens are included in the sim and their order. Each screen should be separated by a comma. For more information, visit the Help Center .	<code>screens=1</code> <code>screens=2, 1</code>
<code>initialScreen</code> - opens the sim directly to the specified screen, bypassing the home screen.	<code>initialScreen=1</code> <code>initialScreen=3</code>

Query Parameter and Description	Example Links
<p>⚙️ <code>locale</code> - specify the language of the simulation using ISO 639-1 codes. Available locales can be found on the simulation page on the Translations tab. Note: this only works if the simulation URL ends in “_all.html”.</p>	<p><code>locale=es</code> (Spanish) <code>locale=fr</code> (French)</p>
<p>⚙️ <code>regionAndCulture</code> - Select the portrayal of people, places, or objects in the sim. Images are not intended to represent the entire diversity of a region or culture. Possible values: <code>africa</code>, <code>africaModest</code>, <code>asia</code>, <code>latinAmerica</code>, <code>oceania</code>, <code>usa</code></p>	<p><code>latinAmerica</code></p>
<p><code>audio</code> - if muted, audio is muted by default. If disabled, all audio is permanently turned off.</p>	<p><code>sound=muted</code> <code>sound=disabled</code></p>
<p><code>allowLinks</code> - when <code>false</code>, disables links that take students to an external URL. Default is <code>true</code>.</p>	<p><code>allowLinks=false</code></p>

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

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