LESSON MAKER PRO

Predict the Pattern

Use data to make and test linear models.

GRADE 8 · 8A.DSP.D

8A.DSP.D "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 _____

FROM DATA TO MODEL

When the output changes by the same amount for each increase of 1 in the input, you can use a linear model. Find the change per input, then find the value when the input is 0. Use the model to predict values and check how well it fits the data.

WORKED EXAMPLE

A player earns tokens after each arcade round. Use the table to predict the total after 12 rounds.

ARCADE TOKENS

Rounds	Total tokens
3	14
6	26
9	38

1. From 3 to 6 rounds, the total rises by 26 - 14 = 12 tokens.
2. That is 12 / 3 = 4 tokens per round.
3. At 0 rounds, the model gives 14 - 3(4) = 2 tokens, so y = 4x + 2.
4. At 12 rounds, y = 4(12) + 2 = 50.

Answer: 50 tokens

PRACTICE 6 problems

1 The table shows a linear pattern. How much does y increase when x increases by 1?

PATTERN A

x	y
0	8
1	11
2	14

ANSWER _____

2 Use the linear pattern to predict y when x = 11.

PATTERN B

x	y
5	15
7	21
9	27

ANSWER _____

3 Find the change in y for each increase of 1 in x. Then write a model in the form y = mx + b.

PATTERN C

x	y
0	7
2	17
4	27

ANSWER _____

4 Use the first three rows to predict y when x = 4. The actual value was 29. What is the prediction, and how much higher is the actual value?

FIRST THREE OBSERVATIONS

x	y
1	10
2	16
3	22

ANSWER _____

5 Two snack plans have costs that follow linear patterns. At x = 6 snacks, which plan costs less, and by how much?

SNACK PLAN COSTS

Snacks (x)	Plan A cost ($)	Plan B cost ($)
0	6	2
2	10	8
4	14	14

ANSWER _____

6 Does one linear model fit all four data pairs? Explain using the changes in y.

PATTERN D

x	y
1	9
2	13
3	17
4	22

ANSWER _____

APPLY IT Show your work

1 A student tracks how many free throws they make out of 20 after different numbers of practice sessions. If the linear pattern continues, how many free throws might they make after 6 sessions?

FREE THROWS MADE

Practice sessions	Made out of 20
0	5
2	9
4	13

ANSWER _____

2 A school gaming club starts with a donation, then sells tickets for its event. The table shows its total funds. If the pattern continues, how much money will the club have after selling 15 tickets?

GAMING CLUB FUNDS

Tickets sold	Total funds ($)
4	26
8	42
12	58

ANSWER _____

CHALLENGE One step up

Two school merchandise teams earn money according to the patterns shown. What is the smallest whole number of shirts each team could sell for Team B to earn more than Team A? Explain using a model for each team.

TEAM EARNINGS

Shirts sold	Team A earnings ($)	Team B earnings ($)
0	12	4
2	22	18
4	32	32

WORK SPACE AND ANSWER

ANSWER KEY

Predict the Pattern

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The table shows a linear pattern. How much does y increase when x increases by 1?	**3**
2	Use the linear pattern to predict y when x = 11.	**33**
3	Find the change in y for each increase of 1 in x. Then write a model in the form y = mx + b.	**5 per increase of 1 in x; y = 5x + 7**
4	Use the first three rows to predict y when x = 4. The actual value was 29. What is the prediction, and how much higher is the actual value?	**Predicted y = 28; the actual value is 1 higher.**
5	Two snack plans have costs that follow linear patterns. At x = 6 snacks, which plan costs less, and by how much?	**Plan A costs $2 less.**
6	Does one linear model fit all four data pairs? Explain using the changes in y.	**No. As x rises by 1 each time, y rises by 4, then 4, then 5.**

PART 2 · APPLY IT

1. **17 free throws out of 20** The student makes 4 more shots after every 2 sessions, or 2 more per session. After 6 sessions, the model predicts 5 + 2(6) = 17.
2. **$70** Funds increase by $16 for every 4 tickets, so each ticket adds $4. The starting donation is $10, giving a model of y = 4x + 10 and a prediction of $70 for 15 tickets.

CHALLENGE

5 shirts. Team A follows y = 5x + 12, and Team B follows y = 7x + 4. At 4 shirts both earn $32. At 5 shirts, Team B earns $39 and Team A earns $37.

Accept equivalent equations and explanations. Predictions assume each pattern continues at the same rate.