LESSON MAKER PRO

Predict the Pattern

Use equations and inequalities to find values and reach goals.

HIGH SCHOOL · A2S.AF.D

A2S.AF.D "Expressions, equations, and inequalities can be used to analyze and make predictions, both within mathematics and as mathematics is applied in different contexts—in particular, contexts that arise in relation to linear, quadratic..."

NAME _____ **DATE** _____

CHOOSE A MODEL

A linear expression adds the same amount for each increase of 1 in x. A quadratic expression includes x^2, while an exponential expression multiplies by the same factor for each increase of 1 in x. Substitute a value to make a prediction, or solve an equation or inequality to find when a target is reached.

WORKED EXAMPLE

A club has 19 members and gains 14 members each month. Its membership after x months is 19 + 14x. How many members will it have after 3 months?

1. Substitute x = 3: 19 + 14(3).
2. Multiply: 19 + 42.
3. Add: 61.

Answer: 61 members

PRACTICE 6 problems

1 For f(x) = 5x + 12, find f(6).

ANSWER _____

2 Find the least whole-number value of x that makes 7x + 11 ≥ 60 true.

ANSWER _____

3 For $h(x) = -x^2 + 10x$, find h(6).

ANSWER _____

4 Solve $x^2 - 12x + 35 = 0$. Find both values of x.

ANSWER _____

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5 For $p(x) = 6 \times 2^x$, find p(5).

ANSWER _____

6 Solve $5 \times 2^x = 160$ for a whole-number value of x.

ANSWER _____

APPLY IT Show your work

1 You have $18 saved for a concert ticket and add $7 each week. How many full weeks will it take to have at least $74?

WORK SPACE

ANSWER _____

2 A student-made video has 15 views at the start of a sharing campaign. The view count doubles each day. What is the first day when it will have at least 400 views?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A ball's height in meters x seconds after it is thrown is $h(x) = -5x^2 + 25x$. At what two times is the ball 30 meters high? Explain why there are two times.

WORK SPACE AND ANSWER

ANSWER KEY

Predict the Pattern

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For $f(x) = 5x + 12$, find $f(6)$.	**42**
2	Find the least whole-number value of x that makes $7x + 11 \geq 60$ true.	**7**
3	For $h(x) = -x^2 + 10x$, find $h(6)$.	**24**
4	Solve $x^2 - 12x + 35 = 0$. Find both values of x.	**$x = 5$ and $x = 7$**
5	For $p(x) = 6 \times 2^x$, find $p(5)$.	**192**
6	Solve $5 \times 2^x = 160$ for a whole-number value of x.	**5**

PART 2 · APPLY IT

1. **8 weeks** Solve $18 + 7x \geq 74$. Since $x \geq 8$, it takes 8 full weeks.
2. **Day 5** After 4 days, $15 \times 2^4 = 240$ views, which is below 400. After 5 days, $15 \times 2^5 = 480$ views, so day 5 is the first day.

CHALLENGE

At x = 2 seconds and x = 3 seconds. The ball reaches 30 meters on the way up and again on the way down.

Accept the two quadratic solutions in either order. For the word problems, students should use whole weeks and days when identifying the first time a target is reached.