Today's Materials:

- ❑ folder/packet
- ❑ pen/pencil
- ❑ Chromebook
- ❑ Positive Attitude!

Features of Graphs

Lesson 6

Walking Home

Page 22

6.1 Warm Up (5 minutes)

Diego is walking home from school at a constant rate. This graph represents function d, which gives his distance from home, in kilometers since leaving the school.

Use the graph to find or estimate:

1. $d(0)$

1. $d(12)$

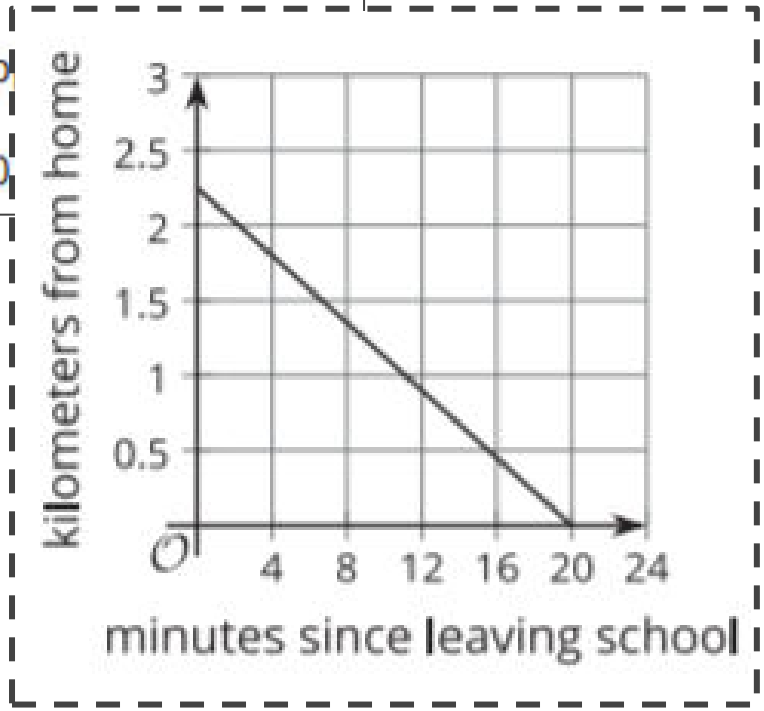
1. the solution to $d(m)=1$

1. the solution to $d(m)=0$

Students, write your response!

How did it go?

1. $d(0) = 2.25$
2. $d(12) = 0.75$
3. m is ap
4. m is 20



Activity Synthesis:

- ➔ Is the relationship between Diego's distance from school and time a linear function?
- ➔ Can we tell from the graph how far away Diego's house is from school?
- ➔ Can we tell from the graph how long it took Diego to get home?
- ➔ Why does the graph slant downward?

Let's use graphs of functions to learn about situations.

Today's Goals:

- ❑ **I can identify** important features of graphs of functions and **explain** what they mean in the situations represented.
- ❑ **I understand** and **can use** the terms "*horizontal intercept*," "*vertical intercept*," "*maximum*," and "*minimum*" when talking about functions and their graphs.

A Toy Rocket & a Drone

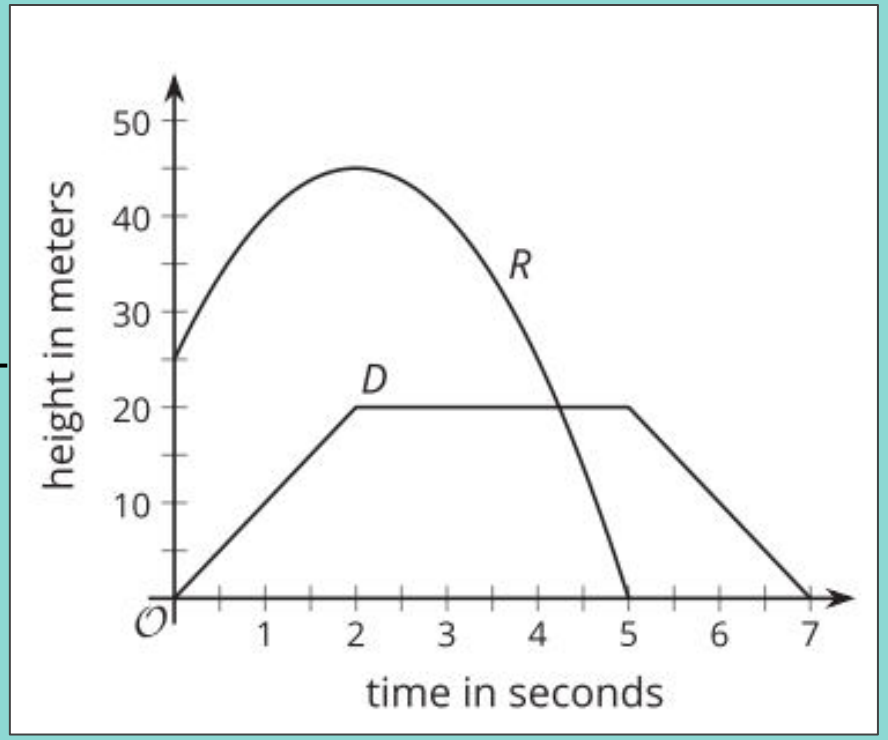
page 22

6.2 Activity (15 minutes)

A toy rocket and a drone were launched at the same time.

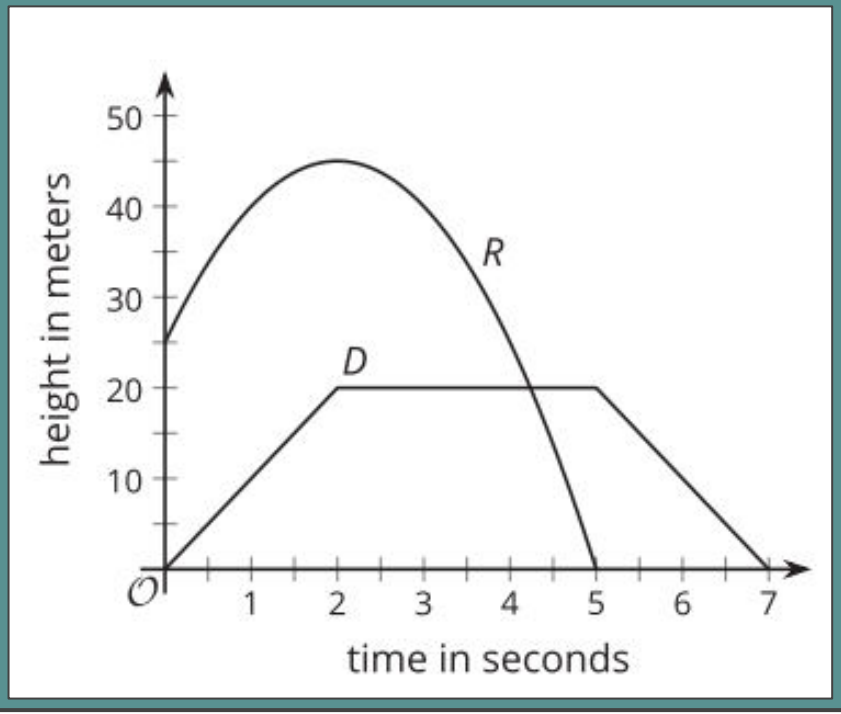
Here are the graphs that represent the heights of two objects as a function of time since they were launched.

Height is measured in feet above the ground and time is measured in seconds since launch.

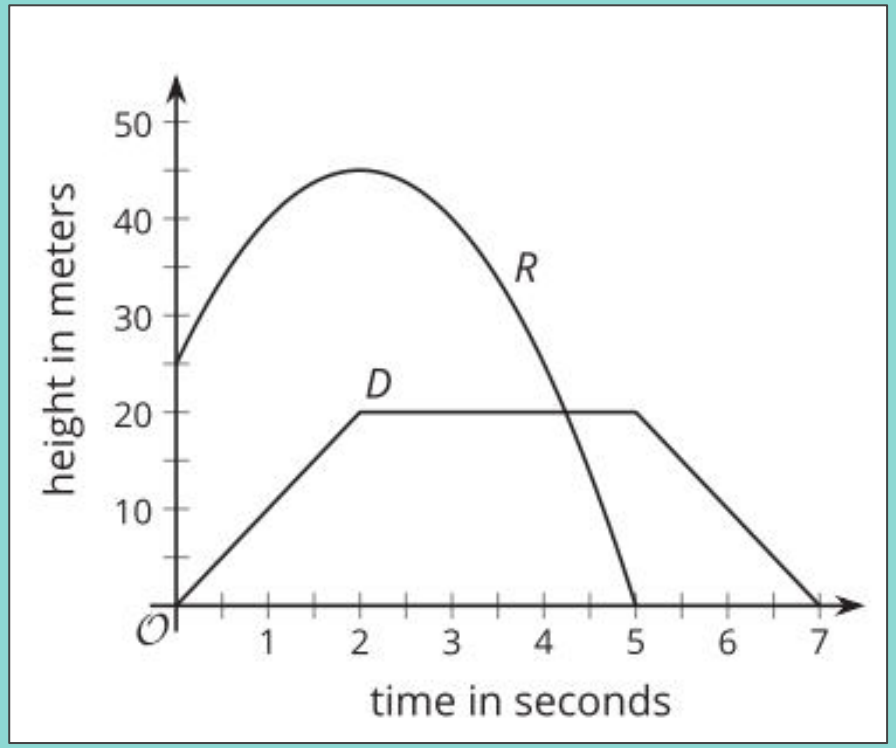


➔ What are some possible mathematical questions that could be asked about this situation?

Students, write your response!



1. Analyze the graphs and describe—as precisely as you can—what was happening with each object. Your descriptions should be complete and precise enough that someone who is not looking at the graph could visualize how the objects were behaving.



← Draw on me

2. Which parts or features of the graphs show important information about each object's movement? List the features or mark them on the graphs.

Students, draw anywhere on this slide!

Activity Synthesis: Vocabulary

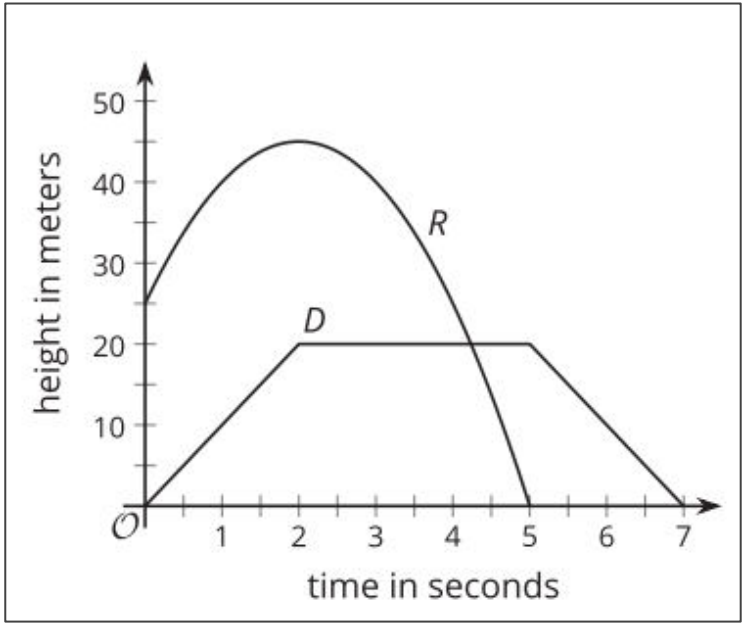
★ **A maximum (*relative max*):** a point on the graph that is as high or higher then all other points

★ **A minimum (*relative min*):** a point on the graph that is as low or lower than all other points

★ Note: a graph could have more than one relative max or relative min

ex: points $(2, (D(2))$ and $(5, D(5))$

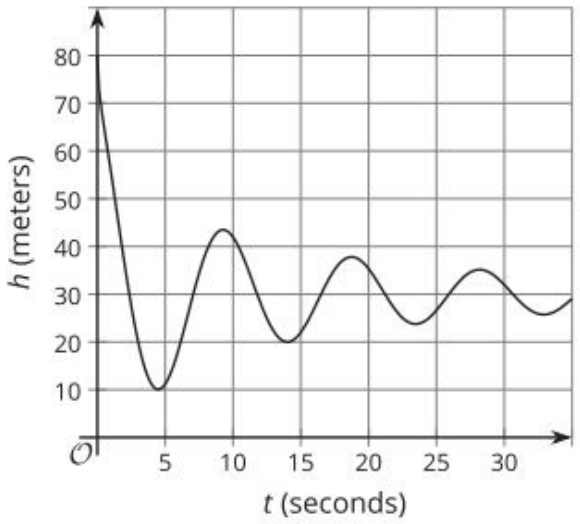
★ *Mark on graph (if needed): vertical & horizontal intercepts, intervals of increasing, staying constant, or decreasing*



The Jump

page
23-24

6.3 Activity (15 minutes)



In a bungee jump, the height of the jumper is a function of time since the jump begins.

Function h defines the height, in meters, of a jumper above a river, t seconds since leaving the platform.

Here is a graph of function h, followed by five expressions or equations and five graphical features.

FACTS:

$h(0)$
$h(t) = 0$
$h(4)$
$h(t) = 80$
$h(t) = 45$

- first dip in the graph
- vertical intercept
- first peak in the graph
- horizontal intercept
- maximum

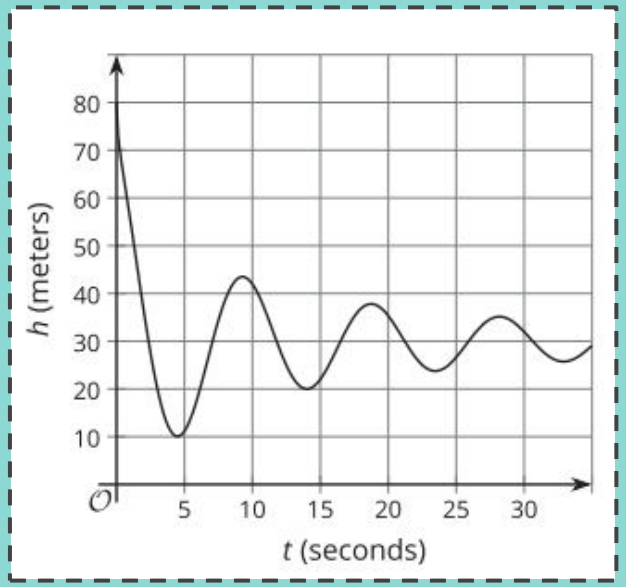
Match each description about the jump (from the table) **to a corresponding expression or equation and to a feature on the graph.**

description of jump	expression or equation	feature of graph
a. the greatest height that the jumper is from the river		
b. the height from which the jumper was jumping		
c. the time at which the jumper reached the highest point after the first bounce		
d. the lowest point that the jumper reached in the entire jump		
e.		

Complete in your packet, page 24!

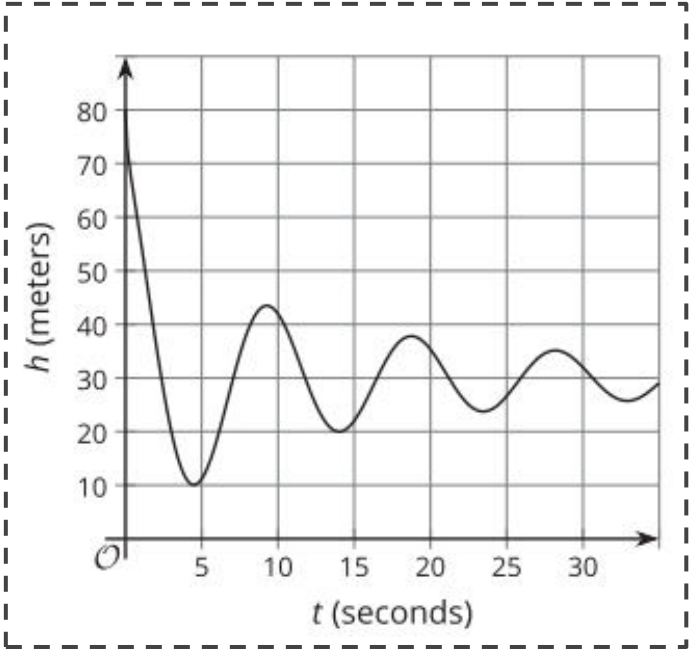
How did it go?

description of jump	expression or equation	feature of graph
a. the greatest height that the jumper is from the river	$h(t) = 80$	maximum
b. the height from which the jumper was jumping	$h(0)$	vertical intercept
c. the time at which the jumper reached the highest point after the first bounce	$h(t) = 45$	first peak in the graph
d. the lowest point that the jumper reached in the entire jump	$h(4)$	first dip in the graph
e. the time at which the jumper hits the surface of the river	$h(t) = 0$	horizontal intercept



Let's interpret $h(t)=0$

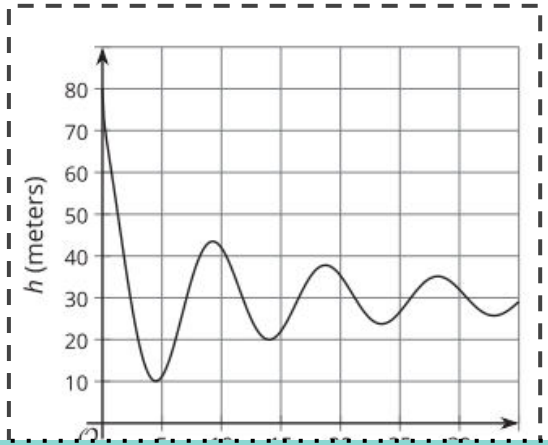
Let's distinction between a max/min **of a graph** and the maximum/minimum **of a function**....



Activity Synthesis:

- ➔ What is the greatest value of function *h*?
  - ◆ 80
- ➔ How do you know 80 is the greatest?
  - ◆ The jumper could not be higher than the platform
- ➔ What is the least value of function *h*?
  - ◆ About 10
- ➔ How do you know h(t) could not have lesser values?
  - ◆ We don't...

Activity Synthesis continued...



➔ **In this case, the graph has one maximum and it coincides with the maximum of the function, which is the greatest value of the function.**

➔ **The graph also has a minimum, $(4, h(4))$, which is lower than all other points shown on the graph, but this point does NOT represent the minimum of the function.**

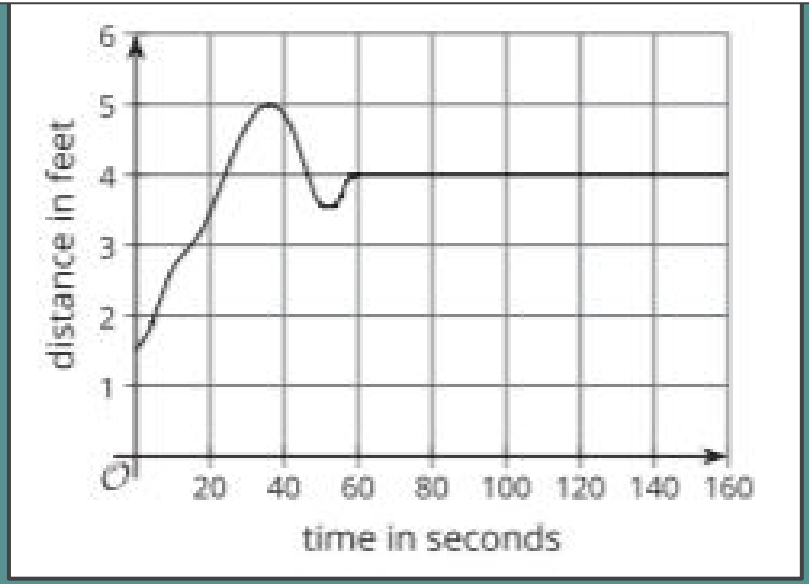
- The function h could have 0 as its minimum (or negative), but as far as the given graph (4, 10) is a minimum.

-A maximum/minimum **of a graph** is a *point*, and it gets labeled as such relative to other visible points on the graph.

-A maximum/minimum **of a function**, is a *value* that is the greatest (or least) for any input.

LESSON SYNTHESIS

- Function b gives the vertical distance (or the height) of a bee from the ground as a function of time, t.
- Function d gives the distance of a child from where his mom is sitting as a function of time, t.



1. **Choose a function *(b or d)***

1. **Take turns with your partner identifying the following features on the graph and interpreting then in terms of the situation (look below)**

- vertical intercept
- horizontal intercept
- **maximum**
- **minimum**
- intervals where the function is increasing
- intervals where the function is decreasing
- intervals where the function is staying constant
- solution or solutions to $b(t) = 2.5$ or $d(t) = 2.5$

Students, draw anywhere on this slide!

The Squirrel

6.4 COOL DOWN