

# Translations and Rotations

## With a Little Calculus

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### Graphic and Path

```
In[84]:= object =
  {{Red, Rectangle[{-0.1, -0.5}, {0.1, 0.5}]}, {Blue, Rectangle[{-0.5, -0.1}, {0.5, 0.1}]}};

f[x_] := Piecewise[{{Sin[2 x], x ≤ 0}, {2 x, 0 < x < 2}, {4, x > 2}}];

Show[
  Plot[f[x], {x, -4, 4}],
  Graphics[object],
  PlotRange → 5, AspectRatio → Automatic
]
```

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### Translation Only

```
In[87]:= object =
  {{Red, Rectangle[{-0.1, -0.5}, {0.1, 0.5}]}, {Blue, Rectangle[{-0.5, -0.1}, {0.5, 0.1}]}};

f[x_] := Piecewise[{{Sin[2 x], x ≤ 0}, {2 x, 0 < x < 2}, {4, x > 2}}];

Manipulate[
  Show[
    Plot[f[x], {x, -4, 4}],
    Graphics[GeometricTransformation[object, TranslationTransform[{t, f[t]}]]],
    PlotRange → 5, AspectRatio → Automatic
  ],
  {t, -4, 4}]
```

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### Translation and Rotation

```
In[81]:= object =
  {{Red, Rectangle[{-0.1, -0.5}, {0.1, 0.5}]}, {Blue, Rectangle[{-0.5, -0.1}, {0.5, 0.1}]}};

f[x_] := Piecewise[{{Sin[2 x], x ≤ 0}, {2 x, 0 < x < 2}, {4, x > 2}}];

Manipulate[
  Show[
    Plot[f[x], {x, -4, 4}],
    Graphics[GeometricTransformation[object,
      TranslationTransform[{t, f[t]}].RotationTransform[{{0, 1}, {1, f'[t]}]]],
    PlotRange → 5, AspectRatio → Automatic
  ],
  {t, -4, 4}]
```

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