Linguistic Mapping

The Principles of Calculus I

II

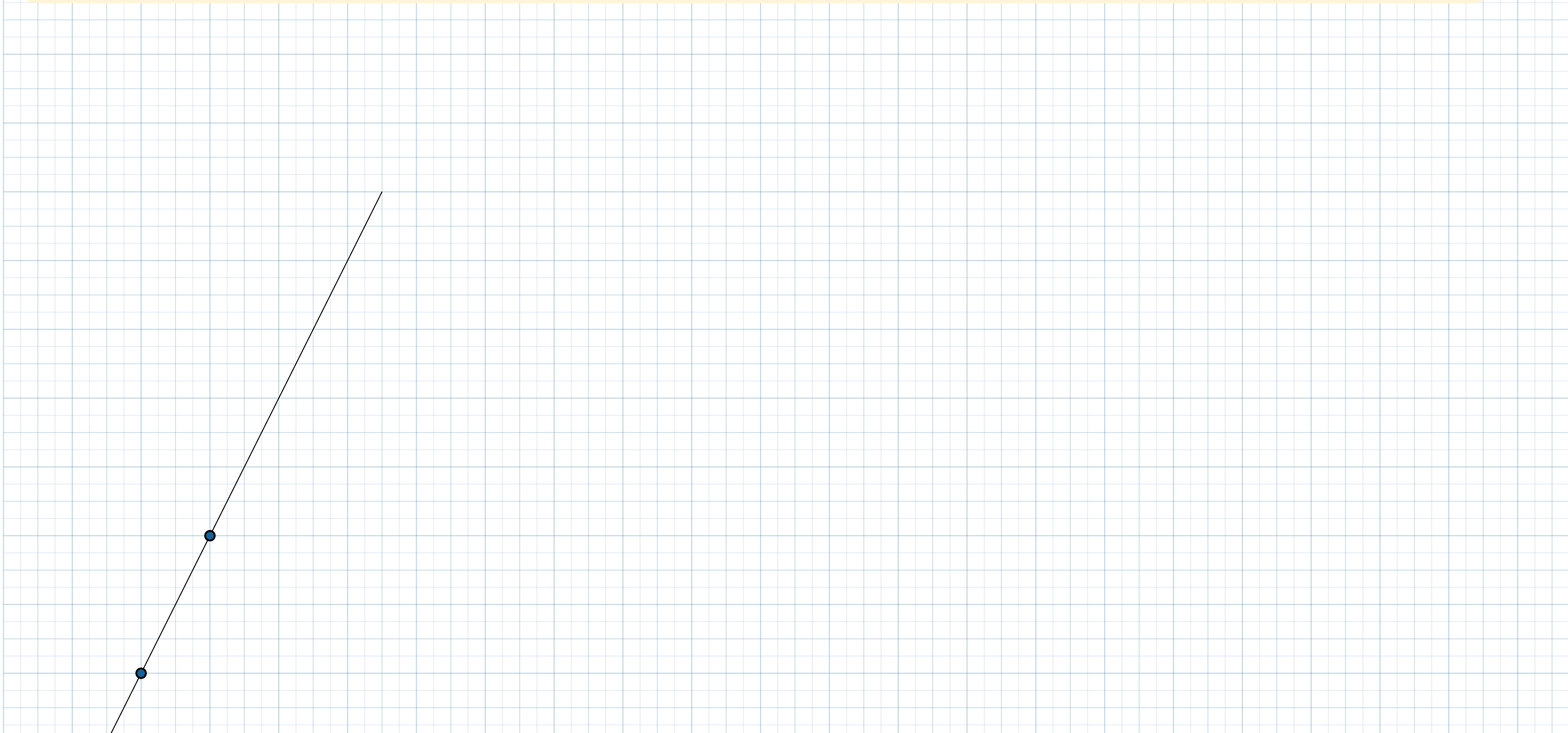
Transformation

II.3

Movement along Lines

Classroom Exercises

Take L to be the line that contains the points $(1,3)$ and $(2,5)$. Identify a vector that moves points in L along L and use this vector to describe the line segment with endpoints $(1,3)$ and $(2,5)$ using set builder notation.

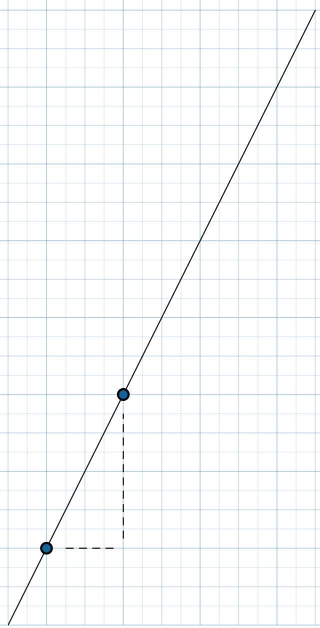


Exercise 2

Take L to be the line that is given by the equation

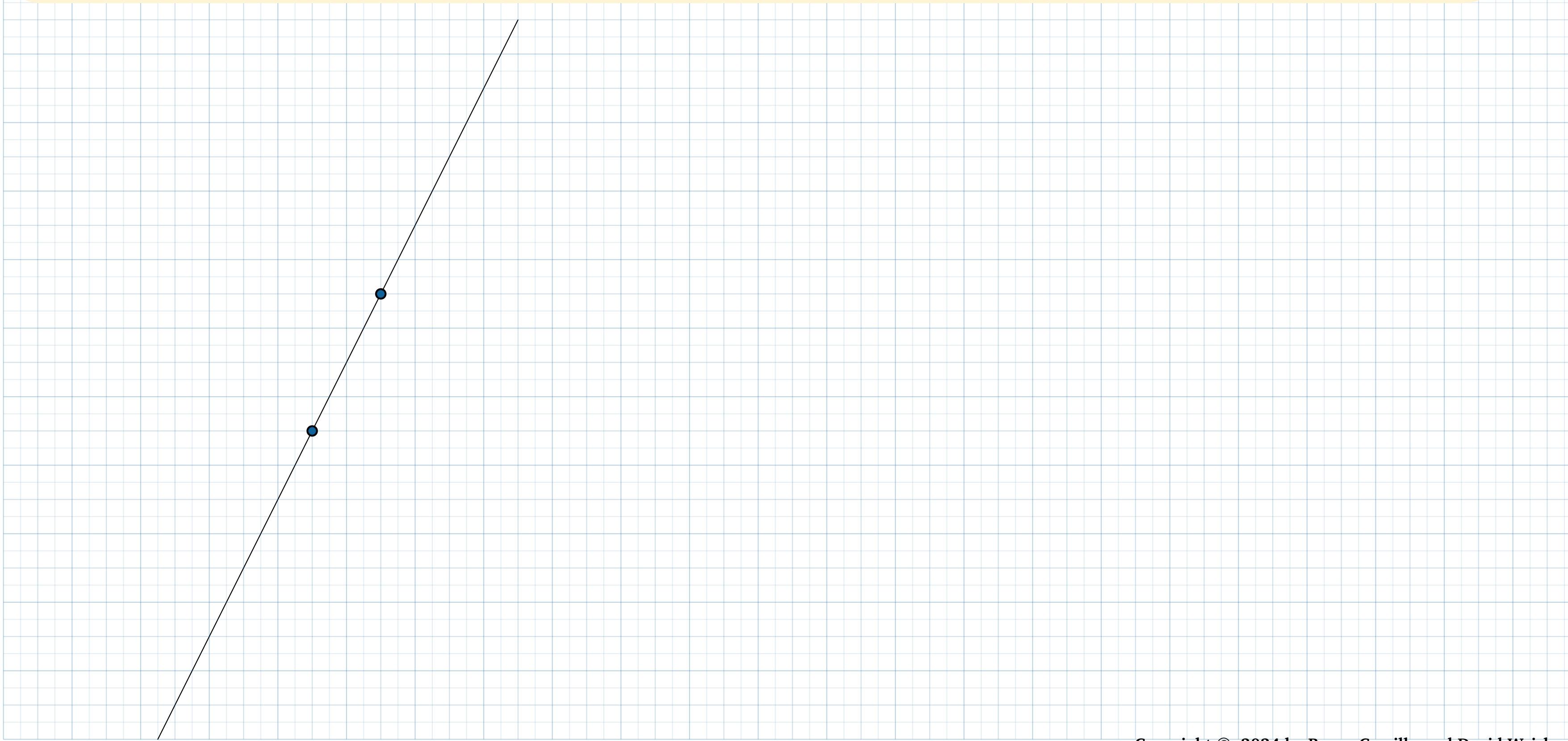
$$y = 2x + 1.$$

Identify a vector that moves points in L along L.



Exercise 3

Take L to be the line that contains the points $(1,3)$ and $(2,5)$. Use the polar form of the difference between $(1,3)$ and $(2,5)$ to identify all points on L that are a distance of 4 from $(1,3)$.

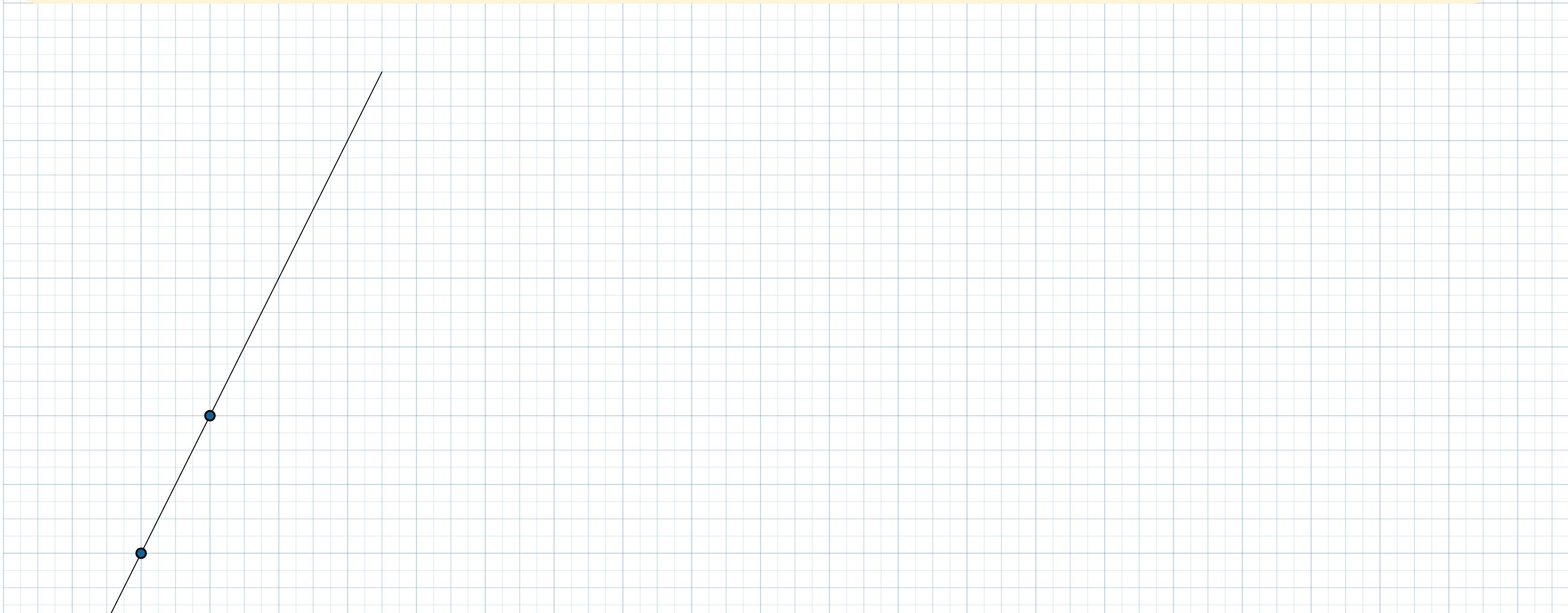


Exercise 4

Take L to be the line that contains the points $(1,3)$ and $(2,5)$.

(a) Roughly sketch a point p on L so that p lies to the right of $(1,3)$ and the distance between $(1,3)$ and p is three times the distance between $(1,3)$ and $(2,5)$.

(b) Sketch the vector V that is given by the difference $(2,5)-(1,3)$ and use V to exactly determine p. Think: How should V relate to $p-(1,3)$?

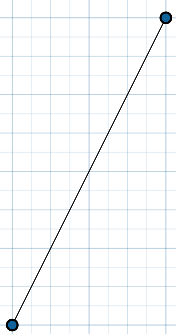


Exercise 5

Roughly sketch a point p in the line segment with endpoints $(1, 3)$ and $(2, 5)$ so that the distance between $(1, 3)$ and p is four times the distance between p and $(2, 5)$.

(a) Write the distance between p and $(2, 5)$ as d and the total distance from $(1, 3)$ to $(2, 5)$ as D. Determine the fraction of the line segment that is given by the part that is between $(1, 3)$ and p.

(b) Use the above fraction to scale the vector that moves $(1, 3)$ to $(2, 5)$ in order to precisely determine p.



Exercise 6

A particle moves at a constant velocity on the time intervals $[0, 2]$ and $(2, 7]$. It is at $(1, 3)$ at time 0, at $(2, 5)$ at time 2. It is at $(4, -1)$ at time 7. Identify an equation for the position, $\ell(t)$, of the particle at time t.