SOLUTIONS

Practice Exam 2B

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.

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1. The Skärstroms want to dig a new well for water for their lake cabin. The company charges \$900 to bring the equipment on site and draw the permit and then \$2 per foot to dig.

   (a) What would a 100 foot deep well cost?

   $900 + 2 \times 100 = \boxed{\$1,100}$

   (b) Name the variables and write an equation relating them.

   F = depth of well (feet) ~ indep
   C = total cost (\$) ~ dep

   $\boxed{C = 900 + 2F}$

   (c) Make a table showing the total cost for a well 100, 250, or 400 feet deep.

F	100	250	400
C	1,100	1,400	1,700

↑ $900 + 2 \times 250 =$

2. Xander grows tomatoes in his garden. He's noticed that a typical plant yields 5 pounds of tomatoes. He's been experimenting with the impact of liquid food on plant yield and estimates that each drop increases yield by 14%.

   (a) Calculate the growth factor and write an equation showing how yield for each tomato plant depends on the number of drops of liquid food. Use Y for the yield (in pounds) and D for the amount of liquid food (in drops).

$r = 14\% = .14 \Rightarrow g = 1 + r = 1 + .14 = \boxed{1.14}$

$\boxed{Y = 5 * 1.14^D}$

   (b) Xander uses 10 drops of food on one of his tomato plans and uses all of the tomatoes from that plant to make salsa. If each pound of tomatoes makes around a pint of salsa, how much salsa will Xander have (from that one plant)?

D	Y
10	18.54 pounds

$\Rightarrow$ 18.54 pints of salsa

$5 \times 1.14 \wedge 10 =$

   (c) Convert your answer into gallons. Use 1 gallon = 4 quarts and 1 quart = 2 pints. Olé!

$18.54 \text{ pints} * \frac{1 \text{ quart}}{2 \text{ pints}} * \frac{1 \text{ gallon}}{4 \text{ quarts}}$

$= 18.54 \div 2 \div 4 = 2.3175.$ $\approx 2\frac{1}{3}$ gal of salsa

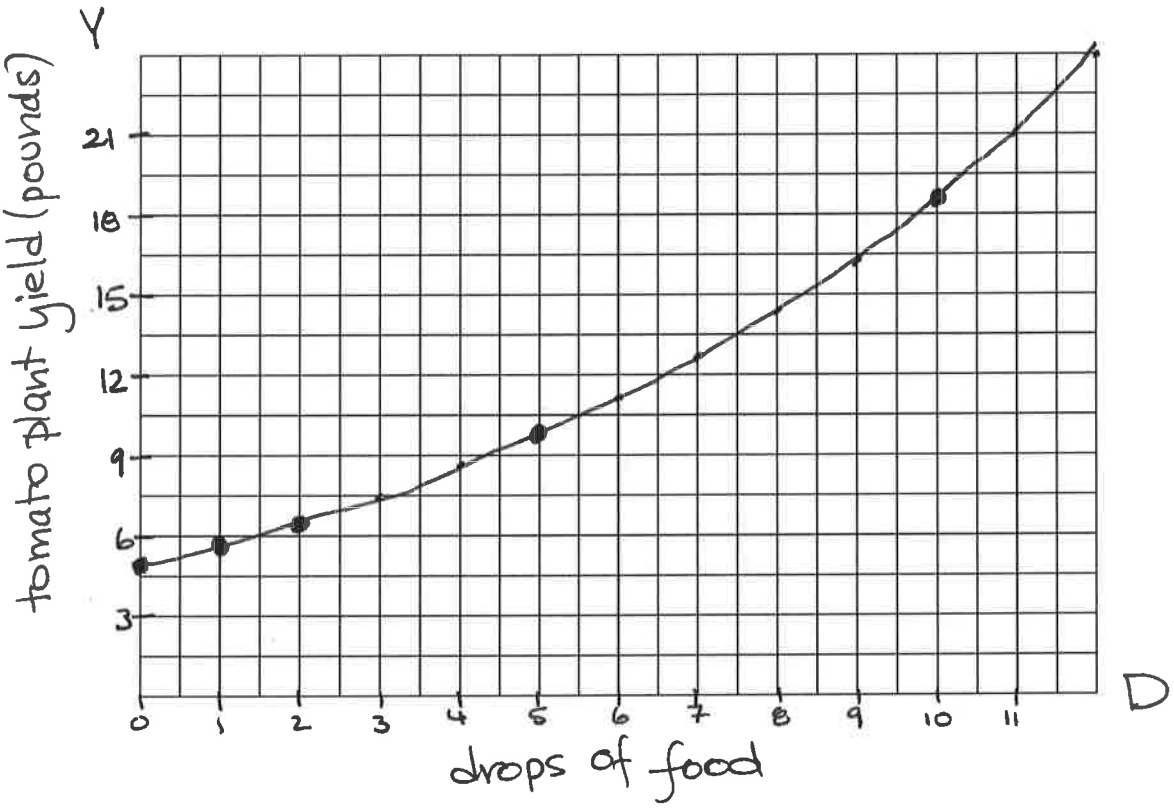
The problem continues ...

(d) Make a table showing Xander's projections for yield for each tomato plant if he uses 0, 1, 2, 5, or 10 drops of liquid food.

D	0	1	2	5	10
Y	5	5.7	6.49	9.63	18.54

$5 \times 1.14 \wedge 10 =$

(e) Graph the function.



3. Skye and her sister Clover started a t-shirt printing company. To produce a particular t-shirt it costs \$350 in materials and labor to set up a silkscreen and then \$7.50 for each shirt made to cover materials and printing. The average cost per t-shirt \$$C$ is a function of N, the number of t-shirts printed. The equation for this function is

$$C = \frac{350 + 7.50N}{N}$$

(a) Evaluate this formula when $N = 50$ and explain what the value of C you get means in the story.

$C = (350 + 7.50 \times 50) \div 50 = 14.5$

If Skye and Clover make 50 t-shirts, the cost will average \$14.50/t-shirt.

(b) Make a table showing the average cost per t-shirt if Skye and Clover make 1, 20, 50, 100, or 300 t-shirts.

N	1	20	50	100	200
C	357.50	25.00	14.50	11.00	8.67

↖ $(350 + 7.50 \times 1) \div 1 =$

(c) Approximately how many t-shirts would they need to make to keep the average cost per shirt under \$10? Use successive approximation and display your guesses in a table.

N	100	300	200	150	130	140	141
C	11.00	8.67	9.25	9.83	10.19	10	9.98
VS 10	HIGH	LOW	LOW	LOW	HIGH	=	LOW

They would need to make 141 t-shirts to keep the average cost under \$10.

The problem continues ...

Skye designs the shirts and runs the press. Clover is the brains behind sales. She would like to price the shirts at \$12.95 each. The sisters will make a profit of \$$P$ where

$$P = 5.45N - 350$$

(d) This is a linear equation. What is the slope, what are its units, and what does it mean in the story?

\$5.45/t-shirt That's the per t-shirt profit.

\$12.95 price
− \$7.50 cost
\$5.45 profit ✓

(e) What is the intercept, what are its units, and what does it mean in the story?

−\$350 That's the set up costs. (loss)

(f) How many t-shirts do they sisters need to sell to make \$1,000 profit? Use successive approximation and display your guesses in a table.

N	100	200	300	250	245	247	248
P	195	740	1,285	1,012.5	985.25	996.15	1001.60
vs 1000	LOW	LOW	HIGH	HIGH (CLOSE)	LOW	LOW	HIGH, CLOSE

248 t-shirts to earn \$1000 profit.

4. (a) Kotoyo's uncle won \$100,000 on a game show. If he invests it in a fund that's expected to earn 5.7% interest compounded monthly, how much will he have after 5 years? Use the COMPOUND INTEREST FORMULA.

$p = \$100{,}000 \quad r = 5.7\% = .057 \quad y = 5 \text{ years}$

$a = 100{,}000\left(1 + \frac{.057}{12}\right)^{12\times 5} = 100000\times(1+.057\div 12)\wedge(12\times 5) =$

$= 132{,}866.5088\ldots \approx \boxed{\$132{,}866.51}$

(b) Kotoyo's grandmother has been contributing \$150 a month into a college fund for Kotoyo for the past 8 years. The account pays 4% interest compounded monthly. How much is in the account now? Use the FUTURE VALUE ANNUITY FORMULA.

$p = \$150 \quad y = 8 \text{ years} \quad r = 4\% = .04$

$a = 150\,\frac{\left(1 + \frac{.04}{12}\right)^{8\times 12} - 1}{\frac{.04}{12}} = 150\times\left((1+.04\div 12)\wedge(8\times 12) - 1\right)\div(.04\div 12) =$

$= 16{,}937.7803\ldots \approx \boxed{\$16{,}937.78}$

(c) Kotoyo owes \$8,742 on her credit card. They charge her 16% interest compounded monthly. What would her monthly payment be if she wants to pay it off in 5 years? Use the LOAN PAYMENT FORMULA.

$a = \$8{,}742 \quad r = 16\% = .16 \quad y = 5 \text{ years}$

$p = \frac{8742 * \frac{.16}{12}}{1 - \left(1 + \frac{.16}{12}\right)^{-5\times 12}} = (8742\times .16\div 12)\div\left(1 - (1+.16\div 12)\wedge\left((-)\,5\times 12\right)\right) =$

$= 212.5884\ldots \approx \boxed{\$212.59}$

(d) What is the equivalent annual percentage rate (APR) of Kotoyo's credit card? Use the EQUIVALENT APR FORMULA. *Don't forget to report the percentage.*

$APR = \left(1 + \frac{.16}{12}\right)^{12} - 1 = (1+.16\div 12)\wedge 12 - 1$

$= .172270\ldots \approx .1723 = \boxed{17.23\%}$