# Exponential Functions

Algebra for Students

Guided Practice Worksheet

## Exploring Exponential Notation & Scientific Notation

1. Write 5 • 5 • 5 in exponential notation.

For 2-8, simplify each exponential expression.

2. $2^0$

3. $2^3 \cdot 2^2$

4. $\frac{2^6}{2^3}$

5. $(5^3)^2$

6. $(2x)^3$

7. $2^{-3}$

8. $\frac{5^0(4x^5)^3}{x^2}$

9. The latest big action movie has a budget of $185,000,000 and has a running time of 150 minutes.

   (a) Express the movie's budget in scientific notation.

   (b) Express the movie's running time in scientific notation.

   (c) Calculate the cost of the movie per minute. Express your answer in scientific notation and in a whole-number dollar value.

10. Express the width of a single strand of hair, 0.000000001 millimeters, in scientific notation.

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## Exponential Growth

You have won the grand prize in a contest and have two options for receiving your cash payment:

(a) The "$100-a-Day" plan, in which you receive $1,000 immediately, plus $100 per day for 30 days;

(b) The "Double Your Money" plan, in which you receive $0.01 immediately, and your winnings double every day for 30 days.

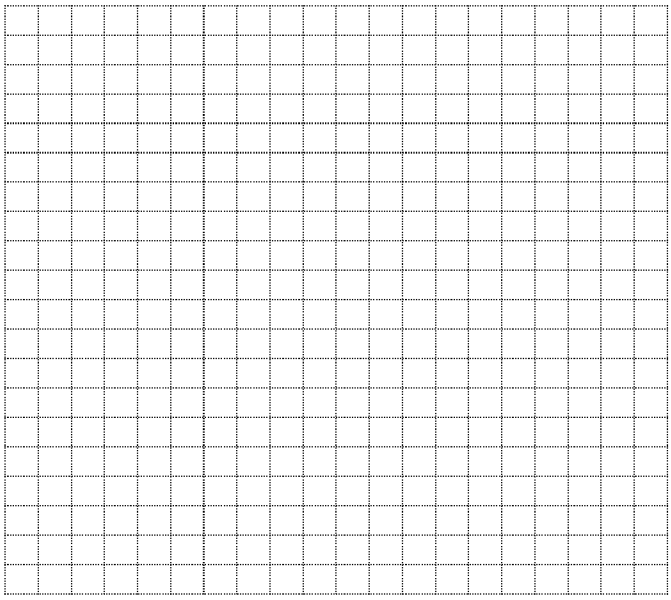
1. Which payment plan seems like the better deal? Why?

2. Complete the following table showing your winnings for the first 20 days based on each payment plan.

| Number of Days | $100-a-Day Plan | Double Your Money Plan |
|---|---|---|
| 0 | $1,000.00 | $0.01 |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

3. Does the information in the table change your choice for which payment plan is the better deal? Why or why not?

4. Graph the amount of money collected from each payment plan.



5. How much money will you have collected by day 30 with the $100-a-Day plan? With the Double Your Money plan?

6. Which plan represents a linear function? Which plan represents an exponential function? Explain your answers.

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## Linear Functions vs. Exponential Functions

Determine whether the data in each table represents a linear function or an exponential function. Explain your answer.

1.

| $x$ | $y$ |
|---|---|
| 0 | $\frac{1}{2}$ |
| 1 | 2 |
| 2 | 8 |
| 3 | 32 |
| 4 | 128 |
| 5 | 512 |

2.

| $x$ | $y$ |
|---|---|
| 0 | 7 |
| 1 | 13 |
| 2 | 19 |
| 3 | 25 |
| 4 | 31 |
| 5 | 37 |

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## Exponential Decay

A ball dropped off a roof reaches a bounce height equal to one-half the height before the bounce (for example, a ball dropped from a height of 500 feet reaches a height of 250 feet after the first bounce).

1. Complete the following table showing the height of the ball after each of the first eight bounces. Round answers to the nearest thousandth where necessary.

| Number of Bounces | Height of the Ball (ft) |
|---|---|
| 0 | 100 |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |

2. Write an exponential decay function for the height of the ball in feet ($y$) after $x$ number of bounces.

3. Graph the height of the ball after each of its first eight bounces.