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# A Solution for Application 1.4

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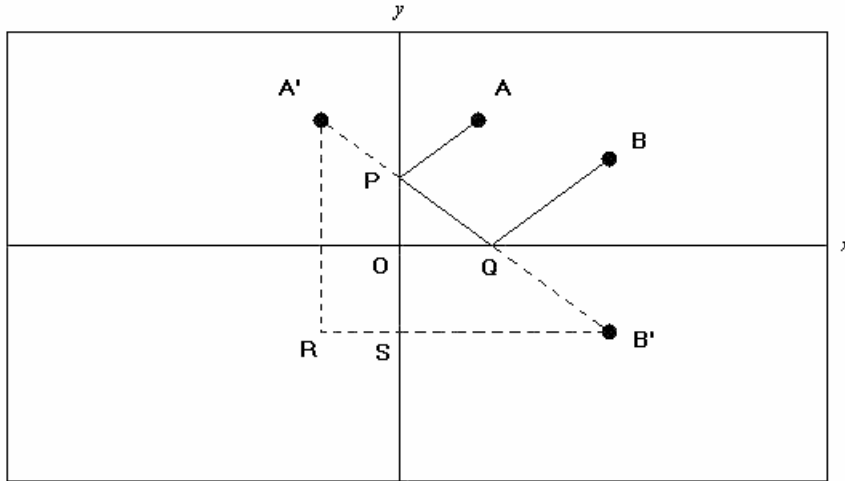
## **Introduction**

This document shows solutions for problem numbers 2 and 3 in Application 1.4.

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## An extended diagram

For this problem, we extend the ideas used in application 1.3. This time, in addition to reflecting point B over the x axis, we reflect point A over the y axis:



This section reviews background knowledge that should have to be able to complete application 1.3.

From our earlier work on application 1.3, we can see that

$$\frac{A'M}{A'R} = \frac{MQ}{RB'}$$

which gives us

$$MQ = \frac{(A'M)(RB')}{A'R}$$

Further, we can see that

$$\frac{A'M}{MQ} = \frac{OP}{OQ}$$

which gives us

$$OP = \frac{(A'M)(OQ)}{MQ}$$

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## The procedures

Here are the procedures I used to solve the problem. Notice that I really broke down each calculation, even further than the author did for application 1.3. This allowed me to test each calculation individually, and also made the exact calculations clearer.

Except for the mailbox procedure, the title of each procedure matches the name of a point whose coordinates must be calculated or the name of a line whose length is to be calculated. For example, procedure `a.prime` outputs the point  $A'$ , and `a.prime.m` outputs the length of line  $A'M$ .

```
to a.prime :a
op (list minus first :a last :a)
end

to a.prime.m :a
op last :a
end

to a.prime.r :a :b
op sum last :a last :b
end

to b.prime :b
op (list first :b minus last b)
end

to m.q :a :b
op quotient product a.prime.m :a r.b.prime :a :b a.prime.r :a :b
end

to mailbox :a :b
op (list (list 0 o.p :a :b) (list o.q :a :b 0))
end

to o.p :a :b
op quotient product a.prime.m :a o.q :a :b m.q :a :b
end

to o.q :a :b
op difference m.q :a :b first :a
end

to r.b.prime :a :b
op sum first :a first :b
end
```



## The Author

TJ Leone owns and operates Leone Learning Systems, Inc., a private corporation that offers tutoring and educational software. He has a BA in Math and an MS in Computer Science, both from the City College of New York. He spent two years in graduate studies in education and computer science at Northwestern University, and six years developing educational software there. He is a former Montessori teacher and currently teaches gifted children on a part time basis at the Center for Talent Development at Northwestern University in addition to his tutoring and software development work. His web site is <http://www.leonelearningsystems.com>