SOLUTIONS

Practice Exam 3B

Try taking this version of the practice exam under testing conditions: no book, no notes, no classmate's help, no electronics (computer, cell phone, television). Give yourself one hour to work and wait until you have tried your best on all of the problems before checking any answers.

Caution: Usually more than half points on this exam are for solving equations and inequalities. Be sure you understand what you need to show for full credit. Using a different method, or not showing enough work might get little to no partial credit.

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1. Goldie the Goldfish, Pinches the Lobster, Quackers the Duck, Speedy the Turtle. These first generation Beanie Babies toys were anticipated to increase in value according to the equation

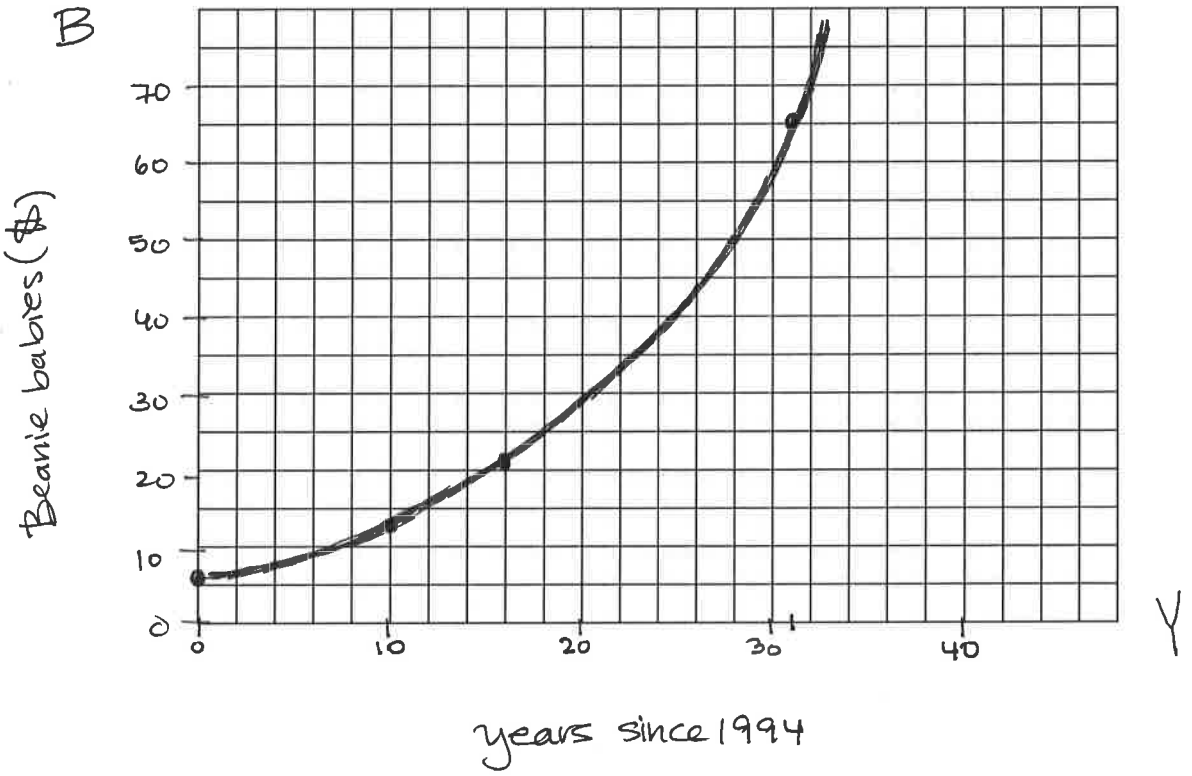
$$B = 6 * 1.08^{Y}$$

where B is the value of Beanie Babies (in \$) and Y is the years since 1994.

(a) Make a table showing the anticipated value in 1994, 2004, 2010, and 2025.

year	1994	2004	2010	2025
Y	0	10	16	31
B	6.00	12.95	20.56	65.21

(b) Draw a graph showing how the value of the Beanie Babies increased.



The problem continues ...

(c) Set up and solve an equation to determine when will Beanie Babies made in 1994 were anticipated to be worth over \$40. Report the actual year.

$\frac{6}{6} \cdot 1.08^Y = \frac{40}{6}$

$1.08^Y = 6.666....$

$Y = \frac{\log(6.66....)}{\log(1.08)} = \log(\text{ANS}) \div \log(1.08) = 24.65...$

≈ 25 years after 1994 = In year 2019

2. Best we can tell, the floor of our front porch was 7'2" above ground when the house was built. It has been slowly sinking ever since. The contractor estimated that it's dropped .45 inches per year. The equation is

$$P = 86 - .45A$$

where P is the height of the porch (in inches) and A is the age of the house (in years).

(a) Make a table showing the height of the front porch when the house was built, when it was 20 years old, and when it was 50 years old.

A	0	20	50
P	86	77	63.5

(b) The floor of our front porch is currently 48 inches above ground. Set up and solve an equation to figure out how old our house is.

$86 - .45A = 48$

$-86 \quad\quad -86$

$\frac{-.45A}{-.45} = \frac{-38}{-.45}$

$A = 84.44..$

Our house is $\approx$ 84 years old.

(c) Once the porch is below 40 inches, we will have to do something to fix it. Set up and solve an inequality to find the answer to the nearest year. Remember it's already an old house, so figure out how many years *from now*.

$86 - .45A < 40$

$-86 \quad\quad -86$

$\frac{-.45A}{-.45} < \frac{-46}{-.45}$

$A > 102.2...$

$-84 \quad\quad -84$

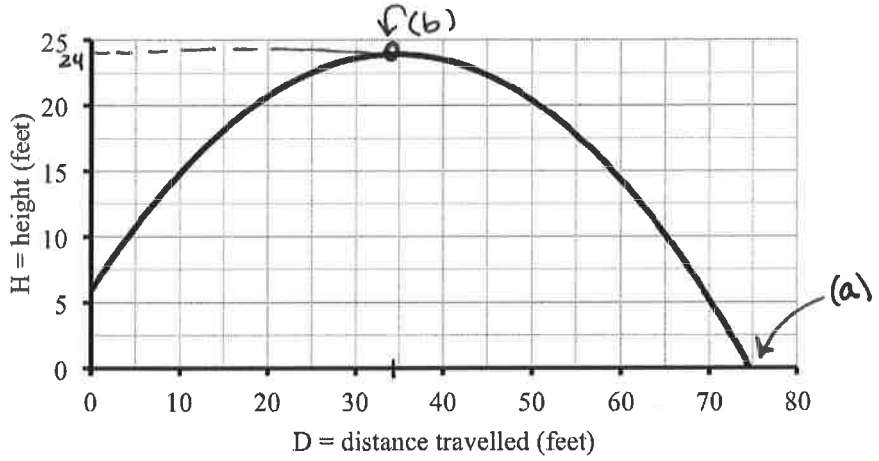
18

We will need to fix the porch in $\approx$ 18 years.

3. A shot put (large metal ball) is thrown closely following the parabolic arch given by the equation

$$H = -.015D^2 + 1.04D + 5.9$$

where D is the distance travelled horizontally, and H is the height above the ground of the shot, both in feet. The path of the shot put is graphed below.



(a) How far away did the shot put land? Estimate the answer from the graph. Then show how to set up and solve an equation to find the answer to two decimal places.

≈ 74 feet

$-.015D^2 + 1.04D + 5.9 = 0$

$a = -.015,\ b = 1.04,\ c = 5.9$

$$D = \frac{-1.04}{2(-.015)} \pm \frac{\sqrt{1.04^2 - 4(-.015)(5.9)}}{2(-.015)}$$

(-)1.04 ÷ (2 X (-).015) = $\sqrt{(1.04^2 - 4 \times (-).015 \times 5.9)} \div (2 \times (-).015) =$

$D = 34.667 \pm 39.939$

34.667 + 39.939 = 74.606

34.667 − 39.939 = −5.272

≈ 74.61 feet

(b) How high does the shot put get? Show how to find the exact answer. Then compare to the graph.

$D = 34.667$

$H = -.015 \times 34.667^2 + 1.04 \times 34.667 + 5.9 = 23.926\ldots$

≈ 23.9 feet

4. The amount of snow in a snowball, C cups, depends on the diameter (distance across) of the snowball, D inches according to the equation

$$C = 0.036D^3$$

(a) How many cups of snow are needed to make a snowball that's 3 inches across? 5 inches across?

D	3	5
C	.972	4.5

(b) How many cups of snow are needed to make a snowball that's 2 feet across? Give your answer in gallons. Use that 1 gallon = 4 quarts and 1 quart = 4 cups.

$D = 2 \text{ feet} * \frac{12 \text{ in}}{1 \text{ foot}} = 24 \text{ in}$

$C = .036 \times 24 \wedge 3 = 497.664 \text{ cups} * \frac{1 \text{ quart}}{4 \text{ cups}} * \frac{1 \text{ gal}}{4 \text{ quarts}} = 497.664 \div 4 \div 4 = 31.104$

≈ 31 gallons

WOW!

(c) Karen has a 5 gallon paint bucket packed with snow and wants to make a giant snowball out of it. How big will the snowball be? Show how to use successive approximation to find the answer to the nearest inch. Display your calculations in a table.

$5 \text{ gal} * \frac{4 \text{ quarts}}{1 \text{ gal}} * \frac{4 \text{ cups}}{1 \text{ quart}} = 5 \times 4 \times 4 = 80 \text{ cups}$

D	5	24	10	15	12	13
C	4.5	497	36	121.5	62.2	79.092
vs 80	LOW	HIGH	LOW	HIGH	LOW	YES!

≈ 13 inches across

(d) Now set up and solve an equation to find the answer to the nearest inch.

$\frac{.036D^3}{.036} = \frac{80}{.036}$

$D^3 = 2{,}222.22\ldots$

$D = \sqrt[3]{2{,}222.22}$ — 3 $\sqrt{}$ ANS $= 13.049\ldots$

≈ 13 inches across