LESSON MAKER PRO

Patterns That Pay

Use data to model costs, savings, and change.

HIGH SCHOOL · A1P.DSP.E

A1P.DSP.E "Data analysis techniques can be used to develop models of contextual situations and to generate and evaluate possible solutions to real problems involving those contexts."

NAME _____ DATE _____

BUILD A CONSTANT-RATE MODEL

When a quantity changes by the same amount for each increase of 1 in x, model it with y = mx + b. Find m by dividing the change in y by the change in x, then use a data pair to find b. Check that the model fits the data before using it to make a prediction.

WORKED EXAMPLE

A print shop charges a setup fee plus the same price per print. Use the table to predict the cost of 20 prints.

PRINT SHOP COSTS

Prints, x	Cost, y ($)
12	79
16	95

1. The cost rises by 95 - 79 = 16 dollars for 16 - 12 = 4 more prints.
2. The price per print is 16 / 4 = 4 dollars.
3. The setup fee is 79 - 4(12) = 31 dollars, so y = 4x + 31.
4. For 20 prints, y = 4(20) + 31 = 111.

Answer: $111

PRACTICE 6 problems

1 A game's score grows at a constant rate as you finish levels. Write a model for score y after x levels.

GAME SCORE

Levels, x	Score, y
0	7
2	13

ANSWER _____

2 A bike rental has a starting fee and an hourly charge. Use a constant-rate model to predict the cost for 5 hours.

BIKE RENTAL

Hours, x	Cost, y ($)
1	8
3	18

ANSWER _____

3 Your savings grow by the same amount each week. After how many weeks will you have $36?

SAVINGS

Weeks, x	Savings, y ($)
0	6
3	21

ANSWER _____

4 A student channel gains followers at a constant rate. Predict its follower count after 7 days.

CHANNEL FOLLOWERS

Days, x	Followers, y
1	11
3	17
5	23

ANSWER _____

5 Can one constant-rate model fit all the download counts? Explain by comparing the rates between data pairs.

APP DOWNLOADS

Days, x	Downloads, y
0	8
2	14
5	29

ANSWER _____

6 A shuttle charges a starting fee plus a cost per mile. Write a model for cost y after x miles, then find the cost for 6 miles.

SHUTTLE FARES

Miles, x	Cost, y ($)
0	15
2	19

ANSWER _____

APPLY IT Show your work

1 A club sells tickets for an event. Its total money includes a starting donation and grows by the same amount for each ticket sold. What is the fewest number of tickets the club must sell to reach at least $53?

CLUB FUNDRAISER

Tickets sold, x	Total money, y ($)
2	18
6	38

ANSWER _____

2 Your phone's battery percentage falls steadily while you stream video. Predict the percentage after 25 minutes. Will it meet a plan that needs at least 35% battery?

BATTERY WHILE STREAMING

Minutes, x	Battery, y (%)
0	87
10	67

ANSWER _____

CHALLENGE One step up

Two companies rent gaming stations by the hour. Each has a starting fee and a constant hourly charge. After how many hours will the plans cost the same? Which plan costs less for 7 hours? Explain using a model for each plan.

GAMING STATION RENTALS

Hours, x	Plan A ($)	Plan B ($)
0	23	8
2	27	18

WORK SPACE AND ANSWER

Patterns That Pay

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A game's score grows at a constant rate as you finish levels. Write a model for score y after x levels.	**y = 3x + 7**
2	A bike rental has a starting fee and an hourly charge. Use a constant-rate model to predict the cost for 5 hours.	**$28**
3	Your savings grow by the same amount each week. After how many weeks will you have $36?	**6 weeks**
4	A student channel gains followers at a constant rate. Predict its follower count after 7 days.	**29 followers**
5	Can one constant-rate model fit all the download counts? Explain by comparing the rates between data pairs.	**No. Downloads grow by 3 per day from day 0 to day 2, but by 5 per day from day 2 to day 5.**
6	A shuttle charges a starting fee plus a cost per mile. Write a model for cost y after x miles, then find the cost for 6 miles.	**y = 2x + 15; $27 for 6 miles**

PART 2 · APPLY IT

1. **9 tickets** The total rises $20 for 4 tickets, so y = 5x + 8. Solve 5x + 8 ≥ 53 to get x ≥ 9.
2. **37%; yes, it meets the 35% minimum.** The battery falls 20 percentage points in 10 minutes, so y = 87 - 2x. At 25 minutes, y = 37, which is at least 35.

CHALLENGE

Plan A is y = 2x + 23, and Plan B is y = 5x + 8. They cost the same after 5 hours, when both cost $33. For 7 hours, Plan A costs $37 and Plan B costs $43, so Plan A costs less.

Accept equivalent equations and clear comparisons of the changing rates in the download data. For the fundraiser, a ticket count greater than 9 reaches the goal but does not answer the question about the fewest tickets.