

Pick up
the
Warm Up

HW
TALLY



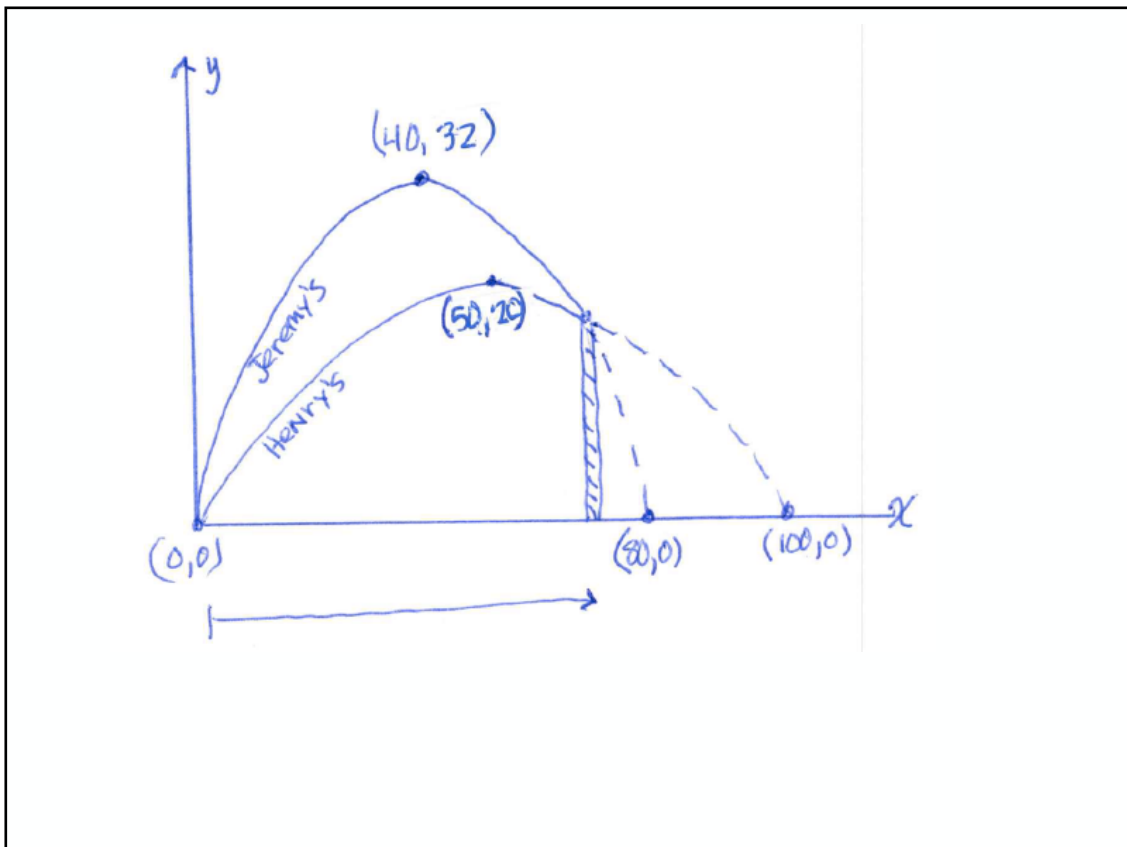
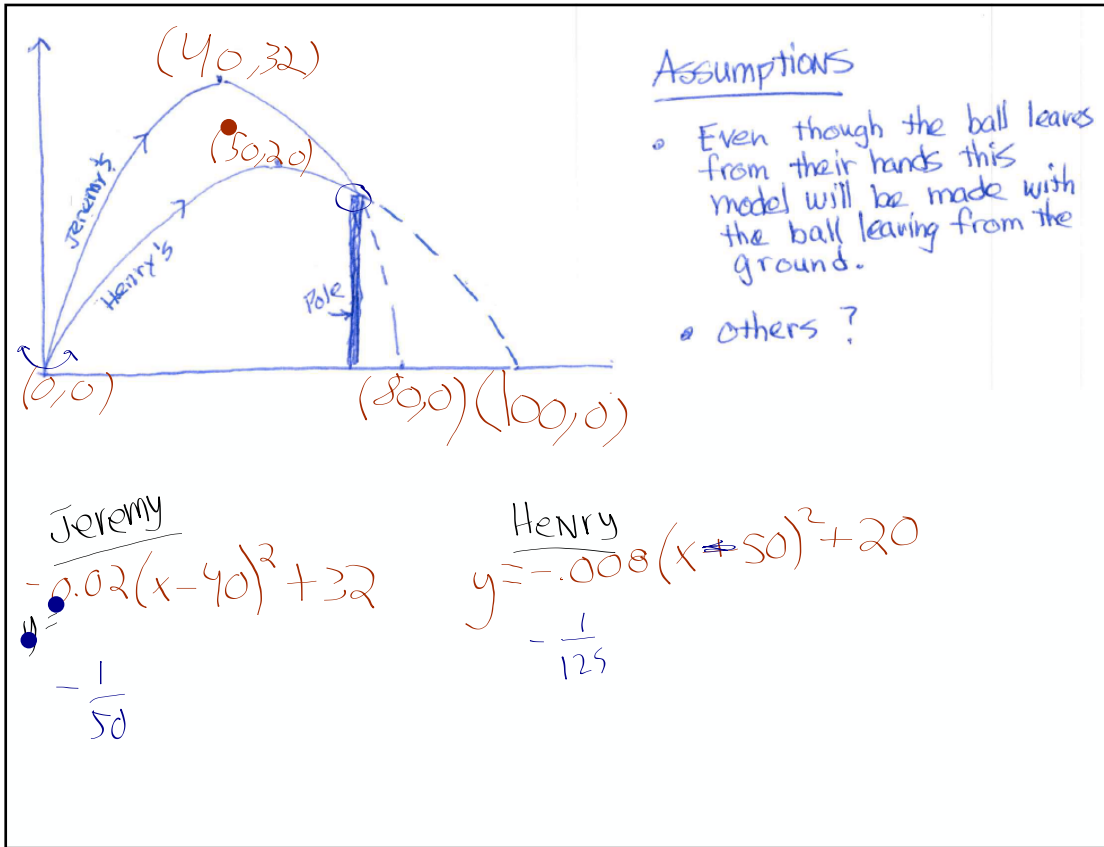
A Modeling Warm Up 4.1.4

Two friends were trying to see how far and how high they could throw a baseball in the air. Henry went first and threw his ball along a giant arc. It would have travelled a total of 100 feet along the ground but on the way back down from its peak height of 20 feet, his baseball hit the top of a light pole and fell straight to the ground.

Jeremy went second. His throw went even higher up to 32 feet, but incredibly his ball hit the top of the very same light pole as Henry's. Jeremy's throw would have travelled a total distance along the ground of 80 feet had it not hit the pole.

So, how how far away from the boys was the light pole? And how high was the light pole?

(Make a neat sketch, label key points, Create a system of equations)



Henry

$$y = a(x-50)^2 + 20$$

$$0 = a(100-50)^2 + 20$$

$$0 = 2500a + 20$$

$$-20 = 2500a$$

$$a = -\frac{20}{2500}$$

$$= -\frac{1}{125}$$

Henry

$$y = -\frac{1}{125}(x-50)^2 + 20$$

Jeremy

$$y = a(x-40)^2 + 32$$

$$0 = a(80-40)^2 + 32$$

$$0 = 1600a + 32$$

$$-32 = 1600a$$

$$a = -\frac{32}{1600}$$

$$a = -\frac{1}{50}$$

Jeremy

$$y = -\frac{1}{50}(x-40)^2 + 32$$

What's next?

What is common from both throws?

- Both balls have the same height when they hit the light pole. (same y -value)
- Both balls would have travelled the same distance at that point (same x -value)
 ↓
 along the ground

$$-\frac{1}{125}(x-50)^2 + 20 = -\frac{1}{50}(x-40)^2 + 32$$

↓
 To solve graphically
 graph each side
 as two functions
 (find intersection)

How far away? • How high? •

$$-\frac{1}{125} (x-50)^2 + 20 = -\frac{1}{50} (x-40)^2 + 32$$

$$-\frac{1}{125} (x-50)^2 = -\frac{1}{50} (x-40)^2 + 12$$

multiply by -250

$$2 (x-50)^2 = 5 (x-40)^2 - 3000$$

expand

$$2 (x-50)(x-50) = 5 (x-40)(x-40) - 3000$$

$$(2x-100)(x-50) = (5x-200)(x-40) - 3000$$

$$2x^2 - 100x - 100x + 5000 = 5x^2 - 200x - 200x + 8000 - 3000$$

$$2x^2 - 200x = 5x^2 - 400x$$

$$-200x = 3x^2 - 400x$$

$$0 = 3x^2 - 200x$$

$$0 = 3x^2 - 200x$$

factor

$$0 = x [3x - 200]$$

$$\downarrow$$
$$x = 0$$

$$\downarrow$$
$$3x - 200 = 0$$

$$3x = 200$$

$$x = \frac{200}{3} \approx 66.67 \text{ feet}$$

$$y = -\frac{1}{50} (66.67 - 46)^2 + 32$$

$$y = 17.8 \text{ feet tall}$$

∴ The light pole was 66.67 feet away from the boys and was about 17.8 feet tall

Questions
on HW

40

40
c

$$y = 2(x+3)^2 - 5 \quad y = 14x + 17$$

$$2(x+3)^2 - 5 = 14x + 17$$

$$2(x+3)(x+3) - 5 = 14x + 17$$

$$(2x+6)(x+3) = 14x + 22$$

$$2x^2 + 6x + 6x + 18 = 14x + 22$$

$$2x^2 - 2x - 4 = 0$$

(d) $y = 3(x-2)^2 + 3 \quad y = 6x - 12$

41

a) $3(y+1)^2 - 5 = 43$

b) $\sqrt{1-4x} = 10$

$$\textcircled{c} \quad \frac{6y-1}{y} - 3 = 2$$

$$\frac{6y-1}{y} = 5$$

$$\textcircled{d} \quad \sqrt[3]{1-2x} = 3$$

42 is a checkpoint ✓
 -meaning you should be close to mastery

(a) $t(n) = 1, 4, 7, 10$

Explicit $t(n) =$ or $t(n) =$

Recursive $\begin{cases} t(1) = \\ t(n+1) = \end{cases}$

(b) $3, \frac{3}{2}, \frac{3}{4}, \frac{3}{8}$ multiplier •

Explicit $t(n) =$

Recursive $\begin{cases} t(1) = 3 \\ t(n+1) = \end{cases}$

(c) Arithmetic

n	t(n)
0	
1	17
2	
3	3
4	

Explicit: $t(n)$

Recursive: $\begin{cases} t(1) = \\ t(n+1) = \end{cases}$

(d) Geometric

n	t(n)
0	
1	
2	7.2
3	8.64
4	

$t(n) =$

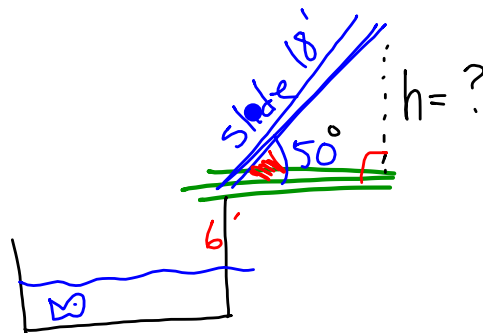
$\begin{cases} t(1) = \\ t(n) = \end{cases}$

(e) If arithmetic sequence \rightarrow $t(7) = 1056$
 $t(12) = 116$
 $t(4) = ?$

7	1056
8	
9	
10	
11	
12	116

43

Soh cah Toa
 $\nearrow \uparrow$



46 Solve system $2^{x+y} = 16$
 $2^{2x+y} = \frac{1}{8}$

$$2^{x+y} = 16$$

Pick up
the
Solutions

from
me



Aim

Use problem solving skills
to write equations and find
solutions to applications.

Will be doing as part of your HW.

As you work on the three problems
today, be thinking about

How can we model it?

What does the solution tell us?

Are there any new strategies
that might be useful.

- 2 problems
- Goal: Set up and solve both

Persistence
😊

$$4 - 48$$

$$4 - 49$$

When your group is finished

→ Have me check
your answer, then

$$4 - 49$$

p. 183

48 define variables

i.e. $a = \underline{\text{cost}}$ of chocolate truffles
 $b = \text{cost}$ of caramel turtles

TOTALS GIVEN
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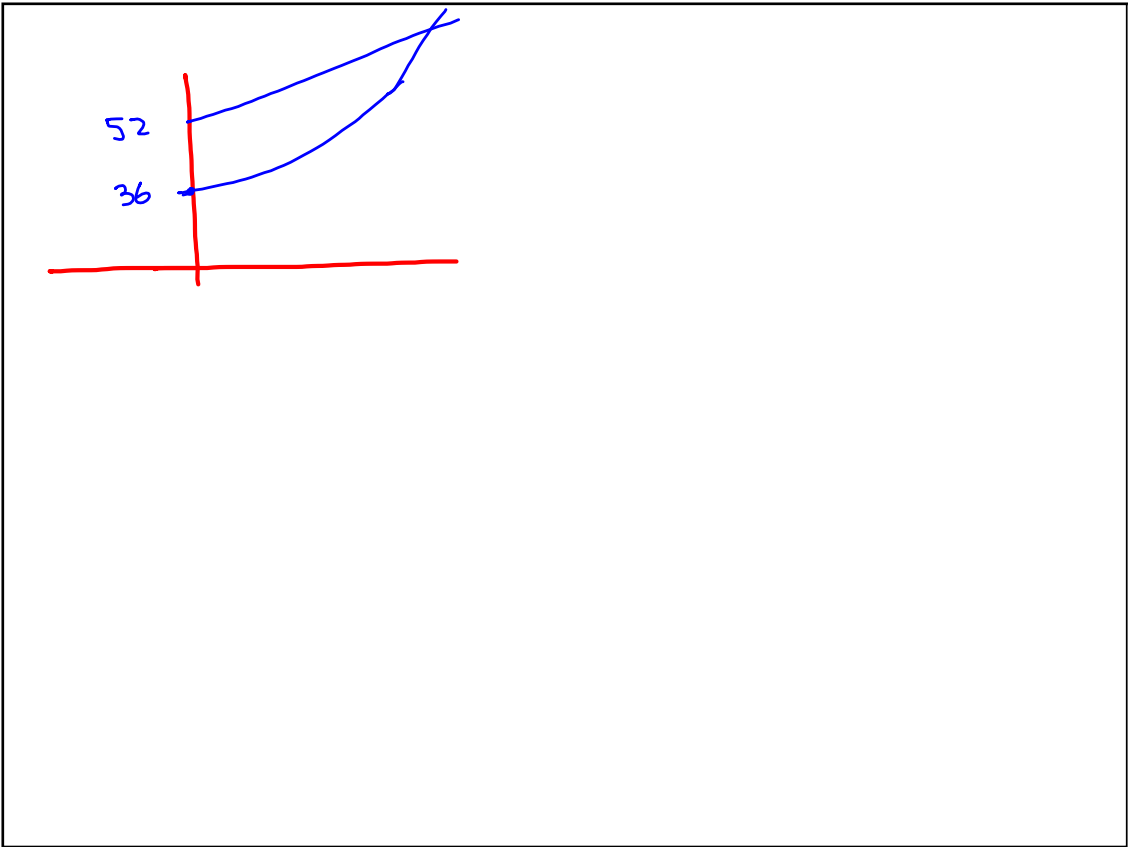
$$= 4,25$$

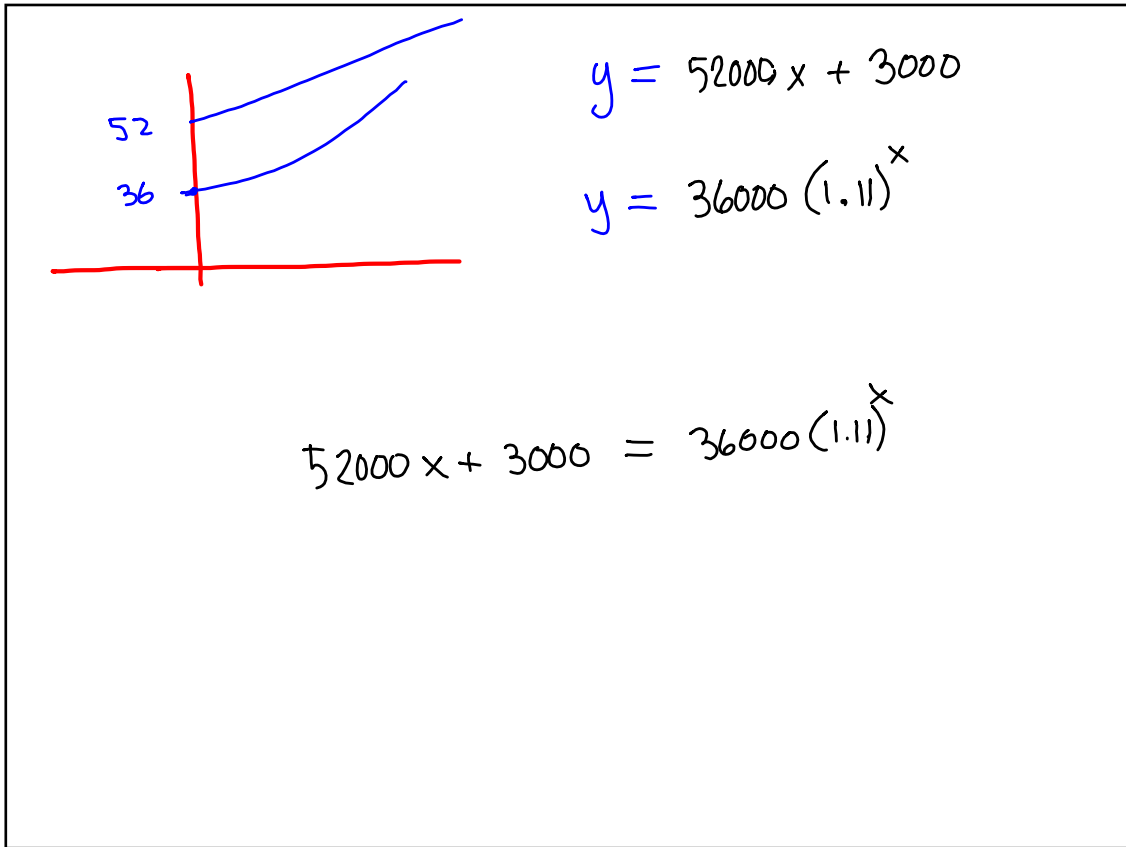
$$= 3,50$$

= cost of caramel
= cost of truffles

$$4 - 49a$$

Job A \$ 52,000 , 3000 raises
Job B \$ 36,000 , 11% raises





Assignment

4..... 48-49, 53bc, 54

↕
chocolate
truffles

costing

\$0.75 per
truffle

