

Diseños

```
DynamicModule[  
{img3 = , grosor = Thickness[0.007],  
rojo = ■, azul = RGBColor[0, 69 / 256, 124 / 256],  
verde = RGBColor[206 / 256, 210 / 256, 27 / 256],  
fuente = "Gabriola", tama = 30, fcero},  
fcero[x_] := Which[x <= 0, 0, True, x];  
Manipulate[Pane[  
Column[{  
Item[Style["Diseños preestablecidos para los tipos de baldosas",  
tama, Bold, azul, FontFamily → fuente], Alignment → Center],  
Grid[{{Style[Row[{ " Medidas a =", a // fcero,  
", b =", b // fcero, ", a - b =",  
(a - b) // fcero, " (centímetros)"}],  
tama - 1, azul, FontFamily → fuente], SpanFromLeft},  
{Rotate[Item[Style[Row[{ "Ancho de la baldosa ⇒ a-b"}],  
tama - 5, azul, FontFamily → fuente]], 90 Degree], Show[  
Graphics[{EdgeForm[{grosor, Black}], FaceForm[RGBColor[0, 69 / 256,  
124 / 256, 0.2]], Rectangle[{0, 0}, {12.45 a, a - b // fcero}]}],  
Graphics[{Black, Style[Text[a, {12.45 * a / 2, -10}]], tama - 6,  
FontFamily → fuente}, Style[Text[(a - b) // fcero, {-25,  
(12.45 (a - b) / 2) // fcero}], tama - 6, FontFamily → fuente]}],  
PlotRange → {{-40, 500}, {-30, 250}}, ImageSize → {340, 200}],  
Rotate[Item[Style[Row[{ "Ancho de la baldosa ⇒ a-b"}],  
tama - 5, azul, FontFamily → fuente]], 90 Degree], Show[  

```

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ImageSize -> 280}, " ", Control@{{b, 3},
0, a, 0.5, Appearance -> {"Labeled", "DownArrow"}, ImageSize -> 280} }],  

SaveDefinitions -> True, Deployed -> True]

```



Diseños preestablecidos para los tipos de baldosas

Medidas $a = 5$, $b = 3$, $a - b = 2$ (centímetros)

Ancho de la baldosa $\Rightarrow a - b$



Largo de la baldosa $\Rightarrow a$

Ancho de la baldosa $\Rightarrow a - b$



Largo de la baldosa $\Rightarrow b$

```

DynamicModule[  

{img3 = , grosor = Thickness[0.007],  

rojo = ■, azul = RGBColor[0, 69 / 256, 124 / 256],  

verde = RGBColor[206 / 256, 210 / 256, 27 / 256],  

fuente = "Gabriola", tama = 30, fcero},  

fcero[x_] := Which[x ≤ 0, 0, True, x];  

Manipulate[Pane[  

Column[{  

Item[Style["Modelo 1: Dimensiones de la baldosa",  

tama, Bold, azul, FontFamily → fuente], Alignment → Center],  

Grid[{{Style[Row[{ "Medidas a =", a // fcero, ", b =", b // fcero,  

", a - b =", (a - b) // fcero, " (centímetros)"}],  

tama - 1, azul, FontFamily → fuente], SpanFromLeft},  

{Rotate[Item[Style[Row[{ "Ancho de la baldosa ⇒ a-b"}],  

tama - 5, azul, FontFamily → fuente]], 90 Degree], Show[  

Graphics[{EdgeForm[{grosor, Black}], FaceForm[RGBColor[0, 69 / 256,  

124 / 256, 0.2]], Rectangle[{0, 0}, {12.45 a, 12.45 a - b // fcero}]},  

Graphics[{Black, Style[Text[a, {12.45 * a / 2, -10}], tama - 6,  

FontFamily → fuente], Style[Text[(a - b) // fcero, {-25,  

(12.45 (a - b) / 2) // fcero}], tama - 6, FontFamily → fuente}]],  

PlotRange → {{-40, 500}, {-30, 250}}, ImageSize → {340, 200}}],  

{, Item[Style[Row[{ "Largo de la baldosa ⇒ a"}],  

tama - 5, azul, FontFamily → fuente]}]},  

Alignment → {Left, Bottom}], Frame → All], {Automatic, Automatic}],  

Row[{Control @{{a, 5}, 2, 20, 0.5, Appearance → {"Labeled", "DownArrow"},  

ImageSize → 140}, " ", Control @{{b, 3}, 0, a,  

0.5, Appearance → {"Labeled", "DownArrow"}, ImageSize → 140}]],  

SaveDefinitions → True, Deployed → True}]
]

```

a 11.

b 5.

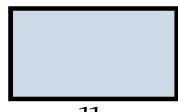


Modelo 1: Dimensiones de la baldosa

Medidas $a = 11.$, $b = 5.$, $a - b = 6.$ (centímetros)

Ancho de la baldosa $\Rightarrow a - b$

6.



11.

Largo de la baldosa $\Rightarrow a$

```

DynamicModule[  

{img3 = , grosor = Thickness[0.007],  

rojo = ■, azul = RGBColor[0, 69 / 256, 124 / 256],  

verde = RGBColor[206 / 256, 210 / 256, 27 / 256],  

fuente = "Gabriola", tama = 30, fcero},  

fcero[x_] := Which[x ≤ 0, 0, True, x];  

Manipulate[Pane[  

Column[{  

Item[Style["Modelo 2: Dimensiones de la baldosas",  

tama, Bold, azul, FontFamily → fuente], Alignment → Center],  

Grid[{{Style[Row[{ "Medidas a =", a // fcero, ", b =", b // fcero,  

", a - b =", (a - b) // fcero, " (centímetros)"}],  

tama - 1, azul, FontFamily → fuente], SpanFromLeft},  

{Rotate[Item[Style[Row[{ "Ancho de la baldosa ⇒ a-b"}],  

tama - 5, azul, FontFamily → fuente]], 90 Degree], Show[  

Graphics[{EdgeForm[{grosor, Black}], FaceForm[RGBColor[0, 69 / 256,  

124 / 256, 0.2]], Rectangle[{0, 0}, {12.45 b, a - b // fcero}]},  

Graphics[{Black, Style[Text[b, {12.45 * b / 2, -10}]], tama - 6,  

FontFamily → fuente}, Style[Text[(a - b) // fcero, {-20,  

(12.45 (a - b) / 2) // fcero}], tama - 6, FontFamily → fuente}}],  

PlotRange → {{-40, 500}, {-30, 250}}, ImageSize → {340, 200}]],  

{, Item[Style[Row[{ "Largo de la baldosa ⇒ b"}],  

tama - 5, azul, FontFamily → fuente]]},  

Alignment → {Left, Bottom}]], Frame → All], {Automatic, Automatic}],  

Row[{Control @{{a, 5}, 2, 20, 0.5, Appearance → {"Labeled", "DownArrow"},  

ImageSize → 140}, " ", Control @{{b, 3}, 0, a,  

0.5, Appearance → {"Labeled", "DownArrow"}, ImageSize → 140}]],  

SaveDefinitions → True, Deployed → True}]
]

```

The interface shows two sliders at the top: one for dimension a set to 5, and one for dimension b set to 3. Below the sliders is a title "Modelo 2: Dimensiones de la baldosas". A text box contains the equation "Medidas $a=5$, $b=3$, $a-b=2$ (centímetros)". To the left, a vertical text box displays "Ancho de la baldosa $\Rightarrow a-b$ ". In the center, there is a diagram of a rectangle divided into two horizontal sections: a top section of height 2 and a bottom section of height 3. Below the diagram, the text "Largo de la baldosa $\Rightarrow b$ " is shown.

Modelos

```

DynamicModule[{grosor = Thickness[0.007], rojo = □,
azul = □, verde = RGBColor[206 / 256, 210 / 256, 27 / 256],
fuente = "Gabriola", tama = 30, fcero},
fcero[x_] := Which[x ≤ 0, 0, True, x];
Manipulate[Pane[
Grid[
{{Item[Style[Row[{"Medidas: a =", a // fcero, ",      a - b =", (a - b) // fcero}], tama - 7, azul, FontFamily → fuente], Alignment → Center],
..., Item[Style[Row[{"Medidas: b =", b1 // fcero, ",      a - b =", (a1 - b1) // fcero}], tama - 7, azul,
FontFamily → fuente], Alignment → Center], ...}],
{Rotate[Item[Style[Row[{"Ancho de la baldosa ⇒ a-b"}]], tama - 5, azul, FontFamily → fuente]], 90 Degree], Show[
Graphics[{EdgeForm[{grosor, Black}], FaceForm[RGBColor[0, 69 / 256, 124 / 256, 0.2]], Rectangle[{0, 0}, 10 {a, a - b // fcero}] }],
Graphics[{Black, Style[Text[a, {10 a / 2, -8}]], tama - 6,
FontFamily → fuente}, Style[Text[(a - b) // fcero, {-15, (10 (a - b) / 2) // fcero}], tama - 6, FontFamily → fuente}]],
PlotRange → {{-30, 210}, {-20, 210}}, ImageSize → {300, 250}],
Rotate[Item[Style[Row[{"Ancho de la baldosa ⇒ a-b"}]], tama - 5, azul, FontFamily → fuente]], 90 Degree]
]
]

```

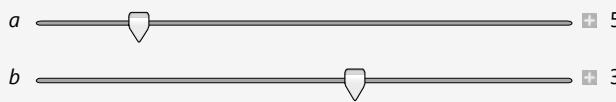
```

tama - 5, azul, FontFamily → fuente]], 90 Degree], Show[
Graphics[{EdgeForm[{grosor, Black}], FaceForm[RGBColor[0, 69 / 256,
124 / 256, 0.2]], Rectangle[{0, 0}, 10 {b1, a1 - b1 // fcero}]}]],
Graphics[{Black, Style[Text[b1, {10 b1 / 2, -8}], tama - 6,
FontFamily → fuente], Style[Text[(a1 - b1) // fcero,
{-15, (10 (a1 - b1) / 2) // fcero}], tama - 6, FontFamily → fuente]}]],
PlotRange → {{-30, 210}, {-20, 210}}, ImageSize → {300, 250}}}],
{, Item[Style[Row[{"Largo de la baldosa ⇒ a"}]], tama - 5, azul,
FontFamily → fuente]], , Item[Style[Row[{"Largo de la baldosa ⇒ b"}]],
tama - 5, azul, FontFamily → fuente]}]},
Alignment → {Left, Bottom}, Frame → All], {710, Automatic}],
Grid[{{Item[Style["Software de programación y diseño", tama,
Bold, azul, FontFamily → fuente], Alignment → Center], ...}, {
Column[{Item[Style["Modelo 1", tama, rojo, FontFamily → fuente],
Alignment → Center], Control @{{a, 5}, 2, 20, 0.5, Appearance →
{"Labeled", "DownArrow"}, ImageSize → 280}, Control @{{b, 3}, 0, a,
0.5, Appearance → {"Labeled", "DownArrow"}, ImageSize → 280}}]],
Column[{Item[Style["Modelo 2", tama, rojo, FontFamily → fuente],
Alignment → Center], Control @{{a1, 5, "a"}, 2, 20, 0.5, Appearance →
{"Labeled", "DownArrow"}, ImageSize → 280}, Control @{{b1, 3, "b"}, 0,
a1, 0.5, Appearance → {"Labeled", "DownArrow"}, ImageSize → 280}}]}
}}], SaveDefinitions → True, Deployed → True]]

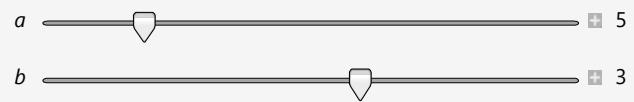
```

Software de programación y diseño

Modelo 1



Modelo 2



Medidas: $a = 5$, $a - b = 2$

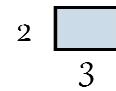
Medidas: $b = 3$, $a - b = 2$

Ancho de la baldosa $\Rightarrow a - b$



Largo de la baldosa $\Rightarrow a$

Ancho de la baldosa $\Rightarrow a - b$



Largo de la baldosa $\Rightarrow b$

» Modelo 1

```

DynamicModule[{grosor = Thickness[0.007], rojo = □,
  azul = □, verde = RGBColor[206 / 256, 210 / 256, 27 / 256],
  fuente = "Gabriola", tama = 30, fcero},
  fcero[x_] := Which[x ≤ 0, 0, True, x];
  Manipulate[Pane[
    Grid[{{Item[Style[
      Row[{ "Medidas: a =", a // fcero, ", a - b =", (a - b) // fcero}], 
      tama - 7, azul, FontFamily → fuente], Alignment → Center], ...}, 
    {Item[Style["Modelo 1", tama, rojo, FontFamily → fuente], 
      Alignment → Center], ...}, 
    {Rotate[Item[Style[Row[{ "Ancho de la baldosa ⇒ a-b"}], 
      tama - 5, azul, FontFamily → fuente]], 90 Degree], 
      Show[
        Graphics[{EdgeForm[{grosor, Black}], FaceForm[RGBColor[0, 69 / 256,
          124 / 256, 0.2]], Rectangle[{0, 0}, 10 {a, a - b // fcero}] }],
        Graphics[{Black, Style[Text[a, {10 a / 2, -8}], tama - 6,
          FontFamily → fuente], Style[Text[(a - b) // fcero,
            {-15, (10 (a - b) / 2) // fcero}], tama - 6, FontFamily → fuente]}], 
        PlotRange → {{-30, 270}, {-20, 270}}, ImageSize → {300, 250}]],
      {, Item[Style[Row[{ "Largo de la baldosa ⇒ a"}], 
        tama - 5, azul, FontFamily → fuente]]}, 
        Alignment → {Left, Bottom}, Frame → All], {Automatic, 350}],
    Grid[{{Item[Style["Software de programación y diseño", tama,
      Bold, azul, FontFamily → fuente], Alignment → Center], ...}, {
      Column[{Control @{{a, 5}, 2, 25, 0.5, Appearance →
        {"Labeled", "DownArrow"}, ImageSize → 280}, Control @{{b, 3}, 0, a,
        0.5, Appearance → {"Labeled", "DownArrow"}, ImageSize → 280}}]
    }}], SaveDefinitions → True, Deployed → True]]
  ]

```

Software de programación y diseño

a 5

b 3

| | |
|---|-------------------------------------|
| | Medidas: $a = 5$, $a - b = 2$ |
| | Modelo 1 |
| Ancho de la baldosa $\Rightarrow a - b$ | |
| | 2 5 |
| | Largo de la baldosa $\Rightarrow a$ |

» Modelo 2

```

DynamicModule[{grosor = Thickness[0.007], rojo = □,
  azul = □, verde = RGBColor[206 / 256, 210 / 256, 27 / 256],
  fuente = "Gabriola", tama = 30, fcero},
  fcero[x_] := Which[x ≤ 0, 0, True, x];
  Manipulate[Pane[
    Grid[{{Item[Style[Row[
      {"Medidas: b =", b1 // fcero, ", a - b =", (a1 - b1) // fcero}],
      tama - 7, azul, FontFamily → fuente], Alignment → Center], ...},
      {Item[Style["Modelo 2", tama, rojo, FontFamily → fuente],
        Alignment → Center], ...},
      {Rotate[Item[Style[Row[{"Ancho de la baldosa ⇒ a-b"}],
        tama - 5, azul, FontFamily → fuente]], 90 Degree], Show[
        Graphics[{EdgeForm[{grosor, Black}], FaceForm[RGBColor[0, 69 / 256,
          124 / 256, 0.2]], Rectangle[{0, 0}, 10 {b1, a1 - b1 // fcero}]}],
        Graphics[{Black, Style[Text[b1, {10 b1 / 2, -8}], tama - 6,
          FontFamily → fuente], Style[Text[(a1 - b1) // fcero,
            {-15, (10 (a1 - b1) / 2) // fcero}], tama - 6, FontFamily → fuente]}],
        PlotRange → {{-30, 210}, {-20, 210}}, ImageSize → {300, 250}]}}},
    {, Item[Style[Row[{"Largo de la baldosa ⇒ b"}],
      tama - 5, azul, FontFamily → fuente]]}},
    Alignment → {Left, Bottom}, Frame → All], {Automatic, 350}],
  Grid[{{Item[Style["Software de programación y diseño", tama,
    Bold, azul, FontFamily → fuente], Alignment → Center], ...},
    Column[{Control @{{a1, 5, "a"}, 2, 20, 0.5, Appearance →
      {"Labeled", "DownArrow"}, ImageSize → 280}, Control @{{b1, 3, "b"}, 0,
      a1, 0.5, Appearance → {"Labeled", "DownArrow"}, ImageSize → 280}]}
  }]], SaveDefinitions → True, Deployed → True]]

```

Software de programación y diseño

Medidas: $b = 3$, $a - b = 2$

Modelo 2

| | |
|---|--|
| Ancho de la baldosa $\Rightarrow a - b$ | |
| | |
| Largo de la baldosa $\Rightarrow b$ | |

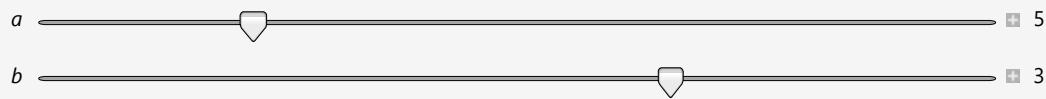
» Modelo 3

```

DynamicModule[{grosor = Thickness[0.007],
  rojo = ■, azul = ■, fuente = "Gabriola", tama = 30, fcero},
  fcero[x_] := Which[x ≤ 0, 0, True, x];
Manipulate[Pane[
  Grid[{{Style[Row[{"
    Medidas      a =", a // fcero,
    ",      b =", b // fcero, ",      a - b =", (a - b) // fcero}],
    tama - 4, azul, FontFamily → fuente], SpanFromLeft},
  {Item[Style["Modelo 3", tama, rojo, FontFamily → fuente],
    Alignment → Center], …},
  {Rotate[Item[Style[Row[{ "Ancho de la baldosa ⇒ a-b"}],
    tama - 5, azul, FontFamily → fuente]], 90 Degree]},
  Show[
    Graphics[{EdgeForm[], FaceForm[RGBColor[0, 69 / 256, 124 / 256, 0.2]],
      Rectangle[{0, 0}, 12.45 * {a, (a - b) // fcero}], Red,
      Rectangle[{12.45 * a, 0}, {12.45 * a, 0} + 12.45 * {b, (a - b) // fcero}],
      EdgeForm[{grosor, Black}], FaceForm[],
      Rectangle[{0, 0}, {12.45 * a, 0} + 12.45 * {b, (a - b) // fcero}] }],
    Graphics[Black, Style[Text[a, {12.45 * a / 2, -6}], azul, tama - 6,
      FontFamily → fuente], Style[Text[b, {12.45 * (2 a + b) / 2, -6}], rojo,
      tama - 6, FontFamily → fuente], Style[Text[(a - b) // fcero, {-20,
        (12.45 (a - b) / 2) // fcero}], tama - 6, FontFamily → fuente}}],
    PlotRange → {{-35, 500}, {-20, 250}}, ImageSize → {550, 250}] },
  {, Item[Style[Row[{ "Largo de la baldosa ⇒ a + b"}],
    tama - 5, azul, FontFamily → fuente]}],
  Alignment → {Left, Bottom}, Frame → All], {Automatic, Automatic}],
  Grid[{{Item[Style["Software de programación y diseño", tama,
    Bold, azul, FontFamily → fuente], Alignment → Center]}},
  {Column[{
    Control @{{a, 5}, 1, 20, 0.5,
      Appearance → {"Labeled", "DownArrow"}, ImageSize → 500},
    Control @{{b, 3}, 0, a - 0.5, 0.5, Appearance →
      {"Labeled", "DownArrow"}, ImageSize → 500}]}]}],
  Alignment → Center], SaveDefinitions → True, Deployed → True]]]

```

Software de programación y diseño



Medidas $a = 5$, $b = 3$, $a - b = 2$

Modelo 3

Ancho de la baldosa $\Rightarrow a - b$



Largo de la baldosa $\Rightarrow a + b$

» Modelo 4

```

DynamicModule[{grosor = Thickness[0.007],
  rojo = ■, azul = ■, fuente = "Gabriola", tama = 30, fcero},
  fcero[x_] := Which[x ≤ 0, 0, True, x];
Manipulate[Pane[
  Grid[
    {{Style[Row[{"
      Medidas      a =", a // fcero, ",      b =", b // fcero,
      ",      a - b =", (a - b) // fcero, "      (centímetros)"}],],
     tama - 4, azul, FontFamily → fuente], SpanFromLeft},
    {Item[Style["Modelo 3", tama, rojo, FontFamily → fuente],
      Alignment → Center], …},
    {Rotate[Item[Style[Row[{ "Ancho de la baldosa ⇒ a-b"}], tama - 5, azul, FontFamily → fuente]], 90 Degree],
      Show[
        Graphics[{EdgeForm[], FaceForm[RGBColor[0, 69 / 256, 124 / 256, 0.2]],
          Rectangle[{0, 0}, 12.45 * {a, (a - b) // fcero}], Red,
          Rectangle[{12.45 * a, 0}, {12.45 * a, 0} + 12.45 * {b, (a - b) // fcero}],
          EdgeForm[{grosor, Black}], FaceForm[],
          Rectangle[{0, 0}, {12.45 * a, 0} + 12.45 * {b, (a - b) // fcero}] }],
        Graphics[{Black, Style[Text[a, {12.45 * a / 2, -10}], azul, tama - 6,
          FontFamily → fuente], Style[Text[b, {12.45 * (2 a + b) / 2, -10}], rojo,
          tama - 6, FontFamily → fuente], Style[Text[(a - b) // fcero, {-20,
            (12.45 (a - b) / 2) // fcero}], tama - 6, FontFamily → fuente]}],
        PlotRange → {{-35, 500}, {-20, 250}}, ImageSize → {550, 250}] },
        , Item[Style[Row[{ "Largo de la baldosa ⇒ a + b"}], tama - 5, azul, FontFamily → fuente]]}],
      Alignment → {Left, Bottom}, Frame → All], {Automatic, Automatic}],
  Grid[{{Item[Style["Software de programación y diseño", tama,
    Bold, azul, FontFamily → fuente], Alignment → Center]}},
  {Column[{
    Control @{{a, 5}, 1, 20, 0.5,
      Appearance → {"Labeled", "DownArrow"}, ImageSize → 500},
    Control @{{b, 3}, 0, a - 0.5, 0.5, Appearance →
      {"Labeled", "DownArrow"}, ImageSize → 500}]}]}],
  Alignment → Center], SaveDefinitions → True, Deployed → True]]

```

+

Software de programación y diseño

Ancho de la baldosa $\Rightarrow a - b$

Medidas $a = 5, b = 3, a - b = 2$ (centímetros)

Modelo 3

Largo de la baldosa $\Rightarrow a + b$

» Modelo 5

Recubrimiento

```

DynamicModule[{grosor = Thickness[0.007],
  rojo = ■, azul = ■, fuente = "Gabriola", tama = 30, fcero, n},
  fcero[x_] := Which[x ≤ 0, 0, True, x];
  n[a_, x_] :=  $\frac{a}{x}$ ;
  Manipulate[Pane[
    Column[{Which[
      m1 == 1, Item[Style[Row[{ "Las medidas de la baldosa son: largo (a) =",
        a // fcero, ", ancho (a - b) =", (a - b) // fcero}], tama - 7, azul, FontFamily → fuente], Alignment → Center],
      m1 == 2, Item[Style[Row[{ "Las medidas de la baldosa son: largo (b) =",
        b // fcero, ", ancho (a - b) =", (a - b) // fcero}], tama - 7, azul, FontFamily → fuente], Alignment → Center],
      True, Item[Style[Row[{ "Medidas"}]], tama - 7, azul, FontFamily → fuente]], Alignment → Center]}],

```

```

Show[
Graphics[],

Which[
m1 == 1, Graphics[
{{Black, Style[Text[a, 25 {a/2, -1}], tama - 6, FontFamily → fuente],
Style[Text[(a - b) // fcero, 25 {-1, (a - b)/2 // fcero}],
tama - 6, FontFamily → fuente]}, , Opacity@0.3, FaceForm[Red],
EdgeForm[Dashed], Rectangle[{0, 0}, 25 {a, (a - b) // fcero}]}],
m1 == 2, Graphics[{{Black, Style[Text[b, 25 {b/2, -1}], tama - 6,
FontFamily → fuente], Style[Text[(a - b) // fcero,
25 {-1, (a - b)/2 // fcero}], tama - 6, FontFamily → fuente]}, ,
Opacity@0.3, FaceForm[Red], EdgeForm[Dashed],
Rectangle[{0, 0}, 25 {b, (a - b) // fcero}]}],
True, Graphics[]],
PlotRange → {25 {-1.5, 35.2}, 25 {-1.5, 10.2}},
AspectRatio → Automatic, ImageSize → Full]],

Show[
Graphics[{EdgeForm[{grosor, azul}],
FaceForm[LightGreen], Rectangle[{0, 0}, 25 {35, 10}]}],
Graphics[{Black, Style[Text[35, 25 {35/2, -1}],
tama - 6, FontFamily → fuente],
Style[Text[10, 25 {-1, 5}], tama - 6, FontFamily → fuente]}]],
Which[
m1 == 1 && (a - b // fcero) ≠ 0,
Graphics[{Opacity@0.3, FaceForm[Red], EdgeForm[Dashed],
Flatten[Table[Table[Rectangle[25 {a i, j (a - b) // fcero },
25 {a (i + 1), (j + 1) (a - b) // fcero }],
{i, 0, Floor[35/a] - 1}], {j, 0, Floor[10/(a - b)] - 1}]]}],
m1 == 2 && (a - b // fcero) ≠ 0 && b ≠ 0, Graphics[
{Opacity@0.3, FaceForm[Red], EdgeForm[Dashed],
Flatten[Table[Table[Rectangle[25 {b i, j (a - b) // fcero },
25 {b (i + 1), (j + 1) (a - b) // fcero }],
{i, 0, Floor[35/b] - 1}], {j, 0, Floor[10/(a - b)] - 1}]]}],
True, Graphics[]],
PlotRange → {25 {-1.5, 35.2}, 25 {-1.5, 10.2}},
AspectRatio → Automatic, ImageSize → Full]], {710, 500}],
Grid[{{Item[Style["Modelo baldosa",
tama, rojo, FontFamily → fuente], Alignment → Center],

```

```

Item[Style[Row[{"Medidas"}], tama - 7, azul, FontFamily → fuente],
 Alignment → Center}],
{Control@{{m1, 1, ""}, {1 -> "modelo 1", 2 -> "modelo 2"}}, 
Column[{ 
 Control @{{a, 5}, 1, 35, 0.5,
 Appearance → {"Labeled", "DownArrow"}, ImageSize → 500},
 Control @{{b, 3}, 0, a - 0.5, 0.5, Appearance → {"Labeled", "DownArrow"}, 
 ImageSize → 500}}]}], Alignment → Center]
, SaveDefinitions → True, Deployed → True]

```

Modelo baldosa

Medidas

Las medidas de la baldosa son: largo (a) = 5., ancho ($a - b$) = 1.

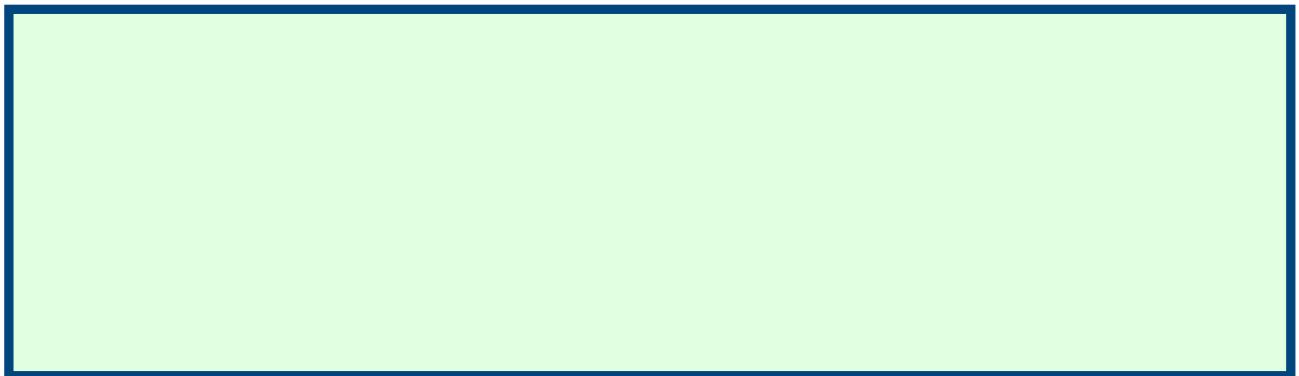
1.

5.

10

35

```
{grosor = Thickness[0.007], rojo = ■,  
azul = ■, fuente = "Gabriola", tama = 30, fcero, n};  
Show[  
Graphics[{EdgeForm[{grosor, azul}],  
FaceForm[LightGreen], Rectangle[{0, 0}, 25 {35, 10}]}],  
Graphics[{Black, Style[Text[35, 25 {35 / 2, -0.5}],  
tama - 6, FontFamily → fuente],  
Style[Text[10, 25 {-1, 5}], tama - 6, FontFamily → fuente]}],  
PlotRange → {25 {-1.5, 35.2}, 25 {-1.5, 10.2}},  
AspectRatio → Automatic, ImageSize → {700, Automatic}]
```



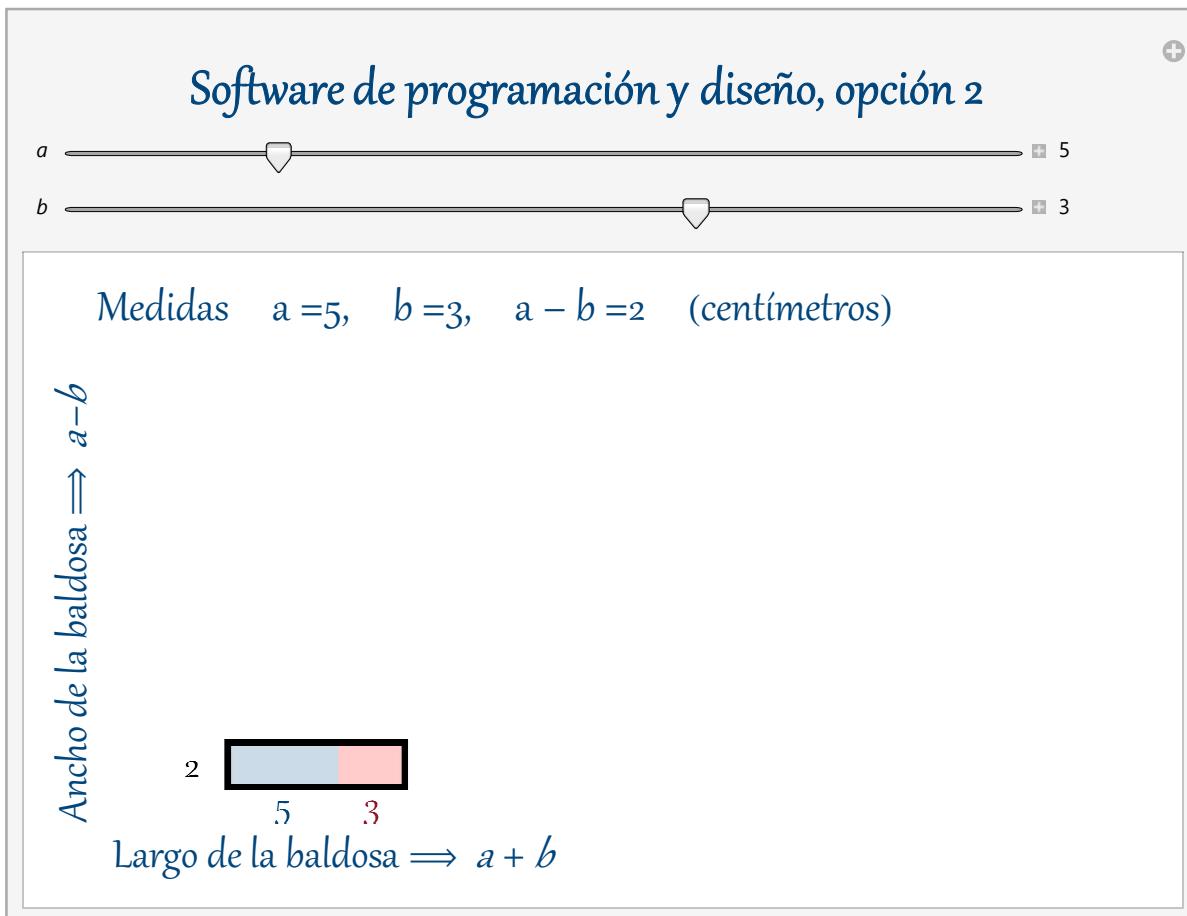
35

Baldosa opción 2

```

DynamicModule[{grosor = Thickness[0.007],
  rojo = ■, azul = ■, fuente = "Gabriola", tama = 30, fcero},
  fcero[x_] := Which[x ≤ 0, 0, True, x];
Manipulate[Pane[
  Grid[
    {{Style[Row[{"
      Medidas      a =", a // fcero, ",      b =", b // fcero,
      ",      a - b =", (a - b) // fcero, "      (centímetros)"}]],
      tama - 4, azul, FontFamily → fuente], SpanFromLeft},
    {Rotate[Item[Style[Row[{ "Ancho de la baldosa ⇒ a-b"}]],
      tama - 5, azul, FontFamily → fuente]], 90 Degree}],
  Show[
    Graphics[{EdgeForm[], FaceForm[RGBColor[0, 69 / 256, 124 / 256, 0.2]],
      Rectangle[{0, 0}, 12.45 * {a, (a - b) // fcero}], Red,
      Rectangle[{12.45 * a, 0}, {12.45 * a, 0} + 12.45 * {b, (a - b) // fcero}],
      EdgeForm[{grosor, Black}], FaceForm[],
      Rectangle[{0, 0}, {12.45 * a, 0} + 12.45 * {b, (a - b) // fcero}] }],
    Graphics[{Black, Style[Text[a, {12.45 * a / 2, -10}], azul, tama - 6,
      FontFamily → fuente], Style[Text[b, {12.45 * (2 a + b) / 2, -10}], rojo,
      tama - 6, FontFamily → fuente], Style[Text[(a - b) // fcero, {-20,
        (12.45 (a - b) / 2) // fcero}], tama - 6, FontFamily → fuente]}],
    PlotRange → {{-35, 500}, {-20, 250}}, ImageSize → {550, 250}}},
    {, Item[Style[Row[{ "Largo de la baldosa ⇒ a + b"}]],
      tama - 5, azul, FontFamily → fuente]}], Alignment → {Left, Bottom}], {570, 310}],
Grid[{{Item[Style["Software de programación y diseño, opción 2",
  tama, Bold, azul, FontFamily → fuente], Alignment → Center]}},
{Column[{
  Control @{{a, 5}, 1, 20, 0.5,
    Appearance → {"Labeled", "DownArrow"}, ImageSize → 500},
  Control @{{b, 3}, 0, a - 0.5, 0.5, Appearance →
    {"Labeled", "DownArrow"}, ImageSize → 500}}]}], Alignment → Center], SaveDefinitions → True, Deployed → True]]

```



Trinomio cuadrado

```

DynamicModule[{grosor = Thickness[0.007], rojo = ■, azul = ■,
  fuente = "Gabriola", tama = 30, fig1, fig21, fig22, fig31, fig32, fig4},
  fig1 = Graphics[{Green, EdgeForm[{Black}], Rectangle[{0, 0}, {1, 1}]},
    ImageSize → 22];
  fig21 = Graphics[{RGBColor[0.01, 0.33, 0.], EdgeForm[{Black}],
    Rectangle[{0, 0}, {1, 2}]}, ImageSize → 22];
  fig22 = Graphics[{RGBColor[0.01, 0.33, 0.], EdgeForm[{Black}],
    Rectangle[{0, 0}, {1.9, 1}]}, ImageSize → 44];
  fig31 = Graphics[{Orange, EdgeForm[{Black}], Rectangle[{0, 0}, {1, 6.2}]},
    ImageSize → 22];
  fig32 = Graphics[{Orange, EdgeForm[{Black}], Rectangle[{0, 0}, {6, 1}]},
    ImageSize → 130];
  fig4 = Graphics[{Yellow, EdgeForm[{Black}], Rectangle[{0, 0}, {1, 1}]},
    ImageSize → 130];
  Manipulate[
    Pane[
      Show[

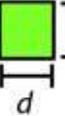
```

```

Graphics[ {EdgeForm[{grosor, azul}], Opacity@0,
  FaceForm[White], Rectangle[{0, 0}, {100 {5.5, 7}}]}, ,
Which[
  m1 == 1,
  Graphics[{Opacity@0.5, EdgeForm[{grosor, azul}],
    FaceForm[LightGreen], Rectangle[{0, 0}, {175, 175}],
    Table[Line[{{i, 0}, {i, 175}}], {i, 1, 175, 25}],
    Table[Line[{{0, j}, {150, j}}], {j, 1, 150, 25}]}],
  m1 == 2, Graphics[{Opacity@0.5, EdgeForm[{grosor, azul}],
    FaceForm[LightGreen], Rectangle[{0, 0}, {350, 625}],
    Table[Line[{{i, 0}, {i, 625}}], {i, 1, 350, 25}],
    Table[Line[{{0, j}, {350, j}}], {j, 1, 625, 25}]}],
  m1 == 3, Graphics[{Opacity@0.5, EdgeForm[{grosor, azul}],
    FaceForm[LightGreen], Rectangle[{0, 0}, {200, 700}],
    Table[Line[{{i, 0}, {i, 700}}], {i, 1, 200, 25}],
    Table[Line[{{0, j}, {200, j}}], {j, 1, 700, 25}]}]],
If[a > 0,
  Graphics[Table[Locator[{380, 600}, fig1], {i, 1, a}]],
  Graphics[]],
If[b1 > 0,
  Graphics[Table[Locator[{380, 550}, fig21], {i, 1, b1}]],
  Graphics[]],
If[b2 > 0,
  Graphics[Table[Locator[{390, 500}, fig22], {i, 1, b2}]],
  Graphics[]],
If[c1 > 0,
  Graphics[Table[Locator[{450, 550}, fig31], {i, 1, c1}]],
  Graphics[]],
If[c2 > 0,
  Graphics[Table[Locator[{450, 450}, fig32], {i, 1, c2}]],
  Graphics[]],
If[d > 0,
  Graphics[Table[Locator[{450, 350}, fig4], {i, 1, d}]],
  Graphics[]],
ImageSize -> {500, 600}
], ImageSize -> {500, 600}],
Grid[{{Item[Style["Tipo de baldosa", tama, rojo, FontFamily -> fuente],
  Alignment -> Center], ... , ... },

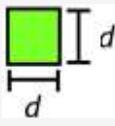
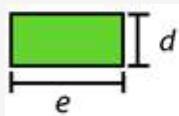
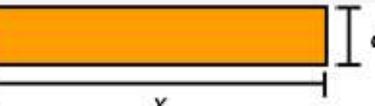
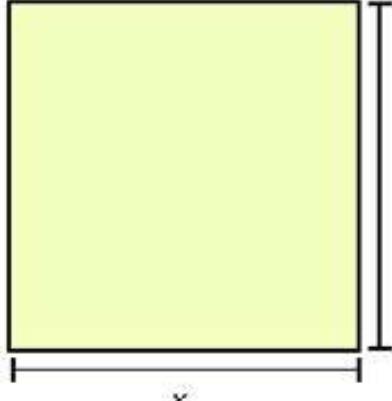
```

```

{Item[Style["Tipo 1", 26, azul, FontFamily → fuente]],
 Control @{{a, 2, ""}, 0, 20, 1, ControlType → PopupMenu}, ...},
 {Image[, ImageSize → {Automatic, 60}], ..., ...},
 {Item[Style["Tipo 2", 26, azul, FontFamily → fuente]],
 Control @{{b1, 6, "hori."}, 0, 10, 1, ControlType → PopupMenu},
 Control @{{b2, 6, "vert."}, 0, 10, 1, ControlType → PopupMenu}, },
 {Image[, ImageSize → {Automatic, 60}], ..., ...},
 {Item[Style["Tipo 3", 26, azul, FontFamily → fuente]],
 Control @{{c1, 6, "hori."}, 0, 10, 1, ControlType → PopupMenu},
 Control @{{c2, 6, "vert."}, 0, 5, 1, ControlType → PopupMenu}, },
 {Image[, ImageSize → {Automatic, 60}], ..., ...},
 {Item[Style["Tipo 4", 26, azul, FontFamily → fuente]],
 Control @{{d, 6, ""}, 0, 5, 1, ControlType → PopupMenu}, ...},
 {Image[, ImageSize → {Automatic, 220}], ..., ...},
 {Control @{{m1, 2, ""}, {1 -> " Región 1 ", 2 -> " Región 2 ",
 3 -> " Región 3 "}, Appearance → "Row"}, ..., ...}],
 Dividers → {False, {False, True, False, True, False,
 True, False, True, False, True}}, Alignment → {{Center, Right, Right}}}],
 ControlPlacement → Left, SaveDefinitions → True, Deployed → True]]

```

Tipo de baldosa

| | |
|--|---|
| Tipo 1  <input type="button" value="2"/> <input type="button" value="▼"/> | <input type="button" value="2"/> <input type="button" value="▼"/> |
| Tipo 2 hori. <input type="button" value="6"/> <input type="button" value="▼"/> vert. <input type="button" value="6"/> <input type="button" value="▼"/>  | |
| Tipo 3 hori. <input type="button" value="6"/> <input type="button" value="▼"/> vert. <input type="button" value="6"/> <input type="button" value="▼"/>  | |
| Tipo 4  | |
| <input type="button" value="Región 1"/> <input type="button" value="Región 2"/> <input type="button" value="Región 3"/> | |

Deploy@DynamicModule[

```

{grosor = Thickness[0.007], rojo = ■, azul = ■, fuente = "Gabriola", tama = 30,
fig1, fig21, fig22, fig31, fig32, fig4, figu1, figu2, figu3, figu4},
fig1 = Graphics[
{Green, EdgeForm[{Black}], Rectangle[{0, 0}, {1, 1}]], ImageSize → 22];
fig21 = Graphics[{RGBColor[0.01, 0.33, 0.], EdgeForm[{Black}],
Rectangle[{0, 0}, {1, 2}]], ImageSize → 22};
fig22 = Graphics[{RGBColor[0.01, 0.33, 0.], EdgeForm[{Black}],
Rectangle[{0, 0}, {1.9, 1}]], ImageSize → 44];
fig31 = Graphics[{Orange, EdgeForm[{Black}], Rectangle[{0, 0}, {1, 6.2}]], 
ImageSize → 22];

```

```

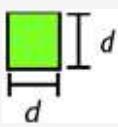
fig32 = Graphics[{Orange, EdgeForm[{Black}], Rectangle[{0, 0}, {6, 1}]},
  ImageSize → 130];
fig4 = Graphics[{Yellow, EdgeForm[{Black}], Rectangle[{0, 0}, {1, 1}]},
  ImageSize → 130];
Manipulate[
  Pane[
    Show[
      Graphics[{EdgeForm[{grosor, azul}], Opacity@0,
        FaceForm[White], Rectangle[{0, 0}, 100 {5.5, 7}]}],
      Which[
        m1 == 1,
        Graphics[{Opacity@0.5, EdgeForm[{grosor, azul}],
          FaceForm[LightGreen], Rectangle[{0, 0}, {175, 175}],
          Table[Line[{{i, 0}, {i, 175}}], {i, 1, 175, 25}],
          Table[Line[{{0, j}, {175, j}}], {j, 1, 175, 25}]}],
        m1 == 2, Graphics[{Opacity@0.5, EdgeForm[{grosor, azul}],
          FaceForm[LightGreen], Rectangle[{0, 0}, {350, 625}],
          Table[Line[{{i, 0}, {i, 625}}], {i, 1, 350, 25}],
          Table[Line[{{0, j}, {350, j}}], {j, 1, 625, 25}]}],
        m1 == 3, Graphics[{Opacity@0.5, EdgeForm[{grosor, azul}],
          FaceForm[LightGreen], Rectangle[{0, 0}, {200, 700}],
          Table[Line[{{i, 0}, {i, 700}}], {i, 1, 200, 25}],
          Table[Line[{{0, j}, {200, j}}], {j, 1, 700, 25}]}]],
        Graphics[Table[Locator[{380, 600}, fig1], {i, 1, 20}]],
        Graphics[Table[Locator[{380, 550}, fig21], {i, 1, 15}]],
        Graphics[Table[Locator[{390, 500}, fig22], {i, 1, 15}]],
        Graphics[Table[Locator[{450, 550}, fig31], {i, 1, 10}]],
        Graphics[Table[Locator[{450, 450}, fig32], {i, 1, 10}]],
        Graphics[Table[Locator[{450, 350}, fig4], {i, 1, 10}]],
        ImageSize → {500, 600}
      ], ImageSize → {500, 600}],
      Grid[{{Item[Style["Tipo de baldosa",
        tama, rojo, FontFamily → fuente], Alignment → Center]},
        {Item[Style["Tipo 1", 26, azul, FontFamily → fuente]]},
        {Image[ d, ImageSize → {Automatic, 60}]}],
        {Item[Style["Tipo 2", 26, azul, FontFamily → fuente]]}}
      ]
    ]
  ]
]

```

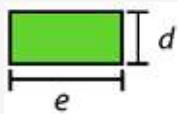
```
{Image[, ImageSize -> {Automatic, 60}],  
{Item[Style["Tipo 3", 26, azul, FontFamily -> fuente]]},  
{Image[, ImageSize -> {Automatic, 60}]},  
{Item[Style["Tipo 4", 26, azul, FontFamily -> fuente]]},  
{Image[, ImageSize -> {Automatic, 220}]},  
{Control@{{m1, 2, ""}, {1 -> " Región 1 ", 2 -> " Región 2 ",  
3 -> " Región 3 "}, Appearance -> "Row"}, ..., ...}],  
Dividers -> {False, {False, True, False, True, False, True,  
False, True, False, True, True}}],  
ControlPlacement -> Left, SaveDefinitions -> True]}]
```

Tipo de baldosa

Tipos 1



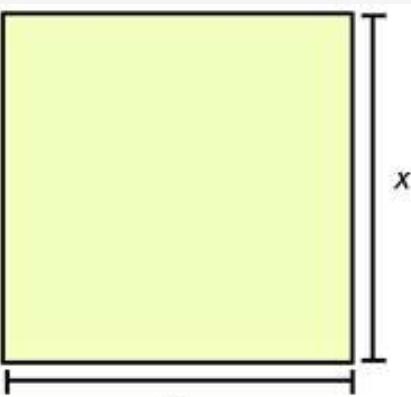
Tipos 2



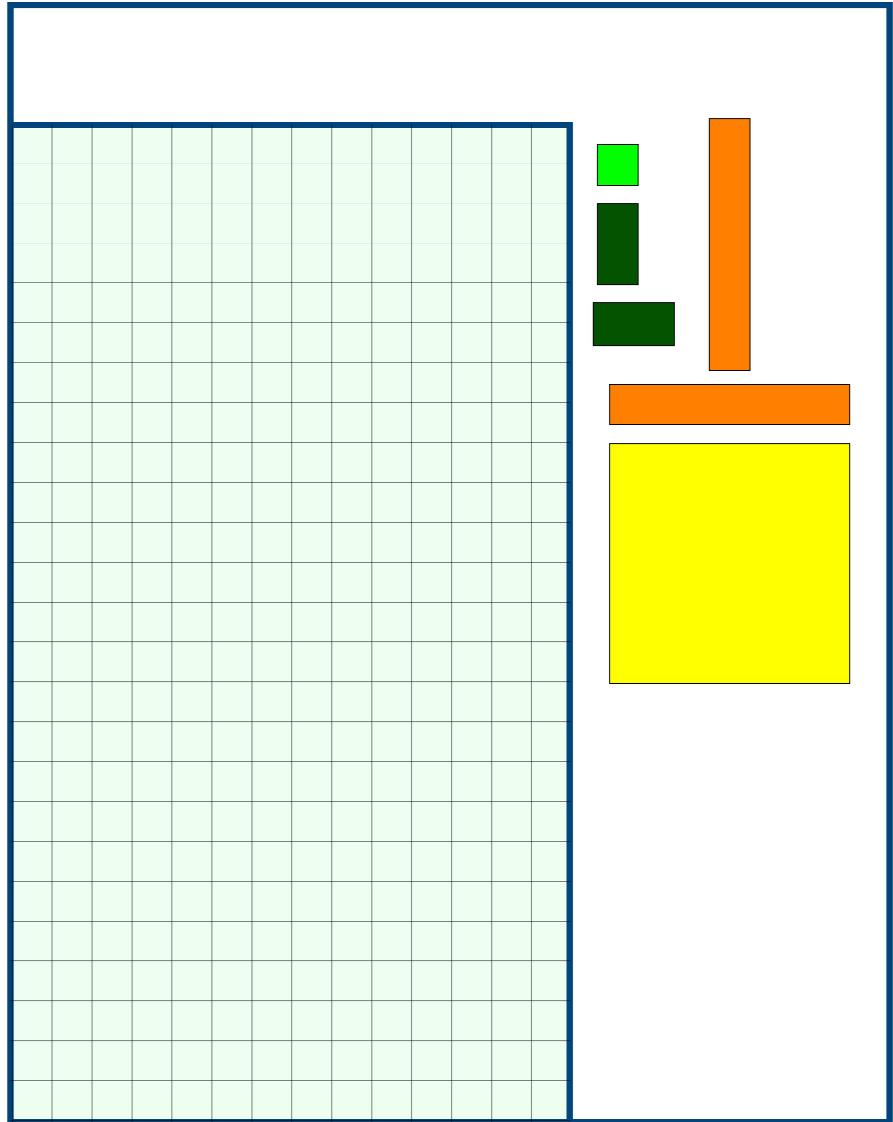
Tipos 3



Tipos 4



Región 1 Región 2 Región 3



Deploy@DynamicModule[

```
{grosor = Thickness[0.007], rojo = ■, azul = ■, fuente = "Gabriola", tama = 30,
fig1, fig21, fig22, fig31, fig32, fig4, figu1, figu2, figu3, figu4, m1 = 2},
fig1 = Graphics[
{Green, EdgeForm[{Black}], Rectangle[{0, 0}, {1, 1}]], ImageSize → 22];
fig21 = Graphics[{RGBColor[0.01, 0.33, 0.], EdgeForm[{Black}],
Rectangle[{0, 0}, {1, 2}]], ImageSize → 22};
fig22 = Graphics[{RGBColor[0.01, 0.33, 0.], EdgeForm[{Black}],
Rectangle[{0, 0}, {1.9, 1}]], ImageSize → 44];
fig31 = Graphics[{Orange, EdgeForm[{Black}], Rectangle[{0, 0}, {1, 6.2}]],
ImageSize → 22];
fig32 = Graphics[{Orange, EdgeForm[{Black}], Rectangle[{0, 0}, {6, 1}]}],
```

```

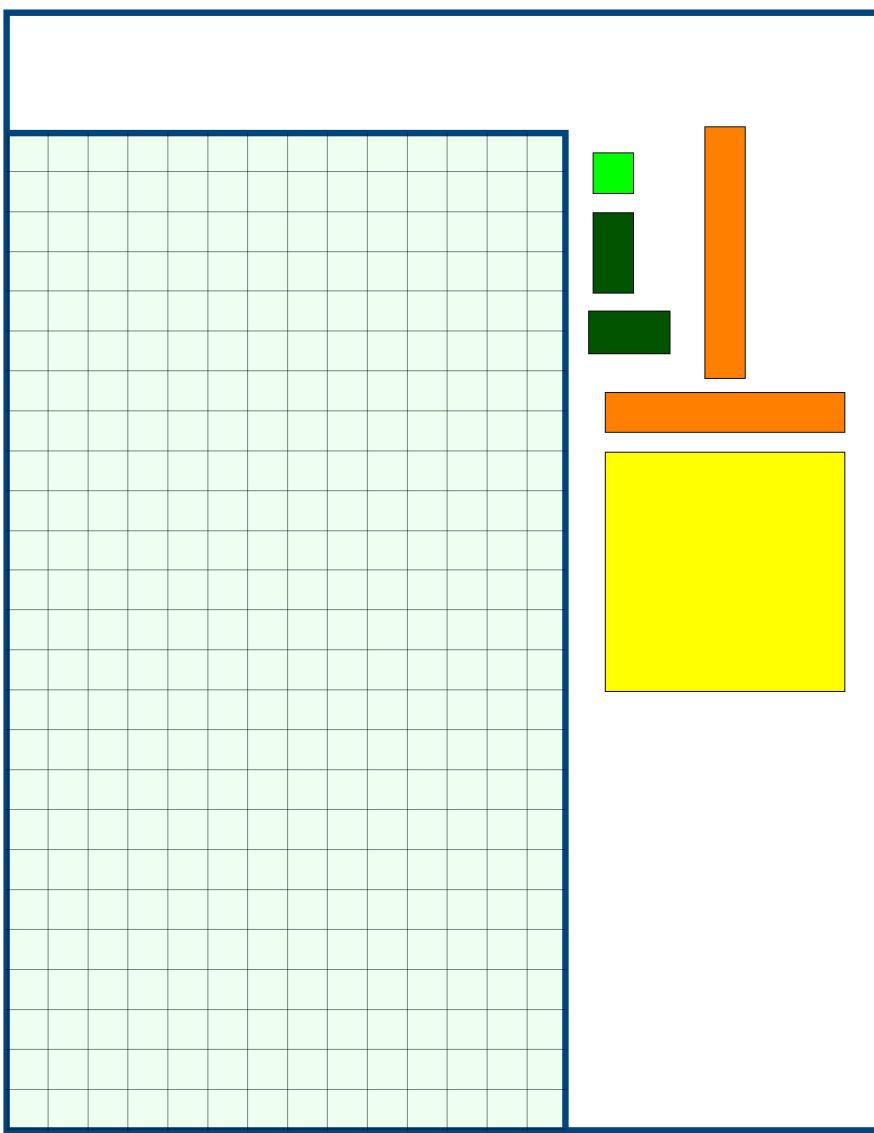
ImageSize → 130];
fig4 = Graphics[{Yellow, EdgeForm[{Black}], Rectangle[{0, 0}, {1, 1}]}],
ImageSize → 130];
Row[{{Pane[
Dynamic@Show[
Graphics[{EdgeForm[{grosor, azul}], Opacity@0,
FaceForm[White], Rectangle[{0, 0}, 100 {5.5, 7}]}],
Which[
m1 == 1,
Graphics[{Opacity@0.5, EdgeForm[{grosor, azul}],
FaceForm[LightGreen], Rectangle[{0, 0}, {175, 175}],
Table[Line[{{i, 0}, {i, 175}}], {i, 1, 175, 25}],
Table[Line[{{0, j}, {175, j}}], {j, 1, 175, 25}]}],
m1 == 2, Graphics[{Opacity@0.5, EdgeForm[{grosor, azul}],
FaceForm[LightGreen], Rectangle[{0, 0}, {350, 625}],
Table[Line[{{i, 0}, {i, 625}}], {i, 1, 350, 25}],
Table[Line[{{0, j}, {350, j}}], {j, 1, 625, 25}]}],
m1 == 3, Graphics[{Opacity@0.5, EdgeForm[{grosor, azul}],
FaceForm[LightGreen], Rectangle[{0, 0}, {200, 700}],
Table[Line[{{i, 0}, {i, 700}}], {i, 1, 200, 25}],
Table[Line[{{0, j}, {200, j}}], {j, 1, 700, 25}]}]],
Graphics[Table[Locator[{380, 600}, fig1], {i, 1, 20}]],
Graphics[Table[Locator[{380, 550}, fig21], {i, 1, 15}]],
Graphics[Table[Locator[{390, 500}, fig22], {i, 1, 15}]],
Graphics[Table[Locator[{450, 550}, fig31], {i, 1, 10}]],
Graphics[Table[Locator[{450, 450}, fig32], {i, 1, 10}]],
Graphics[Table[Locator[{450, 350}, fig4], {i, 1, 10}]],
ImageSize → {500, 600}
], ImageSize → {500, 600}],
Grid[{{Item[Style["Tipo de baldosa",
tama, rojo, FontFamily → fuente], Alignment → Center]},
{Item[Style["Tipo 1", 26, azul, FontFamily → fuente]]},
{Image[, ImageSize → {Automatic, 60}]},
{Item[Style["Tipo 2", 26, azul, FontFamily → fuente]]},
{Image[, ImageSize → {Automatic, 60}]}}
]

```

```

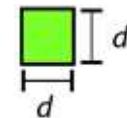
{Item[Style["Tipo 3", 26, azul, FontFamily → fuente]]},
{Image[, ImageSize → {Automatic, 60}]},
{Item[Style["Tipo 4", 26, azul, FontFamily → fuente]]},
{Image[, ImageSize → {Automatic, 220}]},
{SetterBar[Dynamic[m1],
{1 → " Región 1 ", 2 → " Región 2 ", 3 → " Región 3 "}]}},
(*{Control@{{m1,2,""},{1->" Región 1 ",2-> " Región 2 ",
3->" Región 3 "},Appearance→"Row"},...,...}},{*})
Dividers → {False, {False, True, False, True, False, True,
False, True, False, True, True}}]}}

```

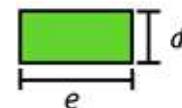


Tipo de baldosa

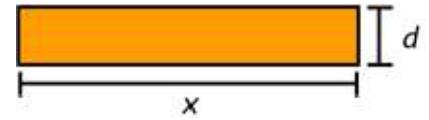
Tipo 1



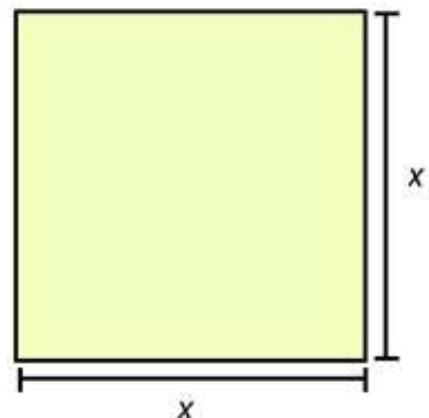
Tipo 2



Tipo 3



Tipo 4



| | | |
|----------|----------|----------|
| Región 1 | Región 2 | Región 3 |
|----------|----------|----------|

Problema

```
Deploy@Style[Grid[{{Style["Factor", "Text"],
  Style["Factor", "Text"], Style["Multiplicación", "Text"]},
 {"(5x - 2d) = 2", "(x + e) = 15", "(5x - 2d)(x + e) = 2×15 = 30"}, 
 {"(5x - 2d) = 15", "(x + e) = 2", "(5x - 2d)(x + e) = 15×2 = 30"}, 
 {"(5x - 2d) = 6", "(x + e) = 5", "(5x - 2d)(x + e) = 6×5 = 30"}, 
 {"(5x - 2d) = 5", "(x + e) = 6", "(5x - 2d)(x + e) = 5×6 = 30"}, 
 {"(5x - 2d) = 30", "(x + e) = 1", "(5x - 2d)(x + e) = 30×1 = 30"}, 
 {"(5x - 2d) = 1", "(x + e) = 30", "(5x - 2d)(x + e) = 1×30 = 30"}], Alignment → Left, Frame → All]]
```

| Factor | Factor | Multiplicación |
|------------------|----------------|---------------------------------------|
| $(5x - 2d) = 2$ | $(x + e) = 15$ | $(5x - 2d)(x + e) = 2 \times 15 = 30$ |
| $(5x - 2d) = 15$ | $(x + e) = 2$ | $(5x - 2d)(x + e) = 15 \times 2 = 30$ |
| $(5x - 2d) = 6$ | $(x + e) = 5$ | $(5x - 2d)(x + e) = 6 \times 5 = 30$ |
| $(5x - 2d) = 5$ | $(x + e) = 6$ | $(5x - 2d)(x + e) = 5 \times 6 = 30$ |
| $(5x - 2d) = 30$ | $(x + e) = 1$ | $(5x - 2d)(x + e) = 30 \times 1 = 30$ |
| $(5x - 2d) = 1$ | $(x + e) = 30$ | $(5x - 2d)(x + e) = 1 \times 30 = 30$ |

```
Deploy@Style[Grid[{{Style["Factor", "Text"],
  Style["Factor", "Text"], Style["Multiplicación", "Text"]},
 {"(5x - 2d) = 2", "(x + e) = 15", "(5x - 2d)(x + e) = 2 15 = 30"}], Alignment → Left, Frame → All]]
```

1. Expresiones algebraicas

1.1 Trabajando con expresiones

Situación: Fábrica de pinturas

```
DynamicModule[{{x1 = 2, y1 = Sqrt[5] + 1/2, z = 1.5, x2 = 3, y2 = 2 Sqrt[5], rad = 0.45}},
 Panel[
 Row[{Show[
 Graphics3D[{Opacity@0.1, LightBlue,
 Polygon[{{{0, 0, 0}, {x1, 0, 0}, {x1, 0, z}, {0, 0, z}}}],
 Polygon[{{0, 0, 0}, {0, y1, 0}, {0, y1, z}, {0, 0, z}}],
 Polygon[{{0, y1, 0}, {x1, y1, 0}, {x1, y1, z}, {0, y1, z}}]}]}]]]
```

```

Polygon[{{x1, y1, 0}, {x1, 0, 0}, {x1, 0, z}, {x1, y1, z}}],  

Opacity@1, Polygon[{{0, 0, 0}, {x1, 0, 0}, {x1, y1, 0}, {0, y1, 0}}]]],  

Graphics3D[{  

  Opacity@0.5,  

  Table[Cylinder[{{i, j, 0}, {i, j, z}}, rad],  

   {i, 0.5, x1, 1}, {j, 0.5, y1,  $\sqrt{5} - 0.5$ }],  

  Table[Cylinder[{{i, j, 0}, {i, j, z}}, rad],  

   {i, 1, x1 - 1, 1}, {j,  $\frac{\sqrt{5} + 0.5}{2}$ , y1, 2}]]],  

  BoxRatios → Automatic,  

  PlotRange → {{0, x1}, {0, y1}, {0, z}},  

  ImageSize → {200, 300}],  

Show[  

  Graphics3D[{Opacity@0.1, LightBlue,  

    Polygon[{{0, 0, 0}, {x2, 0, 0}, {x2, 0, z}, {0, 0, z}}],  

    Polygon[{{0, 0, 0}, {0, y2, 0}, {0, y2, z}, {0, 0, z}}],  

    Polygon[{{0, y2, 0}, {x2, y2, 0}, {x2, y2, z}, {0, y2, z}}],  

    Polygon[{{x2, y2, 0}, {x2, 0, 0}, {x2, 0, z}, {x2, y2, z}}],  

    Opacity@1, Polygon[{{0, 0, 0}, {x2, 0, 0}, {x2, y2, 0}}]]],  

  Graphics3D[{  

    Opacity@0.5,  

    Table[Cylinder[{{i, j, 0}, {i, j, z}}, rad],  

     {i, 0.5, x2, 1}, {j, 0.5, y2,  $\sqrt{5} - 0.5$ }],  

    Table[Cylinder[{{i, j, 0}, {i, j, z}}, rad], {i, 1, x2 - 1, 1},  

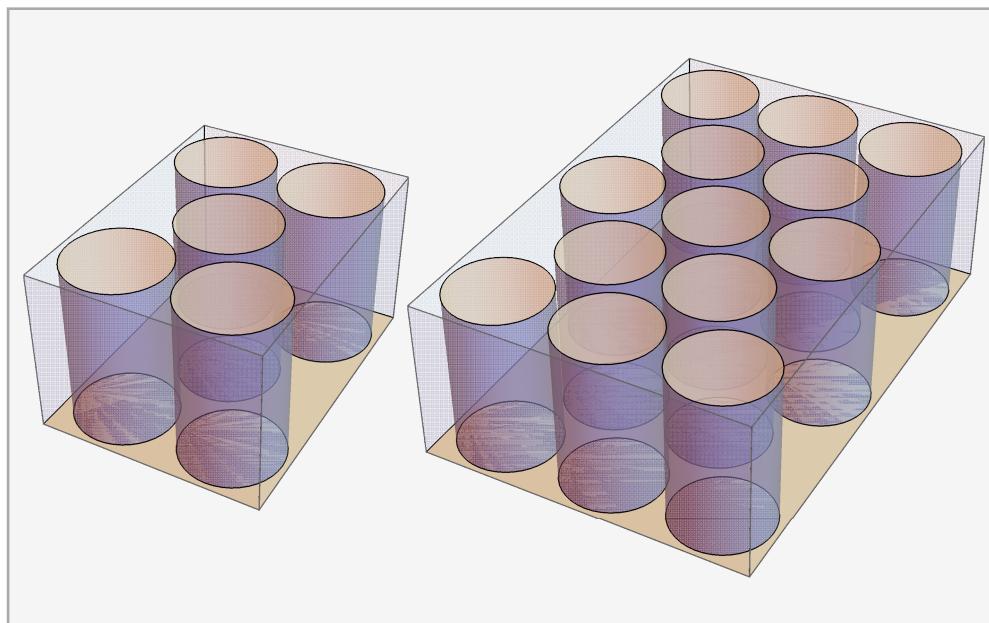
     {j,  $\frac{\sqrt{5} + 0.5}{2}$ , y2 - 1,  $\sqrt{5} - 0.5$ }]  

  }],  

  BoxRatios → Automatic,  

  PlotRange → {{0, x2}, {0, y2}, {0, z}},  

  ImageSize → {300, 300}]]]
]
```



```

DynamicModule[{\$x1 = 2, \$y1 = \sqrt{5} + \frac{1}{2}, \$x2 = 3,
\$y2 = 2\sqrt{5}, \$x3 = 4, \$y3 = 3\sqrt{5} - \frac{1}{2}, mag = 110, rad = 0.45},
Grid[{
{
Graphics[{\EdgeForm[{Thick, Black}], FaceForm[LightRed],
Table[Disk[{i, j}, rad], {i, 0.5, \$x1, 1}, {j, 0.5, \$y1, \sqrt{5} - 0.5}],
Table[Disk[{i, j}, rad], {i, 1, \$x1 - 1, 1}, {j, \frac{\sqrt{5} + 0.5}{2}, \$y1, 2}],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {\$x1, \$y1}],
PlotRange \rightarrow {{0, \$y1}, {0, \$y1}},
AspectRatio \rightarrow 1
}, ImageSize \rightarrow {mag, Automatic}],
Graphics[{\EdgeForm[{Thick, Black}], FaceForm[LightRed],
Table[Disk[{i, j}, rad], {i, 0.5, \$x2, 1}, {j, 0.5, \$y2, \sqrt{5} - 0.5}],
Table[Disk[{i, j}, rad], {i, 1, \$x2 - 1, 1},
{j, \frac{\sqrt{5} + 0.5}{2}, \$y2 - 1, \sqrt{5} - 0.5}],
FaceForm[], EdgeForm[{Thick, LightBlue}],
}
]
}
]

```

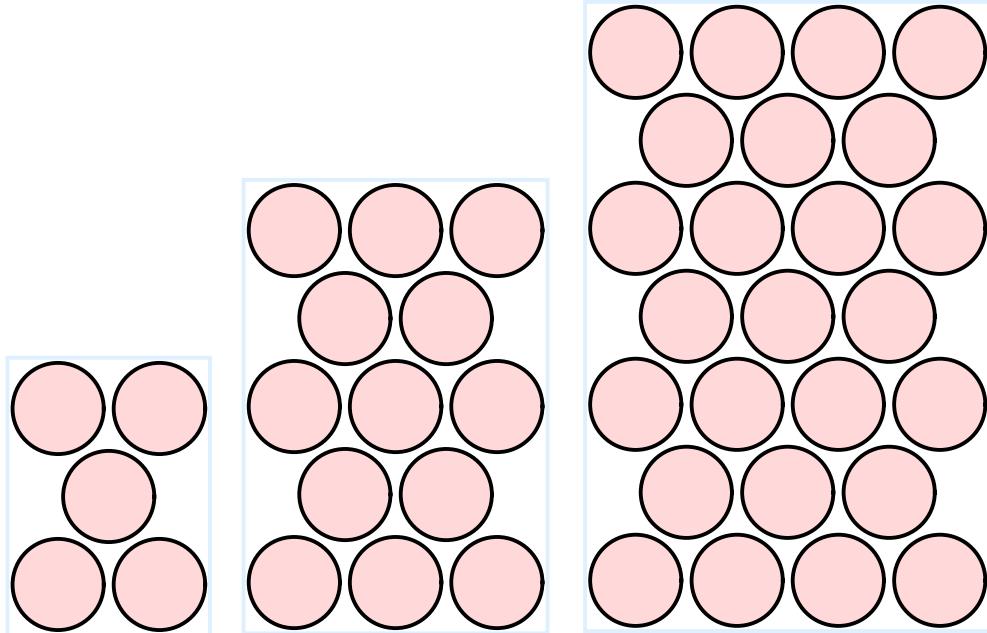
```

Rectangle[{0, 0}, {x2, y2}],
PlotRange -> {{0, x2}, {0, y2}},
AspectRatio -> 1
}, ImageSize -> { $\frac{\text{mag} * 3}{2}$ , Automatic}],

Graphics[{{EdgeForm[{Thick, Black}], FaceForm[LightRed],
Table[Disk[{i, j}, rad], {i, 0.5, x3, 1}, {j, 0.5, y3,  $\sqrt{5} - 0.5$ }],
Table[Disk[{i, j}, rad], {i, 1, x3 - 1, 1},
{j,  $\frac{\sqrt{5} + 0.5}{2}$ , y3 - 1,  $\sqrt{5} - 0.5$ }],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x3, y3}],
PlotRange -> {{0, x3}, {0, y3}},
AspectRatio -> 1
}, ImageSize -> { $\frac{\text{mag} * 4}{2}$ , Automatic}]}

}, Alignment -> Bottom]]

```

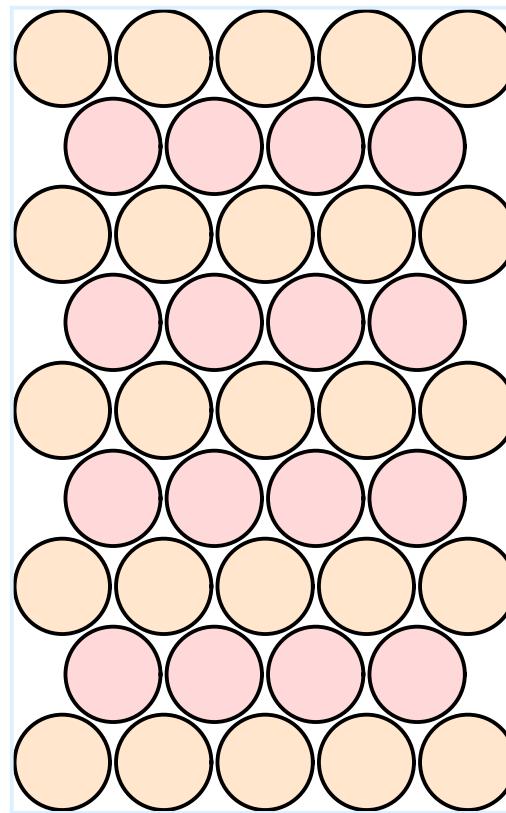


```

DynamicModule[{\{x1 = 2, y1 =  $\sqrt{5} + \frac{1}{2}$ , x2 = 3, y2 =  $2\sqrt{5}$ , x3 = 4,
y3 =  $3\sqrt{5} - \frac{1}{2}$ , x4 = 5, y4 =  $4\sqrt{5} - 1$ , mag = 110, rad = 0.47\},

Graphics[\{EdgeForm[{Thick, Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x4, 1}, {j, 0.5, y4,  $\sqrt{5} - 0.5$ }],
FaceForm[LightRed],
Table[Disk[{i, j}, rad], {i, 1, x4 - 1, 1}, {j,  $\frac{\sqrt{5} + 0.5}{2}$ , y4 - 1,  $\sqrt{5} - 0.5$ }],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x4, y4}],
PlotRange -> {{0, x4}, {0, y4}},
AspectRatio -> 1
}], ImageSize -> {\frac{mag * 5}{2}, Automatic}\}]\]

```



```

DynamicModule[{\{x1 = 2, y1 =  $\sqrt{5} + \frac{1}{2}$ , x2 = 3, y2 =  $2\sqrt{5}$ ,
x3 = 4, y3 =  $3\sqrt{5} - \frac{1}{2}$ , x4 = 5, y4 =  $4\sqrt{5} - 1$ , mag = 50, rad = 0.44\},

Grid[\{

```

```

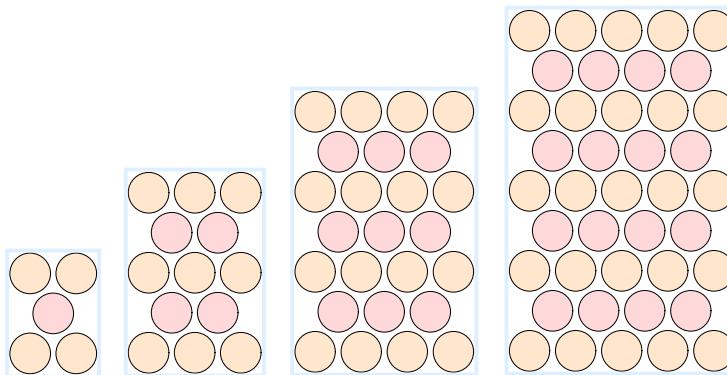
{
Graphics[{{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x1, 1}, {j, 0.5, y1, \sqrt{5} - 0.5}],
FaceForm[LightRed], Table[Disk[{i, j}, rad],
{i, 1, x1 - 1, 1}, {j, \frac{\sqrt{5} + 0.5}{2}, y1, 2}],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x1, y1}],
PlotRange \rightarrow {{0, y1}, {0, y1}},
AspectRatio \rightarrow 1
}, ImageSize \rightarrow {mag, Automatic}],
Graphics[{{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x2, 1}, {j, 0.5, y2, \sqrt{5} - 0.5}],
FaceForm[LightRed], Table[Disk[{i, j}, rad],
{i, 1, x2 - 1, 1}, {j, \frac{\sqrt{5} + 0.5}{2}, y2 - 1, \sqrt{5} - 0.5}],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x2, y2}],
PlotRange \rightarrow {{0, x2}, {0, y2}},
AspectRatio \rightarrow 1
}, ImageSize \rightarrow \{\frac{mag * 3}{2}, Automatic\}],
Graphics[{{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x3, 1}, {j, 0.5, y3, \sqrt{5} - 0.5}],
FaceForm[LightRed], Table[Disk[{i, j}, rad],
{i, 1, x3 - 1, 1}, {j, \frac{\sqrt{5} + 0.5}{2}, y3 - 1, \sqrt{5} - 0.5}],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x3, y3}],
PlotRange \rightarrow {{0, x3}, {0, y3}},
AspectRatio \rightarrow 1
}, ImageSize \rightarrow \{\frac{mag * 4}{2}, Automatic\}]
}

```

```

Graphics[{{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x4, 1}, {j, 0.5, y4, Sqrt[5] - 0.5}],
FaceForm[LightRed],
Table[Disk[{i, j}, rad],
{i, 1, x4 - 1, 1}, {j, (Sqrt[5] + 0.5)/2, y4 - 1, Sqrt[5] - 0.5}],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x4, y4}],
PlotRange -> {{0, x4}, {0, y4}},
AspectRatio -> 1
}, ImageSize -> {mag*5/2, Automatic}]]}
}, Alignment -> Bottom]]

```



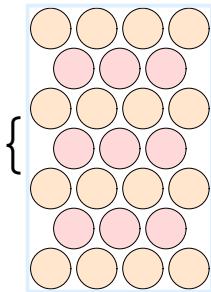
```

Deploy@Style[Grid[{{Style["Arreglo", "Text"],
Style[Column[{"Número de canecas", "en cada fila"}], "Text"],
Style[Column[{"Número total", "de canecas"}], "Text"]},
{Style[Column[{{"2 filas con 2 canecas cada una", "1 filas con 1 canecas cada una"}], "Text", 14],
"2 2 + 1 1 = 2^2 + 1^2 = 5"}],
"Text", 14],
"2 2 + 1 1 = 2^2 + 1^2 = 5"}],

```

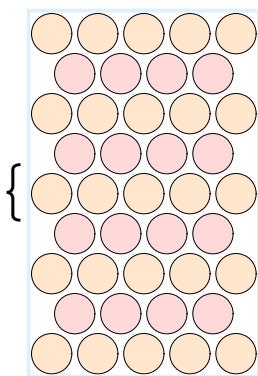
{Style[Column[{{"3 filas con 3 canecas cada una", "2 filas con 2 canecas cada una"}], "Text", 14],
"2 2 + 1 1 = 2^2 + 1^2 = 5"}], "Text", 14]

" 2 filas con 2 canecas cada una"}], "Text", 14],
 "3 3 + 2 2 = 3² + 2² = 13"},



{, Style[Column[{ " 4 filas con 4 canecas cada una",

" 3 filas con 3 canecas cada una"}], "Text", 14],
 "4 4 + 3 3 = 4² + 3² = 25"},



{, Style[Column[{ " 5 filas con 5 canecas cada una",

" 4 filas con 4 canecas cada una"}], "Text", 14],
 "5 5 + 4 4 = 5² + 4² = 41"}]

| Arreglo | Número de canecas en cada fila | Número total de canecas |
|---------|--|--|
| | 2 filas con 2 canecas cada una 1 filas con 1 canecas cada una | $2 \cdot 2 + 1 \cdot 1 = 2^2 + 1^2 = 5$ |
| | 3 filas con 3 canecas cada una 2 filas con 2 canecas cada una | $3 \cdot 3 + 2 \cdot 2 = 3^2 + 2^2 = 13$ |
| | 4 filas con 4 canecas cada una 3 filas con 3 canecas cada una | $4 \cdot 4 + 3 \cdot 3 = 4^2 + 3^2 = 25$ |
| | 5 filas con 5 canecas cada una 4 filas con 4 canecas cada una | $5 \cdot 5 + 4 \cdot 4 = 5^2 + 4^2 = 41$ |

Problema 2

» Multimedia: Expresiones algebraicas

» *Expresión algebraica*

Una **expresión algebraica** es una combinación entre *números reales*, y un conjunto de letras a las cuales se les denomina *símbolo de variable o constante* (o simplemente variables o constantes), vinculados entre sí por operaciones aritméticas. Una expresión algebraica está compuesta por un término o la adición de términos algebraicos.

La utilidad de una expresión algebraica es que permite la generalización de cualquier situación que involucre operaciones entre valores conocidos y desconocidos.

Ejemplos:

| Situación | Expresión algebraica | Términos | Coeficientes | Variables |
|---|--------------------------|----------------------------|---------------------|-----------|
| El doble del cuadrado de un número más su mitad. | $2 a^2 + \frac{a}{2}$ | $2 a^2$, $\frac{a}{2}$ | 2, $\frac{1}{2}$ | a |
| El área de un triángulo. | $\frac{b \cdot h}{2}$ | $\frac{b \cdot h}{2}$ | $\frac{1}{2}$ | b, h |
| El costo de un plan de telefonía móvil con un cargo básico de \$54.000 y un cobro adicional de \$400 por minuto y \$7.000 por GB de navegación. | $54000 + 400 m + 7000 g$ | 54000, 400 m, 7000 g | 400, 7000 | m, g |

```

Deploy@Style[Grid[{{Style["Situación", "Text"],
Style["Expresión algebraica", "Text"], Style["Términos", "Text"],
Style["Coeficientes", "Text"], Style["Variables", "Text"]},
{"El doble del cuadrado de un número más su mitad.", "2 a2 +  $\frac{a}{2}$ ", Grid[{{{"2 a2,"}, {" $\frac{a}{2}$ "}}], Grid[{{{"2,"}}, {" $\frac{1}{2}$ "}}], "a"}, {"El área de un triángulo.", " $\frac{b \cdot h}{2}$ ", " $\frac{b \cdot h}{2}$ ", " $\frac{1}{2}$ ", "b, h"}, {"El costo de un plan de telefonía móvil con un cargo básico de $54.000 y un cobro adicional de $400 por minuto y $7.000 por GB de navegación.", "54000 + 400 m + 7000 g", Grid[{{"54000,"}, {"400 m,"}, {"7000 g"}}], Grid[{{""}, {"400,"}, {"7000"}}], "m, g"}}, Alignment -> Center, Frame -> All]]]

```

| Situación | Expresión algebraica | Términos | Coeficientes | Variables |
|---|--------------------------|----------------------------|---------------------|-----------|
| El doble del cuadrado de un número más su mitad. | $2 a^2 + \frac{a}{2}$ | $2 a^2$, $\frac{a}{2}$ | 2, $\frac{1}{2}$ | a |
| El área de un triángulo. | $\frac{b \cdot h}{2}$ | $\frac{b \cdot h}{2}$ | $\frac{1}{2}$ | b, h |
| El costo de un plan de telefonía móvil con un cargo básico de \$54.000 y un cobro adicional de \$400 por minuto y \$7.000 por GB de navegación. | $54000 + 400 m + 7000 g$ | 54000, 400 m, 7000 g | 400, 7000 | m, g |

» Término algebraico:

Un **término algebraico** es el producto entre un elemento de un conjunto numérico y símbolos de constante o de variable.

Por ejemplo, las expresiones:

$$7, \quad n^2, \quad 5(9 - 3), \quad 3xy, \quad -5a, \quad 7ca b, \quad (3a - b)$$

son términos algebraicos.

Mientras que las expresiones:

$$3a - b, \quad n^2 + (n - 1)^2, \quad x^2 + y^2, \quad -5a - 7ca b, \quad (3a - b) + c^2$$

no son términos algebraicos (son expresiones algebraicas), están separados por sumas o restas.

La expresión $2x^2 - 5xy + 8y^2$ consta de tres términos (separados por la suma y la resta)

» Término semejante:

Dos términos algebraicos son semejantes si sus símbolos de constante o variable (letra) son los mismos con la misma potencia.

Ejemplos:

>>> Los términos:

$$0.94t^2, \quad -2t^2, \quad \frac{3}{2}t^2$$

son *términos semejantes*.

>>> Los términos:

$$x^2y^3, \quad -5x^2y^4$$

no son *términos semejantes*; aunque tienen las mismas variables x, y , los exponentes de la variable y no son los mismos.

» Adición:

Para sumar dos expresiones algebraicas se suman entre sí los coeficientes de los **términos semejantes**, dejando la misma parte literal. Mientras adquiere habilidad en sumar expresiones algebraicas, se recomienda realizar el siguiente proceso:

i. Identifique los términos de cada una de las expresiones a sumar.

ii. Identifique los términos semejantes.

iii. Sume los coeficientes dejando las mismas variables con sus respectivos exponentes.

(En el caso de una resta, recuerde que restar es sumar el opuesto, por tanto, se cambian los signos del sustraendo y realizar los pasos anteriores).

Ejemplos:

» Sumar $2x^3 + 3x^2y^3 - 4xy^3$ con $-5x^3 + x^2y^3 + 7xy^3 + 3$

i. Identifique los términos de cada una de las expresiones a sumar:

En el primer sumando hay tres términos y en el segundo cuatro términos.

ii. Identifique los términos semejantes.

Los términos semejantes son: $2x^3$ y $-5x^3$, $3x^2y^3$ y x^2y^3 , $-4xy^3$ y $7xy^3$

iii. Sume los coeficientes dejando las mismas variables con sus respectivos exponentes.

$$\begin{aligned}
& (2x^3 + 3x^2y^3 - 4xy^3) + (-5x^3 + x^2y^3 + 7xy^3 + 3) \\
& = \cancel{2x^3} + \cancel{3x^2y^3} - 4xy^3 - \cancel{5x^3} + \cancel{x^2y^3} + 7xy^3 + 3 \\
& = (\cancel{2x^3} - \cancel{5x^3}) + (\cancel{3x^2y^3} + \cancel{x^2y^3}) + (-4xy^3 + 7xy^3) + 3 \\
& = (\cancel{-3x^3}) + (\cancel{4x^2y^3}) + (3xy^3) + 3 \\
& = -3x^3 + 4x^2y^3 + 3xy^3 + 3
\end{aligned}$$

» Simplificar la siguiente expresión: $(\frac{1}{2}t^2 + 5t - \frac{3}{2}) - (5t^2 - \frac{1}{2}t)$

$$\begin{aligned}
(\frac{1}{2}t^2 + 5t - \frac{3}{2}) - (5t^2 - \frac{1}{2}t) &= \frac{1}{2}t^2 + 5t - \frac{3}{2} - 5t^2 + \frac{1}{2}t \\
&= (\frac{1}{2}t^2 - 5t^2) + (5t + \frac{1}{2}t) - \frac{3}{2} \\
&= -\frac{9}{2}t^2 + \frac{11}{2}t - \frac{3}{2}
\end{aligned}$$

» *Multiplicación:*

Para la multiplicación de expresiones algebraicas se debe tener presente la propiedad distributiva de la multiplicación respecto a la suma tanto a derecha como izquierda; esto es:

$$\mathbf{a}(b+c) = \mathbf{a} \cdot b + \mathbf{a} \cdot c$$

$$(b+c)\mathbf{a} = \mathbf{a} \cdot b + \mathbf{a} \cdot c$$

Además, al multiplicar factores que tienen las mismas variables se debe aplicar la propiedad de la potenciación:

$$a^m \cdot a^n = a^{m+n}$$

es decir, en la multiplicación de factores con la misma base se suman los exponentes de cada una.

Una vez multiplicadas las expresiones se procede a simplificar los términos semejantes.

Ejemplos:

» Al operar $(2x)(3xy)$ se tiene que

$$(2x)(3xy) = 6x^2y$$

» Al operar $(-3ab^2 + 2a)(8a^2 + 5a^2b^2 + 3)$ se tiene que:

$$\begin{aligned}
& (-3ab^2 + 2a)(8a^2 + 5a^2b^2 + 3) \\
& = -3ab^2 \cdot 8a^2 - 3ab^2 \cdot 5a^2b^2 - 3ab^2 \cdot 3 + 2a \cdot 8a^2 + 2a \cdot 5a^2b^2 + 2a \cdot 3 \\
& = -24a^4b^2 - 15a^3b^4 - 9ab^2 + 16a^4 + 10a^3b^2 + 6a
\end{aligned}$$

» Al operar $-2(x^2 + y^2) + 3x(x-2) - y(-2y+1)$ se tiene que:

$$\begin{aligned}
-2(x^2 + y^2) + 3x(x-2) - y(-2y+1) &= -2x^2 - 2y^2 + 3x^2 - 6x + 2y^2 - y \\
&= x^2 - 6x - y
\end{aligned}$$

» Al operar $(a+b)(a-b)$ se tiene que:

$$\begin{aligned}
(a+b)(a-b) &= a^2 + ab - ab - b^2 \\
&= a^2 - b^2
\end{aligned}$$

```

In[]:= Deploy@dynamicModule[{framePane, textPane, tabImage, tabText,
  style1, style2, style3,
  color1 = ■, color2 = ■, color3 = ■,
  tama1 = 15, tama2 = 18, tama3 = 25, font1 = "Georgia",
  page1, page2, page3, page4, page5,
  titlePopUp, textPopUp, panelWidth = 500, bodyWidth = 610},
  (*Inicializar page's*)
  page1 = page2 = page3 = page4 = page5 = 1;
  (*estilos de los textos/recuadros*)
  framePane[s_String] := Pane[TextCell[Style[s, tama1], "Cuadro/Titulo",
    LineIndent → 0, TextJustification → 0, LinebreakAdjustments →
    {0.9, 100, 0, 0, 0}]];
  textPane[s_String] := Pane[TextCell[Style[s, tama1], "EmphasisText",
    LineIndent → 0, TextJustification → 0, LinebreakAdjustments →
    {0.9, 100, 0, 0, 0}]];
  style1[txt_] := Style[txt, {FontFamily → font1, FontSize → 15}];
  style2[txt_] := Style[txt, {FontFamily → font1, FontSize → 15}];
  style3[txt_] := Style[txt, {FontFamily → font1, FontSize → 15}];
  (*Estilos de las ventanas emergentes*)
  titlePopUp[s_String] :=
  Pane[TextCell[Style[s, tama2, FontFamily → font1, color3, Italic],
    "Text", LineIndent → 0, TextJustification → 0, LinebreakAdjustments →
    {0.9, 100, 0, 0, 0}]];
  textPopUp[s_String] := Pane[TextCell[Style[s, tama1, FontFamily → font1],
    "Text", LineIndent → 0, TextJustification → 0, LinebreakAdjustments →
    {0.9, 100, 0, 0, 0}]];
  TextCell[
  Grid[{
  {"¿Qué son las expresiones algebraicas y cómo operarlas?",
   ..., ..., ..., ...},
  {MouseAppearance[Button[TextCell[" Expresión algebraica ", "Text"],
    CreateDialog[{
    Pane[Column[{
      titlePopUp[" Expresión algebraica "],
      textPopUp["Una expresión algebraica es una combinación entre
    
```

números reales, y un conjunto de letras a las cuales se les denomina *símbolo de variable* o *constante* (o simplemente variables o constantes), vinculados entre sí por operaciones aritméticas. Una expresión algebraica está compuesta por un término o la adición de términos algebraicos.

La utilidad de una expresión algebraica es que permite la generalización de cualquier situación que involucre operaciones entre valores conocidos y desconocidos.

Ejemplos:

| "Situación" | "Expresión algebraica" | "Términos" | "Coeficientes" | "Variables" |
|---|--|---|--|--|
| "El doble del cuadrado de un número más su mitad." | $\text{TraditionalForm}[(a + \frac{1}{2})^2]$ | $\begin{aligned} & \text{\textbackslash!\\(TraditionalForm`}\\ & \text{\textbackslash((2}\\ & \text{\textbackslash*SuperscriptBox[\textbackslash(a}\\ & \text{\textbackslash),}\\ & \text{\textbackslash(2\textbackslash)]\textbackslash)\textbackslash,}\\ & \text{\textbackslash)\textbackslash)}"} \\ & \text{\textbackslash!\\(TraditionalForm`}\\ & \text{\textbackslash*}\\ & \text{\textbackslashFractionBox}\\ & [\textbackslash(1\textbackslash),\\ & \text{\textbackslash(2\textbackslash)]\textbackslash)}" \end{aligned}$ | $\begin{aligned} & \text{\textbackslash!\\(TraditionalForm`}\\ & \text{\textbackslash((2\textbackslash)\textbackslash,}\\ & \text{\textbackslash)\textbackslash)}" \\ & \text{\textbackslash!\\(TraditionalForm`}\\ & \text{\textbackslash*}\\ & \text{\textbackslashFractionBox}\\ & [\textbackslash(1\textbackslash),\\ & \text{\textbackslash(2\textbackslash)]\textbackslash)}" \end{aligned}$ | $\text{\textbackslash!\\(TraditionalForm`a}$ |
| "El área de un triángulo." | $\text{TraditionalForm}[\frac{1}{2}(b \cdot h)]$ | $\begin{aligned} & \text{\textbackslash!\\(TraditionalForm`}\\ & \text{\textbackslash*}\\ & \text{\textbackslashFractionBox}\\ & [\textbackslash(b\cdot h\textbackslash),\\ & \text{\textbackslash(2\textbackslash)]\textbackslash)}" \end{aligned}$ | $\begin{aligned} & \text{\textbackslash!\\(TraditionalForm`}\\ & \text{\textbackslash*}\\ & \text{\textbackslashFractionBox}\\ & [\textbackslash(b\cdot h\textbackslash),\\ & \text{\textbackslash(2\textbackslash)]\textbackslash)}" \end{aligned}$ | $\text{\textbackslash!\\(TraditionalForm`b,}$ $\text{\textbackslash h\textbackslash)}"$ |
| "El costo de un plan de telefonía móvil con un cargo básico de \$54.000 y un cobro adicional de \$400 por cada minuto y \$7000 por cada llamada." | $\text{TraditionalForm}[54000 + 400 m + 7000 g]$ | $\begin{aligned} & \text{\textbackslash!\\(TraditionalForm`}\\ & 54000, " \\ & \text{\textbackslash!\\(TraditionalForm`}\\ & \text{\textbackslash((400}\\ & \text{m\textbackslash)\textbackslash, \textbackslash)\textbackslash)}\\ & \text{\textbackslash)}" \\ & \text{\textbackslash!\\(TraditionalForm`}\\ & 7000\\ & g\textbackslash)" \end{aligned}$ | $\begin{aligned} & \text{\textbackslash!\\(TraditionalForm`}\\ & \text{\textbackslash((400\textbackslash)\textbackslash,}\\ & \text{\textbackslash)\textbackslash)}" \\ & \text{\textbackslash!\\(TraditionalForm`}\\ & 7000\textbackslash)" \end{aligned}$ | $\text{\textbackslash!\\(TraditionalForm`m,}$ $\text{\textbackslash g\textbackslash)}"$ |

```

ImageSize -> {panelWidth + 400, bodyWidth},
Scrollbars -> {False, True} ]}, Background -> White, Deployed -> True],
ImageSize -> All], "LinkHand"],
MouseAppearance[Button[TextCell[" Término algebraico ", "Text"],
CreateDialog[{
Pane[Column[{titlePopUp["Término algebraico"],
textPopUp["Un término algebraico es el producto entre un
elemento de un conjunto numérico y
símbolos de constante o de variable."]}]]}

```

Por ejemplo, las expresiones:

$$7, \quad n^2, \quad 5(9 - 3), \quad 3xy, \quad -5a, \quad 7cab, \quad (3a - b)$$

son términos algebraicos.

Mientras que las expresiones:

$$3a - b, \quad n^2 + (n - 1)^2, \quad x^2 + y^2, \quad -5a - 7cab, \quad (3a - b) + c^2$$

no son términos algebraicos (son expresiones algebraicas),
están separados por sumas o restas.

La expresión $2x^2 - 5xy + 8y^2$ consta de tres términos (separados
por la suma y la resta) "]]}],

```

ImageSize -> {panelWidth + 400, bodyWidth}, Scrollbars ->
{False, True} ]], Background -> White, Deployed -> True],
ImageSize -> All], "LinkHand"],

```

```

MouseAppearance[Button[TextCell[" Términos semejantes ", "Text"],
CreateDialog[{
Pane[Column[{titlePopUp["Términos semejantes"],
textPopUp["Dos términos algebraicos son semejantes si sus
símbolos de constante o variable (letra)
son los mismos con la misma potencia."}]}]]}

```

Ejemplos:

>>> Los términos:

$$0.94t^2, \quad -2t^2, \quad \frac{3}{2}t^2$$

son términos semejantes.

>>> Los términos:

$$x^2 y^3, -5 x^2 y^4$$

no son términos semejantes; aunque tienen las mismas variables x, y , los exponentes de la variable y no son los mismos."}]},

ImageSize → {panelWidth + 400, bodyWidth}, Scrollbars → {False, True}]}], Background → White, Deployed → True], ImageSize → All], "LinkHand"],

MouseAppearance[Button[TextCell[" Adición ", "Text"],

CreateDialog[{

Pane[Column[{

titlePopUp["Adición"],

textPopUp[

"Para sumar dos expresiones algebraicas se suman entre sí los coeficientes de los términos semejantes, dejando la misma parte literal. Mientras adquiere habilidad en sumar expresiones algebraicas, se recomienda realizar el siguiente proceso:

- i. Identifique los términos de cada una de las expresiones a sumar.
- ii. Identifique los términos semejantes.
- iii. Sume los coeficientes dejando las mismas variables con sus respectivos exponentes.

(En el caso de una resta, recuerde que restar es sumar el opuesto, por tanto, se cambian los signos del sustraendo y realizar los pasos anteriores).

Ejemplos:

>> Sumar $2x^3 + 3x^2y^3 - 4xy^3$
con $-5x^3 + x^2y^3 + 7xy^3 + 3$

- i. Identifique los términos de cada una de las expresiones a sumar:
En el primer sumando hay tres términos y en el segundo cuatro términos.
- ii. Identifique los términos semejantes.

Los términos semejantes son: $2x^3$ y $-5x^3$,
 $3x^2y^3$ y x^2y^3 , $-4xy^3$ y $7xy^3$

iii. Sume los coeficientes dejando las mismas variables con sus respectivos exponentes.

$$\begin{aligned}
 & (2x^3 + 3x^2y^3 - 4xy^3) + (-5x^3 + x^2y^3 + 7xy^3 + 3) \\
 & = 2x^3 + 3x^2y^3 - 4xy^3 - 5x^3 + x^2y^3 + 7xy^3 + 3 \\
 & = (2x^3 - 5x^3) + (3x^2y^3 + x^2y^3) + (-4xy^3 + 7xy^3) + 3 \\
 & = (-3x^3) + (4x^2y^3) + (3xy^3) + 3 \\
 & = -3x^3 + 4x^2y^3 + 3xy^3 + 3
 \end{aligned}$$

>> Simplificar la siguiente

expresión: $\left(\frac{1}{2}t^2 + 5t - \frac{3}{2}\right) - \left(5t^2 - \frac{1}{2}t\right)$

$$\begin{aligned}
 \left(\frac{1}{2}t^2 + 5t - \frac{3}{2}\right) - \left(5t^2 - \frac{1}{2}t\right) &= \frac{1}{2}t^2 + 5t - \frac{3}{2} - 5t^2 + \frac{1}{2}t \\
 &= \left(\frac{1}{2}t^2 - 5t^2\right) + \left(5t + \frac{1}{2}t\right) - \frac{3}{2} \\
 &= -\frac{9}{2}t^2 + \frac{11}{2}t - \frac{3}{2}
 \end{aligned}
 \quad " \]$$

```

ImageSize → {panelWidth + 400, bodyWidth},
Scrollbars → {False, True} ] }, Background → White, Deployed → True],
ImageSize → All ],
"LinkHand" ],
MouseAppearance[Button[TextCell[" Multiplicación ", "Text"],
CreateDialog[{
Pane[Column[{titlePopUp["Multiplicación"],
textPopUp[
"Para la multiplicación de expresiones algebraicas se debe
tener presente la propiedad distributiva
de la multiplicación respecto a la suma
tanto a derecha como izquierda; esto es:
a(b + c) = a · b + a · c
(b + c) a = a · b + a · c

```

Además, al multiplicar factores que tienen las mismas variables se debe aplicar la propiedad de la potenciación:

$$a^m \cdot a^n = a^{m+n}$$

es decir, en la multiplicación de factores con la misma base se suman los exponentes de cada una.

Una vez multiplicadas las expresiones se procede a simplificar los términos semejantes.

Ejemplos:

>> Al operar $(2x)(3xy)$ se tiene que:

$$(2x)(3xy) = 6x^2y$$

>> Al operar

$(-3ab^2 + 2a)(8a^3 + 5a^2b^2 + 3)$ se tiene que:

$$\begin{aligned} & (-3ab^2 + 2a)(8a^3 + 5a^2b^2 + 3) \\ &= -3ab^2 \cdot 8a^3 - 3ab^2 \cdot 5a^2b^2 - 3ab^2 \cdot 3 + 2a \cdot 8a^3 + 2a \cdot 5a^2b^2 + 2a \cdot 3 \\ &= -24a^4b^2 - 15a^3b^4 - 9ab^2 + 16a^4 + 10a^3b^2 + 6a \end{aligned}$$

>> Al operar $-2(x^2 + y^2) + 3x(x - 2) - y(-2y + 1)$ se tiene que:

$$\begin{aligned} -2(x^2 + y^2) + 3x(x - 2) - y(-2y + 1) &= -2x^2 - 2y^2 + 3x^2 - 6x + 2y^2 - y \\ &= x^2 - 6x - y \end{aligned}$$

>> Al operar $(a + b)(a - b)$ se tiene que:

$$\begin{aligned} (a + b)(a - b) &= a^2 + ab - ab - b^2 \\ &= a^2 - b^2 \end{aligned}$$

"] }

ImageSize → {panelWidth + 400, bodyWidth},
 Scrollbars → {False, True}] }, Background → White, Deployed → True],
 ImageSize → All], "LinkHand"]

}

}], "Multimedia"]]

¿Qué son las expresiones algebraicas y cómo operarlas?

Expresión algebraica

Término algebraico

Términos semejantes

Adición

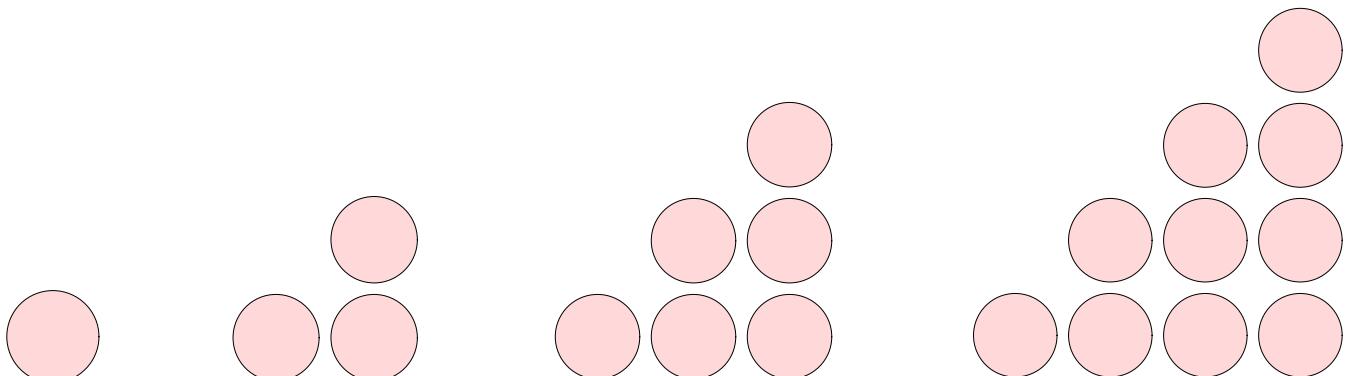
Multiplicación

Problema 3

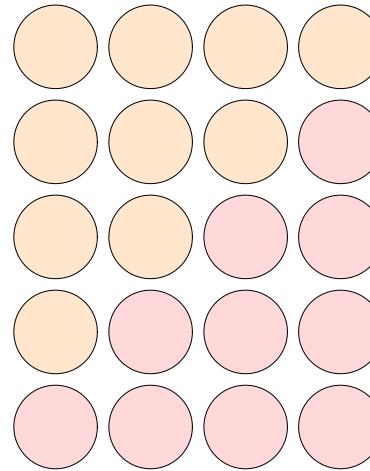
```

DynamicModule[
{x1 = 1, y1 = 1, x2 = 2, y2 = 2, x3 = 3, y3 = 3, x4 = 4, y4 = 4, mag = 50, rad = 0.44},
Grid[{
{
Graphics[{EdgeForm[{Black}], FaceForm[LightRed],
Table[Disk[{i, j}, rad], {j, 0.5, y1, 1}, {i, j, x1, 1}],
PlotRange -> {{0, y1}, {0, y1}},
AspectRatio -> 1
}, ImageSize -> {mag, Automatic}], "          ",
Graphics[{EdgeForm[{Black}], FaceForm[LightRed],
Table[Disk[{i, j}, rad], {j, 0.5, y2, 1}, {i, j, y2, 1}],
PlotRange -> {{0, x2}, {0, y2}},
AspectRatio -> 1
}, ImageSize -> {2 mag, Automatic}], "          ",
Graphics[{EdgeForm[{Black}], FaceForm[LightRed],
Table[Disk[{i, j}, rad], {j, 0.5, y3, 1}, {i, j, y3, 1}],
PlotRange -> {{0, x3}, {0, y3}},
AspectRatio -> 1
}, ImageSize -> {3 mag, Automatic}], "          ",
Graphics[{EdgeForm[{Black}], FaceForm[LightRed],
Table[Disk[{i, j}, rad], {j, 0.5, y4, 1}, {i, j, y4, 1}],
PlotRange -> {{0, x4}, {0, y4}},
AspectRatio -> 1
}, ImageSize -> {4 mag, Automatic}]}
}, Alignment -> Bottom]
]

```



```
DynamicModule[
{x1 = 1, y1 = 1, x2 = 2, y2 = 2, x3 = 3, y3 = 3, x4 = 4, y4 = 4, mag = 50, rad = 0.44},
Graphics[{EdgeForm[{Black}], FaceForm[LightRed],
Table[Disk[{i, j}, rad], {j, 0.5, y4, 1}, {i, j, y4, 1}],
FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {j, 1.5, y4 + 1, 1}, {i, 0.5, j - 1, 1}],
PlotRange → {{0, x4}, {0, y4}},
AspectRatio → 1
}, ImageSize → {4 mag, Automatic}]]
```



Problema 4

```
DynamicModule[{
x1 = 2, y1 =  $\sqrt{5} + \frac{1}{2}$ , x2 = 3, y2 =  $2\sqrt{5}$ ,
x3 = 4, y3 =  $3\sqrt{5} - \frac{1}{2}$ , x4 = 5, y4 =  $4\sqrt{5} - 1$ , mag = 50, rad = 0.44},
Grid[{
{
Graphics[{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x1, 1}, {j, 0.5, y1,  $\sqrt{5} - 0.5$ }],
FaceForm[LightRed], Table[Disk[{i, j}, rad],
{i, 1, x1 - 1, 1}, {j,  $\frac{\sqrt{5} + 0.5}{2}$ , y1, 2}],
FaceForm[Gray], Disk[{1,  $\frac{\sqrt{5} + 0.5}{2}$ }, rad],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x1, y1}]}]]}]
```

```

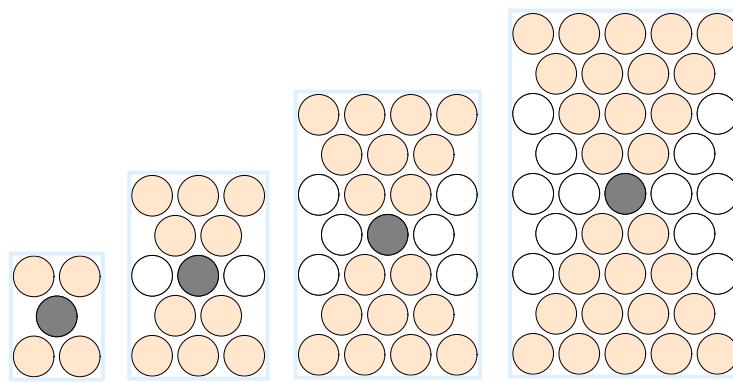
PlotRange → {{0, y1}, {0, y1}},
AspectRatio → 1
}, ImageSize → {mag, Automatic}],
Graphics[{{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x2, 1}, {j, 0.5, y2, √5 - 0.5}], Table[
Disk[{i, j}, rad], {i, 1, x2 - 1, 1}, {j, (√5 + 0.5)/2, y2 - 1, √5 - 0.5}],
FaceForm[Gray], Disk[{1.5, √5}, rad],
FaceForm[White], Disk[{0.5, √5}, rad], Disk[{2.5, √5}, rad],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x2, y2}],
PlotRange → {{0, x2}, {0, y2}},
AspectRatio → 1
}, ImageSize → {mag * 3/2, Automatic}],
Graphics[{{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x3, 1}, {j, 0.5, y3, √5 - 0.5}], Table[
Disk[{i, j}, rad], {i, 1, x3 - 1, 1}, {j, (√5 + 0.5)/2, y3 - 1, √5 - 0.5}],
FaceForm[Gray], Disk[{2, (√5 + 0.5)/2 + √5 - 0.5}, rad],
FaceForm[White], Disk[{1, (√5 + 0.5)/2 + √5 - 0.5}, rad],
Disk[{3, (√5 + 0.5)/2 + √5 - 0.5}, rad],
Disk[{0.5, √5}, rad], Disk[{3.5, √5}, rad],
Disk[{0.5, √5 + √5 - 0.5}, rad], Disk[{3.5, √5 + √5 - 0.5}, rad],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x3, y3}],
PlotRange → {{0, x3}, {0, y3}},
AspectRatio → 1
}, ImageSize → {mag * 4/2, Automatic}]
]

```

```

Graphics[{{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x4, 1}, {j, 0.5, y4, Sqrt[5] - 0.5}],
Table[Disk[{i, j}, rad], {i, 1, x4 - 1, 1},
{j, (Sqrt[5] + 0.5)/2, y4 - 1, Sqrt[5] - 0.5}],
FaceForm[Gray], Disk[{2.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad],
FaceForm[White], Disk[{0.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{1.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{3.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{4.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{1, (Sqrt[5] + 0.5)/2 + Sqrt[5] - 0.5}, rad],
Disk[{4, (Sqrt[5] + 0.5)/2 + Sqrt[5] - 0.5}, rad],
Disk[{1, (Sqrt[5] + 0.5)/2 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{4, (Sqrt[5] + 0.5)/2 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{0.5, 0.5 + (Sqrt[5] - 0.5)}, rad], Disk[{4.5, 0.5 + (Sqrt[5] - 0.5)}, rad],
Disk[{0.5, 0.5 + 3 (Sqrt[5] - 0.5)}, rad],
Disk[{4.5, 0.5 + 3 (Sqrt[5] - 0.5)}, rad],
FaceForm[], EdgeForm[{Thick, LightBlue}],
Rectangle[{0, 0}, {x4, y4}],
PlotRange -> {{0, x4}, {0, y4}},
AspectRatio -> 1
}, ImageSize -> {mag * 5/2, Automatic}]]}
}, Alignment -> Bottom]]

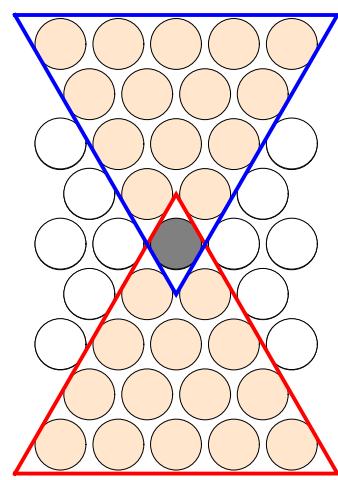
```



```

DynamicModule[{\{x1 = 2, y1 =  $\sqrt{5}$  +  $\frac{1}{2}$ , x2 = 3, y2 =  $2\sqrt{5}$ , x3 = 4,
y3 =  $3\sqrt{5}$  -  $\frac{1}{2}$ , x4 = 5, y4 =  $4\sqrt{5}$  - 1, mag = 70, rad = 0.44, f1, f2, f3, f4\}\},
f1[x_] :=  $\sqrt{3}(x + 0.5) - 0.5\sqrt{3} + 0.5$ ;
f2[x_] :=  $-\sqrt{3}(x - 0.5) + 4.5\sqrt{3} + 0.5$ ;
f3[x_] :=  $\sqrt{3}(x - 0.5) - 0.5\sqrt{3} + 0.5$ ;
f4[x_] :=  $-\sqrt{3}(x + 0.5) + 4.5\sqrt{3} + 0.5$ ;
Graphics[\{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x4, 1}, {j, 0.5, y4,  $\sqrt{3}$ }],
Table[Disk[{i, j}, rad], {i, 1, x4 - 1, 1}, {j,  $\frac{\sqrt{3} + 1}{2}$ , y4 - 1,  $\sqrt{3}$ }],
FaceForm[Gray], Disk[\{2.5, 0.5 + 2( $\sqrt{5} - 0.5$ )\}, rad],
FaceForm[White], Disk[\{0.5, 0.5 + 2( $\sqrt{5} - 0.5$ )\}, rad],
Disk[\{1.5, 0.5 + 2( $\sqrt{5} - 0.5$ )\}, rad],
Disk[\{3.5, 0.5 + 2( $\sqrt{5} - 0.5$ )\}, rad], Disk[\{4.5, 0.5 + 2( $\sqrt{5} - 0.5$ )\}, rad],
Disk[\{1,  $\frac{\sqrt{5} + 0.5}{2} + \sqrt{5} - 0.5$ \}, rad], Disk[\{4,  $\frac{\sqrt{5} + 0.5}{2} + \sqrt{5} - 0.5$ \}, rad],
Disk[\{1,  $\frac{\sqrt{5} + 0.5}{2} + 2(\sqrt{5} - 0.5)$ \}, rad],
Disk[\{4,  $\frac{\sqrt{5} + 0.5}{2} + 2(\sqrt{5} - 0.5)$ \}, rad],
Disk[\{0.5, 0.5 + ( $\sqrt{5} - 0.5$ )\}, rad], Disk[\{4.5, 0.5 + ( $\sqrt{5} - 0.5$ )\}, rad],
Disk[\{0.5, 0.5 + 3( $\sqrt{5} - 0.5$ )\}, rad], Disk[\{4.5, 0.5 + 3( $\sqrt{5} - 0.5$ )\}, rad],
Thick, Red, Line[
{\{-0.29, f1@-0.29\}, {2.5, f1@2.5}, {5.29, f2@5.29}, {-0.29, f1@-0.29}}\}],
Blue, Line[\{\{-0.29, f4@-0.29\}, {2.5, f4@2.5},
{5.29, f3@5.29}, {-0.29, f4@-0.29}\}],
PlotRange → {{0, x4}, {0, y4}},
AspectRatio → 1
}, ImageSize → {\frac{mag * 5}{2}, Automatic}\}]

```



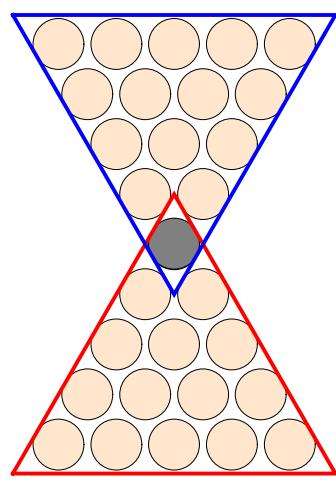
```

DynamicModule[{{x1 = 2, y1 = Sqrt[5] + 1/2, x2 = 3, y2 = 2 Sqrt[5], x3 = 4,
y3 = 3 Sqrt[5] - 1/2, x4 = 5, y4 = 4 Sqrt[5] - 1, mag = 70, rad = 0.44, f1, f2, f3, f4},

f1[x_] := Sqrt[3] (x + 0.5) - 0.5 Sqrt[3] + 0.5;
f2[x_] := -Sqrt[3] (x - 0.5) + 4.5 Sqrt[3] + 0.5;
f3[x_] := Sqrt[3] (x - 0.5) - 0.5 Sqrt[3] + 0.5;
f4[x_] := -Sqrt[3] (x + 0.5) + 4.5 Sqrt[3] + 0.5;

Graphics[{{EdgeForm[{Black}], FaceForm[LightOrange],
Table[Disk[{i, j}, rad], {i, 0.5, x4, 1}, {j, 0.5, y4, Sqrt[3]}],
Table[Disk[{i, j}, rad], {i, 1, x4 - 1, 1}, {j, (Sqrt[3] + 1)/2, y4 - 1, Sqrt[3]}],
FaceForm[Gray], Disk[{2.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad],
EdgeForm[{Thick, White}], FaceForm[White],
Disk[{0.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad], Disk[{1.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{3.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad], Disk[{4.5, 0.5 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{1, (Sqrt[5] + 0.5)/2 + Sqrt[5] - 0.5}, rad], Disk[{4, (Sqrt[5] + 0.5)/2 + Sqrt[5] - 0.5}, rad],
Disk[{1, (Sqrt[5] + 0.5)/2 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{4, (Sqrt[5] + 0.5)/2 + 2 (Sqrt[5] - 0.5)}, rad],
Disk[{0.5, 0.5 + (Sqrt[5] - 0.5)}, rad], Disk[{4.5, 0.5 + (Sqrt[5] - 0.5)}, rad],
Disk[{0.5, 0.5 + 3 (Sqrt[5] - 0.5)}, rad], Disk[{4.5, 0.5 + 3 (Sqrt[5] - 0.5)}, rad],
Thick, Red, Line[
{{{-0.29, f1@-0.29}, {2.5, f1@2.5}, {5.29, f2@5.29}, {-0.29, f1@-0.29}}}],
Blue, Line[{{{-0.29, f4@-0.29}, {2.5, f4@2.5},
{5.29, f3@5.29}, {-0.29, f4@-0.29}}}],
PlotRange -> {{0, x4}, {0, y4}},
AspectRatio -> 1
}], ImageSize -> {mag * 5/2, Automatic}]]]

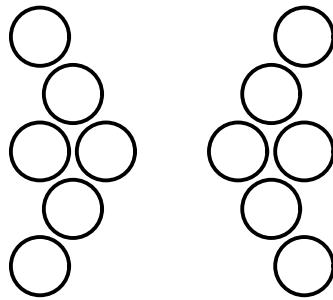
```



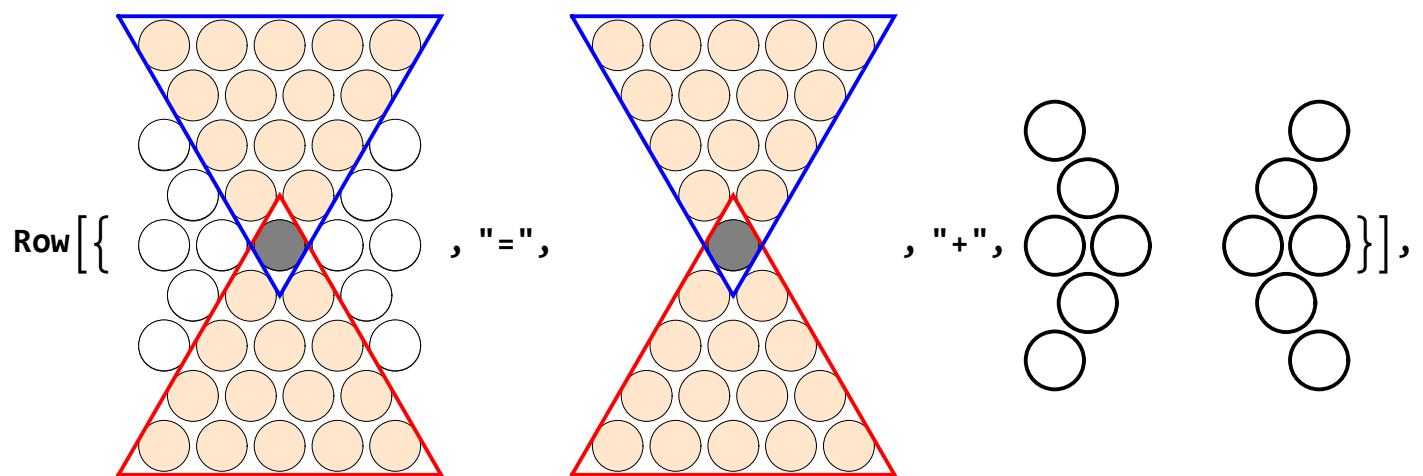
```

DynamicModule[{\{x1 = 2, y1 = Sqrt[5] + 1/2, x2 = 3, y2 = 2 Sqrt[5], x3 = 4,
y3 = 3 Sqrt[5] - 1/2, x4 = 5, y4 = 4 Sqrt[5] - 1, mag = 70, rad = 0.44, f1, f2, f3, f4\},
f1[x_] := Sqrt[3] (x + 0.5) - 0.5 Sqrt[3] + 0.5;
f2[x_] := -Sqrt[3] (x - 0.5) + 4.5 Sqrt[3] + 0.5;
f3[x_] := Sqrt[3] (x - 0.5) - 0.5 Sqrt[3] + 0.5;
f4[x_] := -Sqrt[3] (x + 0.5) + 4.5 Sqrt[3] + 0.5;
Graphics[\{EdgeForm[{White}], FaceForm[White],
Table[Disk[{i, j}, rad], {i, 0.5, x4, 1}, {j, 0.5, y4, Sqrt[3]}],
Table[Disk[{i, j}, rad], {i, 1, x4 - 1, 1}, {j, (Sqrt[3] + 1)/2, y4 - 1, Sqrt[3]}],
EdgeForm[{Thick, Black}], FaceForm[White],
Disk[\{0.5, 0.5 + 2 (\sqrt{5} - 0.5)\}, rad], Disk[\{1.5, 0.5 + 2 (\sqrt{5} - 0.5)\}, rad],
Disk[\{3.5, 0.5 + 2 (\sqrt{5} - 0.5)\}, rad], Disk[\{4.5, 0.5 + 2 (\sqrt{5} - 0.5)\}, rad],
Disk[\{1, (Sqrt[5] + 0.5)/2 + \sqrt{5} - 0.5\}, rad], Disk[\{4, (Sqrt[5] + 0.5)/2 + \sqrt{5} - 0.5\}, rad],
Disk[\{1, (Sqrt[5] + 0.5)/2 + 2 (\sqrt{5} - 0.5)\}, rad],
Disk[\{4, (Sqrt[5] + 0.5)/2 + 2 (\sqrt{5} - 0.5)\}, rad],
Disk[\{0.5, 0.5 + (\sqrt{5} - 0.5)\}, rad], Disk[\{4.5, 0.5 + (\sqrt{5} - 0.5)\}, rad],
Disk[\{0.5, 0.5 + 3 (\sqrt{5} - 0.5)\}, rad], Disk[\{4.5, 0.5 + 3 (\sqrt{5} - 0.5)\}, rad],
PlotRange \rightarrow {{0, x4}, {0, y4}},
AspectRatio \rightarrow 1
\}, ImageSize \rightarrow {\frac{mag * 5}{2}, Automatic}\}]

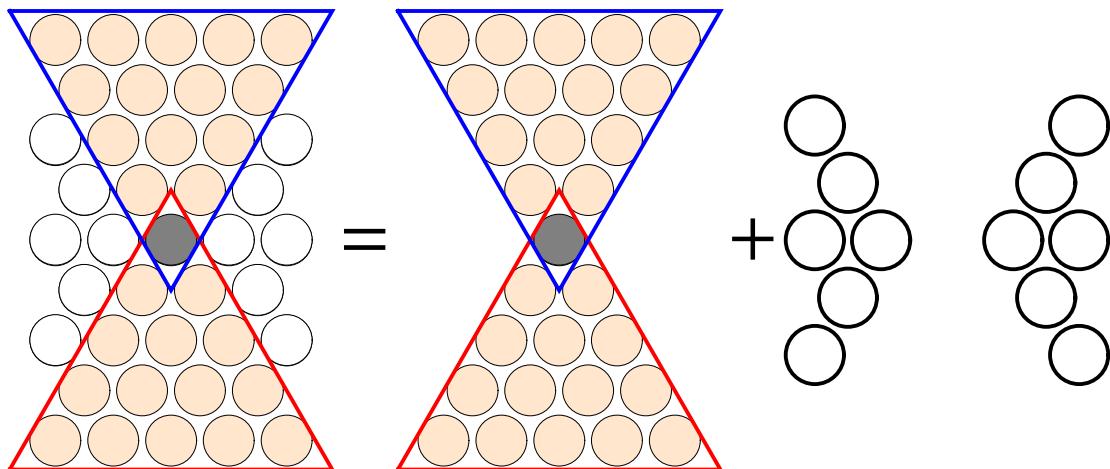
```



style[



"Text", 40]



Resumen

```
TextCell[Column[{  
  "Puede descargar el siguiente aplicativo  
  para practicar el uso de expresiones algebraicas",  
  MouseAppearance[Button[Row[{ "Expresiones \n algebraicas"}],  
    NotebookLocate[{URL["https://goo.gl/EG481g"], None}],  
    ImageSize → All], "LinkHand"]}, Alignment → Center], "PildIzq"]
```

Puede descargar el siguiente aplicativo para practicar el uso de expresiones algebraicas

Expresiones
algebraicas