LESSON MAKER PRO

Model Matchup

Build rules, test outputs, and compare growth.

HIGH SCHOOL · HSF-LE.A

CCSS.Math.Content.HSF-LE.A "Construct and compare linear, quadratic, and exponential models and solve problems"

NAME _____ DATE _____

SPOT THE GROWTH PATTERN

A linear model changes by the same amount for each equal change in x. A quadratic model has constant second differences, and an exponential model is multiplied by the same factor each time. Build an equation from the pattern, then compare models by using the same x-value in each rule.

WORKED EXAMPLE

A linear model has a starting value of 7 and a rate of 9 per x-unit. Write the model and find y when x = 4.

1. The starting value is 7, so the y-intercept is 7.
2. The rate is 9, so the model is y = 9x + 7.
3. Substitute x = 4: y = 9(4) + 7 = 36 + 7 = 43.

Answer: y = 9x + 7; when x = 4, y = 43

PRACTICE 6 problems

1 A linear model starts at -2 when x = 0 and increases by 6 for each x-unit. Write the equation.

ANSWER _____

2 A quadratic model has the form $y = x^2 + bx + 3$ and passes through (1, 6). Find the equation.

ANSWER _____

3 An exponential model has an initial value of 5 and doubles for each x-unit. Write the equation.

ANSWER _____

4 Classify each model as linear, quadratic, or exponential: A: y = 6x - 1, B: $y = x^2 + 2$, C: $y = 5(3^x)$.

ANSWER _____

5 For x = 3, compare these models: L = 5x + 2, Q = $x^2 + 2$, and E = $2(3^x)$. Find each output and identify the greatest output.

ANSWER _____

6 The models $y = x^2$ and y = 3x have the same output at which x-values?

ANSWER _____

APPLY IT Show your work

1 At hour 0, Creator A's video has 12 views and gains 6 views each hour. Creator B's video has 3 views and triples its views each hour. Write a model for each video using x for hours. At x = 2, which video has more views, and by how many?

WORK SPACE

ANSWER _____

2 In a gaming app, Mode L starts with 2 points and adds 5 points each day. Mode Q starts with 2 points, then its total points follow $y = x^2 + 2$. Write the model for Mode L. On day 3 and day 6, which mode has more points?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Use the table to write an equation for each model. Then predict which model has the greatest output at x = 5. Explain your comparison using the equations.

THREE MODELS

x	Model A	Model B	Model C
0	2	2	2
1	5	6	3
2	8	18	6
3	11	54	11

WORK SPACE AND ANSWER

ANSWER KEY

Model Matchup

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A linear model starts at -2 when x = 0 and increases by 6 for each x-unit. Write the equation.	**$y = 6x - 2$**
2	A quadratic model has the form $y = x^2 + bx + 3$ and passes through (1, 6). Find the equation.	**$y = x^2 + 2x + 3$**
3	An exponential model has an initial value of 5 and doubles for each x-unit. Write the equation.	**$y = 5(2^x)$**
4	Classify each model as linear, quadratic, or exponential: A: $y = 6x - 1$, B: $y = x^2 + 2$, C: $y = 5(3^x)$.	**A is linear. B is quadratic. C is exponential.**
5	For x = 3, compare these models: $L = 5x + 2$, $Q = x^2 + 2$, and $E = 2(3^x)$. Find each output and identify the greatest output.	**L = 17, Q = 11, E = 54; E has the greatest output.**
6	The models $y = x^2$ and $y = 3x$ have the same output at which x-values?	**x = 0 and x = 3**

PART 2 · APPLY IT

1. **A = 6x + 12 and B = 3(3ˣ). At x = 2, A has 24 views and B has 27 views, so Creator B has 3 more views.** Use the starting value and constant increase for A. Use the initial value and repeated factor of 3 for B, then substitute x = 2 into both models.
2. **Mode L: y = 5x + 2. On day 3, Mode L has more points, 17 compared with 11. On day 6, Mode Q has more points, 38 compared with 32.** Evaluate both rules at x = 3 and x = 6. Compare the two totals for each day.

CHALLENGE

Model A: y = 3x + 2. Model B: $y = 2(3^x)$. Model C: $y = x^2 + 2$. At x = 5, A = 17, B = 486, and C = 27, so Model B has the greatest output because its exponential factor of 3 produces 486.

Accept equivalent equation forms, such as 2 + 3x for 3x + 2. For the challenge explanation, accept any correct comparison that evaluates all three models at x = 5.