

# Rich Mathematical Task – Algebra II – *Drone's Best Friend*

Name \_\_\_\_\_ Date \_\_\_\_\_

## Drone's Best Friend

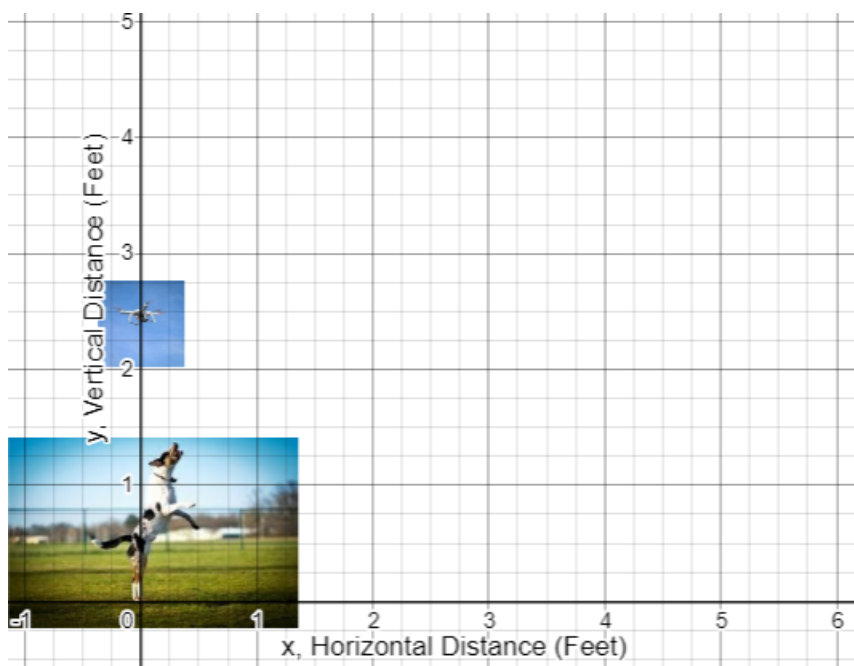
Drones have become very popular in recent years, but dogs have been beloved pets for centuries. What happens when the two come together? If you search the internet, you can see images of drones walking dogs, dogs chasing drones, and even drones and dogs working together for search and rescue.

In the image below, a dog is chasing a drone, beginning a jump towards the drone. The x-axis represents the horizontal distance traveled by the drone and dog and the y-axis represents the vertical distance traveled by the drone and dog.

If the path of the drone can be modeled by the line,  $y = \frac{1}{2}x + \frac{5}{2}$  and the path of the dog can be modeled by the parabola,  $y = -\frac{3}{4}x^2 + \frac{7}{2}x + \frac{1}{4}$ , will the dog catch the drone?

If so, at what point? What does this represent in the context of the situation?

Make sure you have solved the problem both algebraically and graphically to justify your answer.



Algebra II Task

Virginia Department of Education

2020

Copyright ©2020 by the Commonwealth of Virginia, Department of Education, P.O. Box 2120, Richmond, Virginia 23218-2120. All rights reserved. Except as permitted by law, this material may not be reproduced or used in any form or by any means, electronic or mechanical, including photocopying or recording, or by any information storage or retrieval system, without written permission from the copyright owner. Commonwealth of Virginia public school educators may reproduce any portion of these items for non-commercial educational purposes without requesting permission. All others should direct their written requests to the Virginia Department of Education at the above address or by e-mail to [vdoe.mathematics@doe.virginia.gov](mailto:vdoe.mathematics@doe.virginia.gov).