1.2 Modeling with Graphs

ALGEBRA

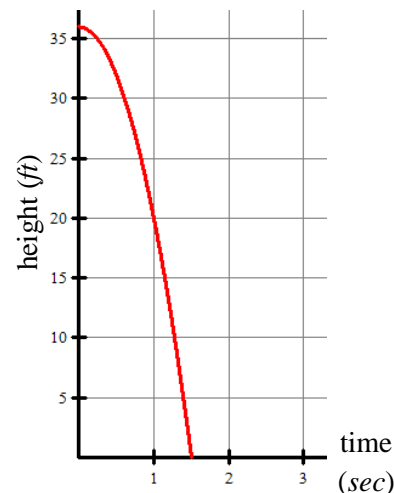**STORY**

Professor Splash set the world record with a 36 feet belly flop into a 1 foot pool of water.

$$h = -16t^2 + 36$$

time (min)	height (ft)
0	
½	
1	

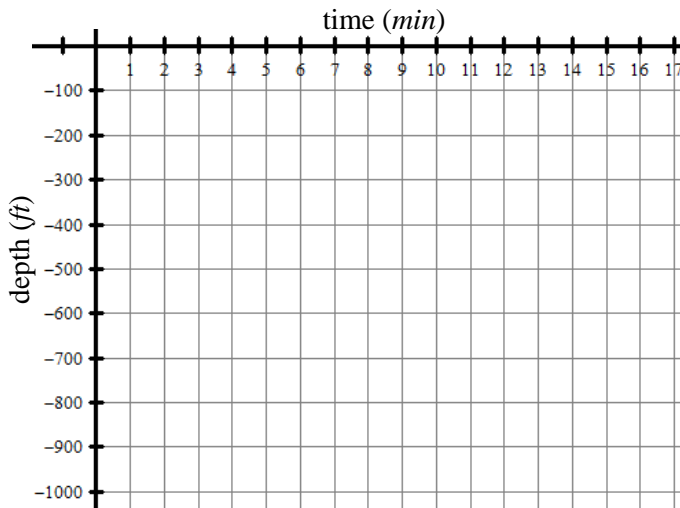*y*-intercept

x-intercept

point of intersection

STORY

Submarine A is 900 feet deep and rises 50 feet per minute.

Submarine B is on the surface level and submerges 100 feet per minute.
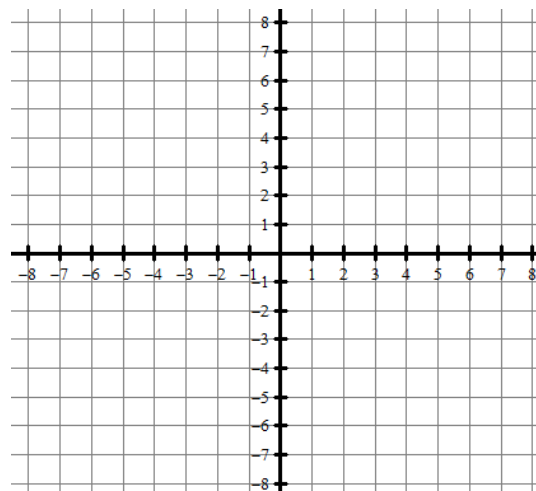
$d =$

time (min)	depth (ft)
0	
2	
4	

$d =$

time (min)	depth (ft)
0	
2	
4	

Point of intersection

Graph anything!

$$y = \sqrt{x + 5} + 1$$

x	y
−5	
−4	
−1	
0	
4	
−9	

STORY Timmy and Kat are at the arcade.   The graph shows each person's quarters over time.

TIMMY

_____	_____
(_____)	(_____)
0	
4	
14	

KAT

_____	_____
(_____)	(_____)
0	
4	
14	
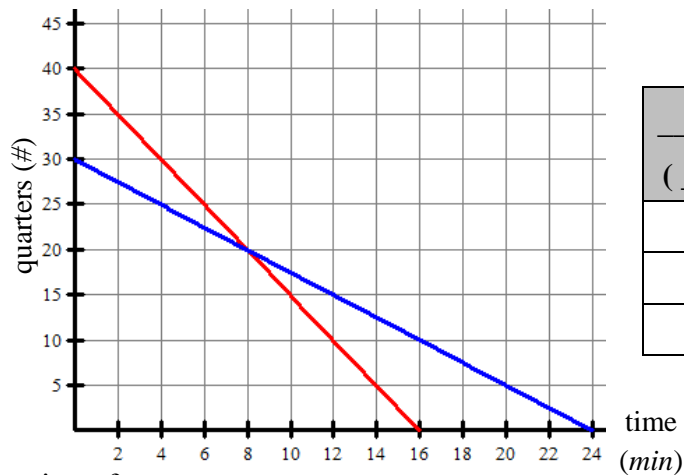
Find and explain the meaning of…

y-intercepts

x-intercpets

point of intersection

SMP #4

SUMMARY:

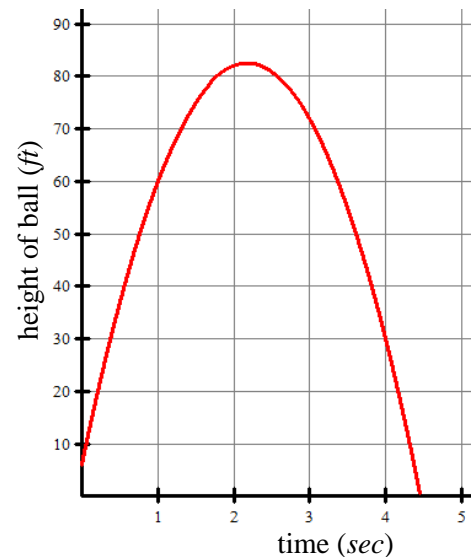Now, summarize your notes here!

1.2 Modeling with Graphs

PRACTICE

Use the information to fill the table exactly and answer the questions.

1. A six foot tall man throws a baseball straight up into the air. The equation represents the ball's height over time.

$$h = -16t^2 + 70t + 6$$

_____	_____
(_____)	(_____)
1	
2	
3	
4	

a) Find the *y*-intercept. What does it represent?

b) Approximate the *x*-intercept. What does it represent?

2. Carlos and Terry run a race. Terry runs 10 ft/sec. Carlos gets a 100 foot head start and runs 20 feet every 3 sec.

CARLOS

$d =$

time (sec)	distance (ft)
15	
45	
21	
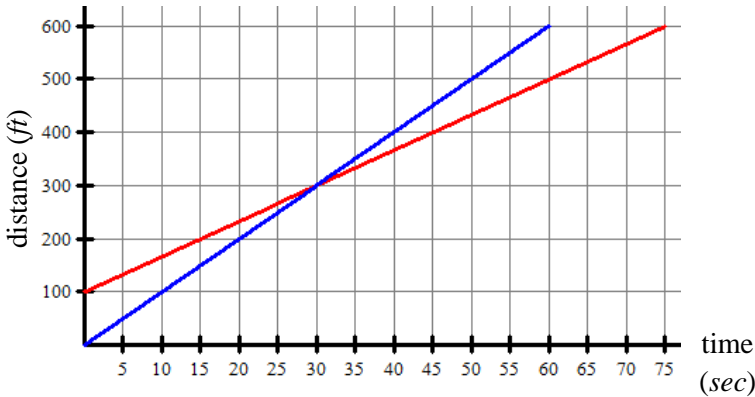
TERRY

$d =$

time (sec)	distance (ft)
10	
50	
8.5	

a) Label each line above as Carlos or Terry. Explain how you know which is which.

b) Find the point of intersection. What does it represent?

c) What is the distance of the race? Who won?

d) Who is winning at 42 seconds? How much are they winning by?

3. I-75 runs North South through Ohio. Dominic starts in Toledo 200 miles north of Cincinnati and travels 40 mph towards Cincinnati. Hannah starts in Cincinnati and travels towards Toledo at a rate of 60 mph. The equations represent each person's distance from Cincinnati.

DOMINIC

$d = 200 - 40t$

_____	_____
(_____)	(_____)
0.5	
1	
1.5	

HANNAH

$d = 60t$

_____	_____
(_____)	(_____)
0.5	
1	
1.5	
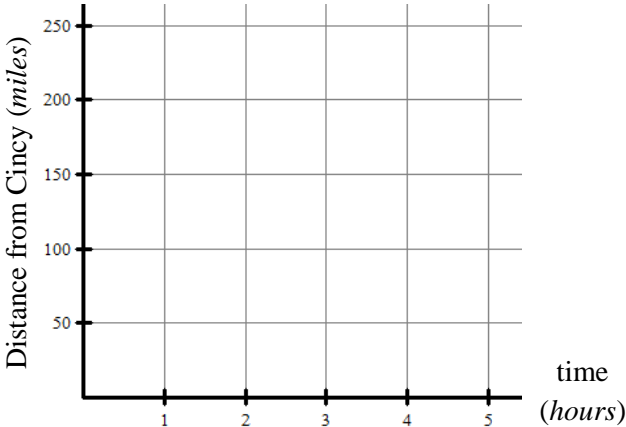
a) Label each line above as Dominic or Hannah.

b) Find the point of intersection. What does it represent?

c) What is Dominic's x-intercept? What does it represent?

d) If Hannah takes no breaks, how long will her drive to Toledo be?

Use the equations and graphs that model the situation to answer the questions.

4. Anthony and Mari are in two different elevators in a large building. Each floor is 13 feet tall. Mari's height over time is graphed below. Both Anthony and Mari ride their elevator for 12 seconds.

ANTHONY

$$h = 130 - \frac{13}{2}t$$

(____)	(____)
4	
6	
9	

height (ft) vs time (sec)
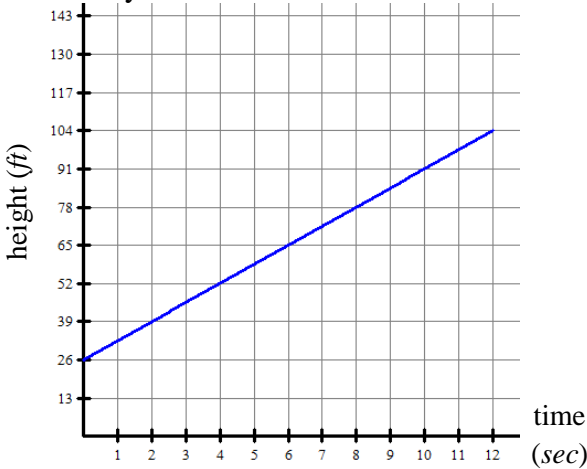
MARI

$$h =$$

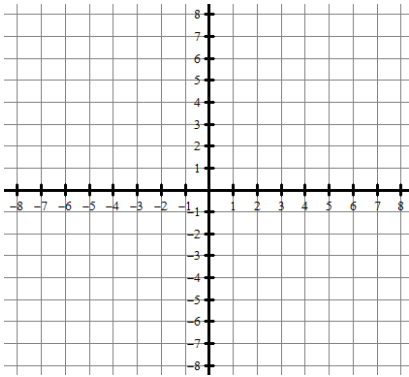| ____	____
(____)	(____)
0	
2	
4	

SMP #4

a) Graph Anthony's equation on the graph above.

b) Find the *y*-intercept for Anthony and Mari. What do the *y*-intercepts represent in this situation?

c) At what time will Anthony and Mari pass each other? Circle this point on the graph above.

d) What floor does Anthony stop on after 12 seconds?

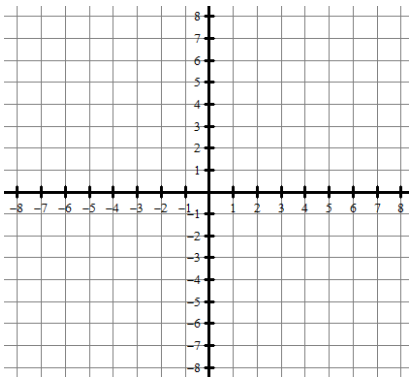**Use the equation to complete the table and sketch a graph.**

5. $y = -x^2 - 6x - 6$

x	y
−6	
−5	
−4	
−3	
−2	
−1	
0	

6. $y = |x - 1| - 3$

x	y
−6	
−3	
−1	
1	
3	
6	

1. **Use the equation to complete the table and sketch a graph.**

$y = x^3 - 4x$

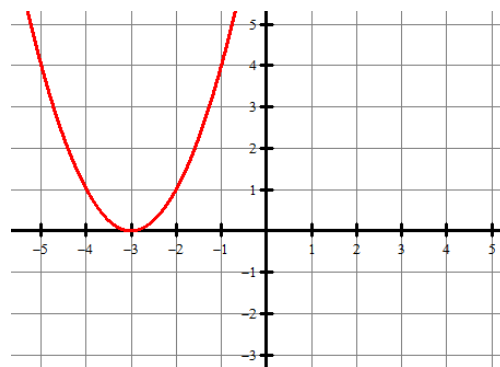| x	y
-2	
-1	
0	
1	
2	
3	

← NOTE: This point does not fit on the graph paper!
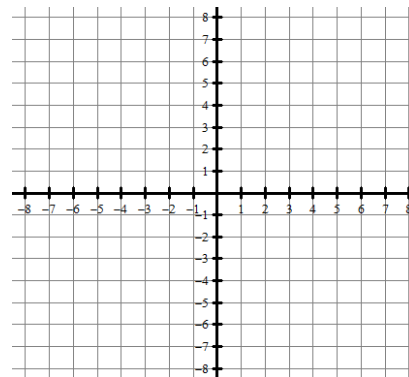
MULTIPLE CHOICE

2. Which of the following equations does NOT make the graph shown below?

   A) $y = (x + 3)^2$

   B) $y = x^2 + 6x + 9$

   C) $y = x^2 + 9$

   D) $y = (x + 3)(x + 3)$

   E) None, they all make the graph shown

EXIT TICKET

A jewelry store offers Chuck a job paying 40 thousand dollars per year plus 2% of every sale that he makes. The equation models the money Chuck makes if he sells x dollars of jewelry.

$$y = 40000 + 0.02x$$

Or Chuck can take the job and make 60 thousand dollars per year. How much jewelry does Chuck need to sell so that the first option is more profitable? Construct a viable argument to support your solution.

SMP #3