Similarity:
Developing the Big Ideas about
Perimeter-Area-Volume Ratios

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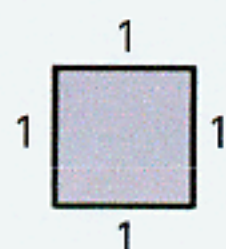
5.2 Perimeters and Areas of Similar Figures
For use with Activity 5.2

Essential Question How do changes in dimensions of similar geometric figures affect the perimeters and areas of the figures?

1 ACTIVITY: Comparing Perimeters and Areas

Work with a partner. Use pattern blocks to make a figure whose dimensions are 2, 3, and 4 times greater than those of the original figure. Find the perimeter P and area A of each larger figure.
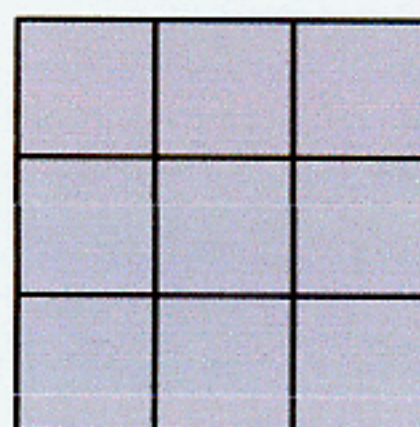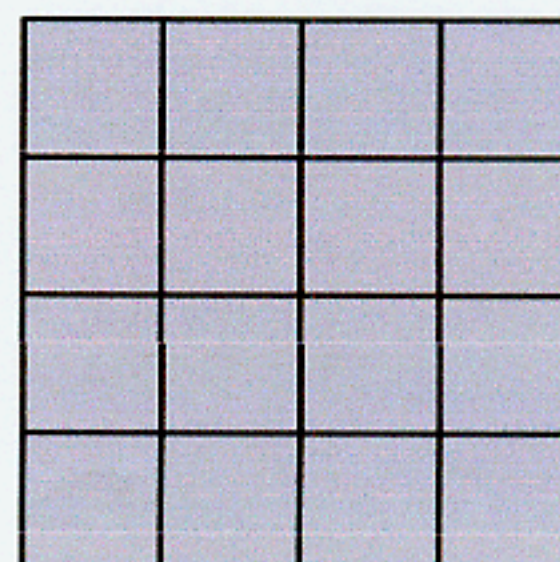
a. Square

$P = 4$ $P =$ _____ $P =$ _____ $P =$ _____
$A = 1$ $A =$ _____ $A =$ _____ $A =$ _____

b. Triangle

$P = 3$ $P =$ _____ $P =$ _____ $P =$ _____
$A = B$ $A =$ _____ $A =$ _____ $A =$ _____
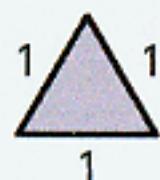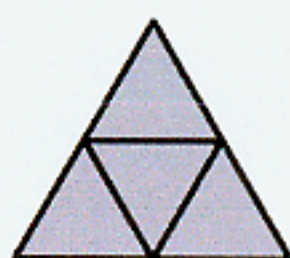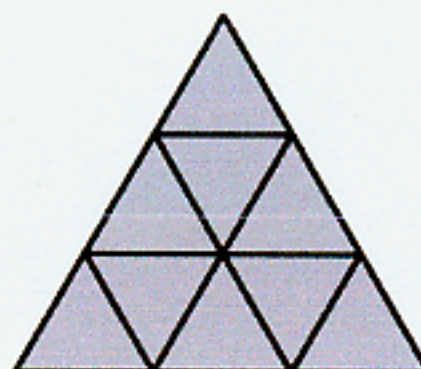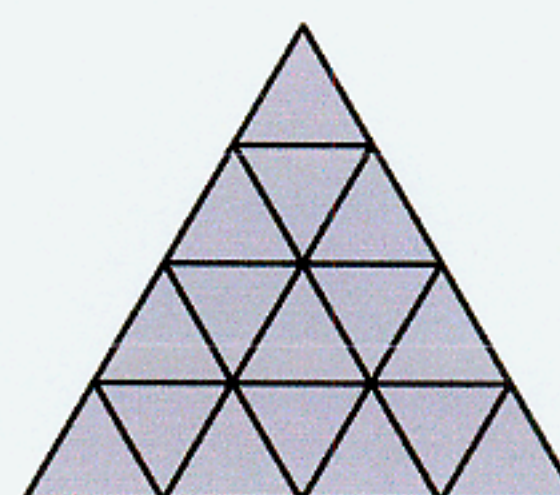
5.2 Perimeters and Areas of Similar Figures (continued)

c. Rectangle
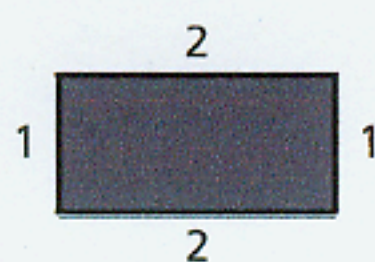
$P = 6$

$A = 2$

d. Parallelogram
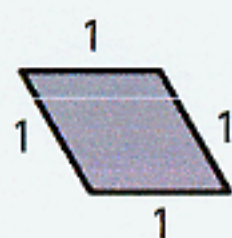
$P = 4$

$A = C$

2 **ACTIVITY:** Finding Patterns for Perimeters

Work with a partner. Complete the table for the perimeters of the figures in Activity 1. Describe the pattern.

Figure	Original Side Lengths	Double Side Lengths	Triple Side Lengths	Quadruple Side Lengths
	$P = 4$			
	$P = 3$			
	$P = 6$			
	$P = 4$			

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3 **ACTIVITY:** Finding Patterns for Areas

Work with a partner. Complete the table for the areas of the figures in Activity 1. Describe the pattern.

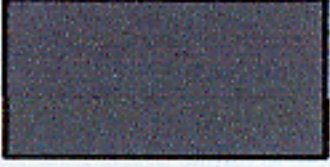| Figure	Original Side Lengths	Double Side Lengths	Triple Side Lengths	Quadruple Side Lengths
	$A = 1$			
	$A = B$			
	$A = 2$			
	$A = C$			

What Is Your Answer?

4. **IN YOUR OWN WORDS** How do changes in dimensions of similar geometric figures affect the perimeters and areas of the figures?

PHOENIX PIZZA

Investigate the prices charged by Spinato's for various sizes of pizza. If you were the general manager, would you recommend any changes in the pricing scheme? Is so, why? Explain and justify.

Create Your Own...

Thin Crust	Lil' (7")	Small (11")	Med. (14")	Large (16")
Serves..................	(1)	(1-2)	(2-3)	(3-4)
Cheese	5.00	8.50	12.50	15.75

Thick Crust *(Pizza Siciliana)*
(For those of you who want more dough for your dough!)

	Lil' (7")	Small (11")	Med. (14")	Large (16")
Serves..................	(1)	(2-3)	(3-4)	(4-5)
Cheese	5.75	9.50	14.00	17.75

Extra Ingredients... Extra Mozzarella Cheese, Ricotta Cheese, Feta Cheese, Homemade Italian Sausage, Pepperoni, Italian Beef*, Meatball*, Genoa Salami, Smoked Canadian Bacon, Ham, Anchovy, Mushroom, Onion, Roma Tomato, Mixed Green & Red Sweet Bell Pepper, Diced Garlic, Black Olive, Green Olive, Fresh Basil, Pineapple, Hot Banana Pepper, Fresh Baby Spinach**, Artichoke Hearts*, Roasted Red Pepper*, Jalapeños.

Add......................	.50	.75	1.00	1.25

*These items count as 2 toppings.
**Fresh Baby Spinach counts as 3 toppings.

Our Specialty Pizzas*

Mamma Spinato's "Signature" Fresh Spinach... Fresh baby spinach carefully marinated in Mamma Spinato's "Secret Seasonings," then baked with fresh roma tomatoes, diced garlic and mozzarella cheese to give it the most authentic taste on our menu... *Our most popular!*

	7.50	12.25	17.50	22.00

L'Italiana, **Mamma's "Other Signature"...** Fresh baby spinach carefully marinated in Mamma Spinato's "Secret Seasonings," then baked with roasted red peppers and a blend of feta and mozzarella cheese!

	7.50	12.25	17.50	22.00

The Spicy Italian... Lots of our meatballs and pepperoni, baked with just the right amount of onions, gives this one its name.

	6.50	10.75	15.50	19.50

Traditional Vegetarian... Mushrooms, mixed green & red sweet bell peppers onions and last but not least, black olives. *Molto gusto!*

	7.00	11.50	16.50	20.75

Get Meaty... Our homemade Italian sausage, Italian beef, pepperoni and smoked Canadian bacon all together on one pizza. *You'll thank us for this one!*

	7.00	11.50	16.50	20.75

The Super Six... This is "The Classic" for those who want the works! It starts with our homemade Italian sausage, mozzarella cheese, pepperoni, ham, mushrooms and mixed green & red sweet bell peppers. *This is an offer you can't refuse!*

	7.00	11.50	16.50	20.75

*Items on our specialty pizzas are not to be substituted at these prices.

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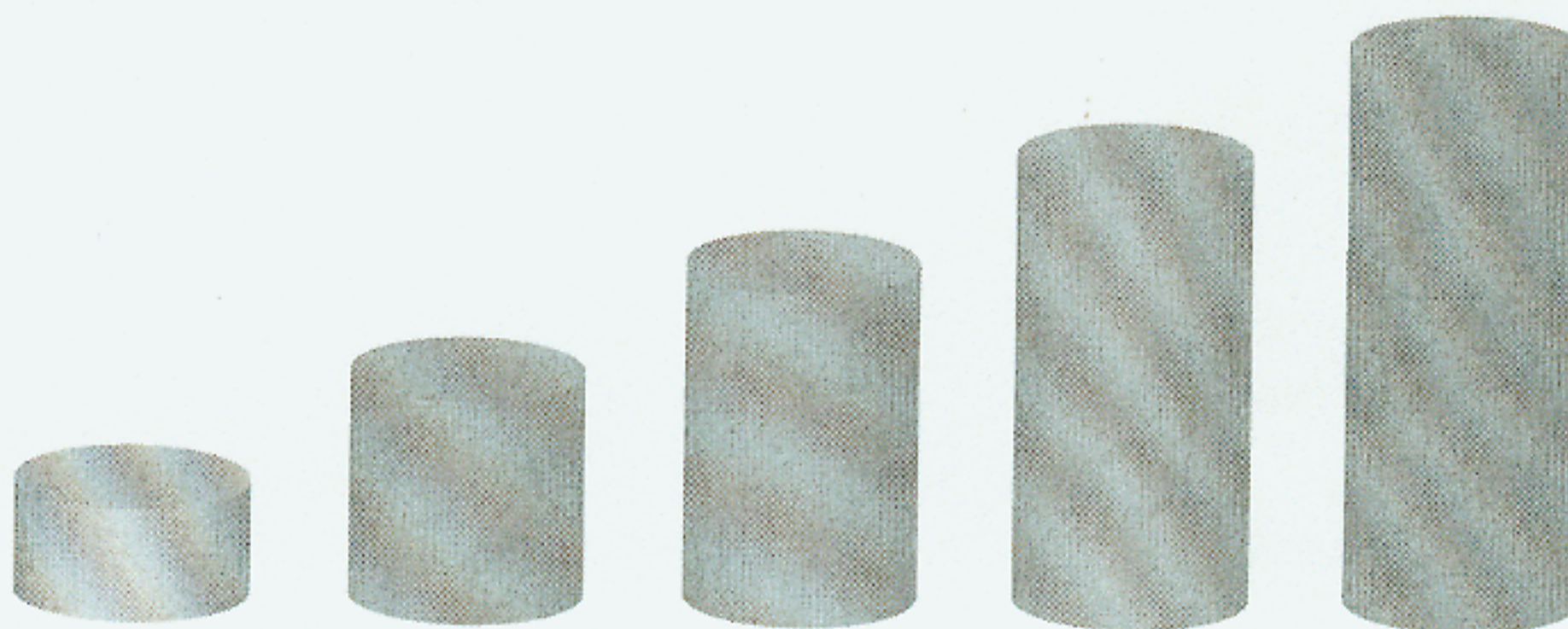## 7.6 Surface Areas and Volumes of Similar Solids
For use with Activity 7.6

Essential Question When the dimensions of a solid increase by a factor of k, how does the surface area change? How does the volume change?

1 ACTIVITY: Comparing Volumes and Surface Areas

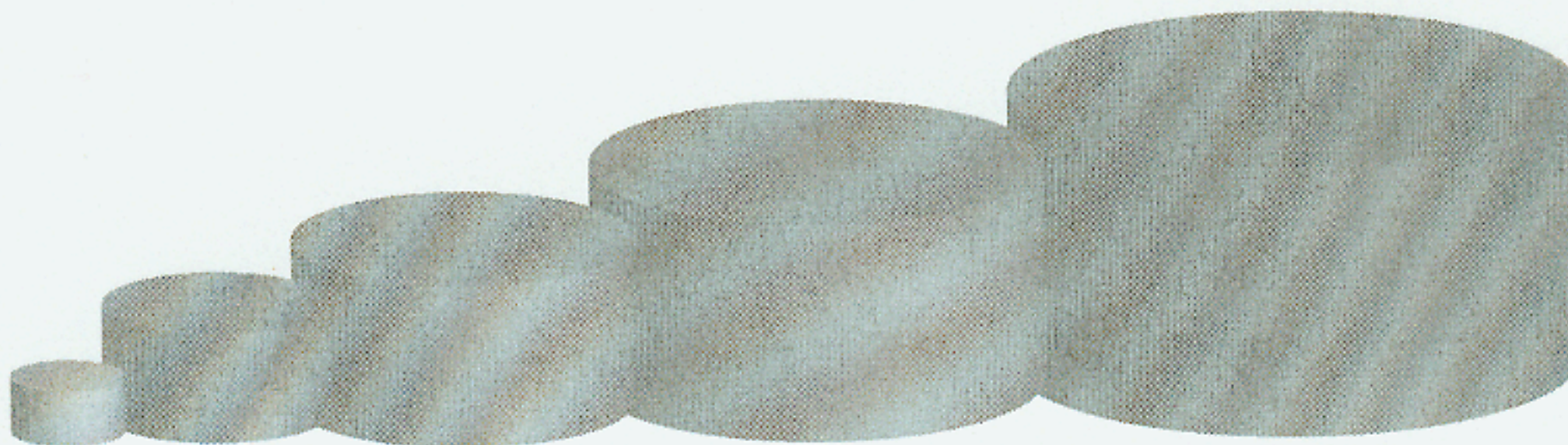Work with a partner. Complete the table. Describe the pattern. Are the solids similar? Explain your reasoning.

a.

Radius	1	1	1	1	1
Height	1	2	3	4	5
Surface Area					
Volume					

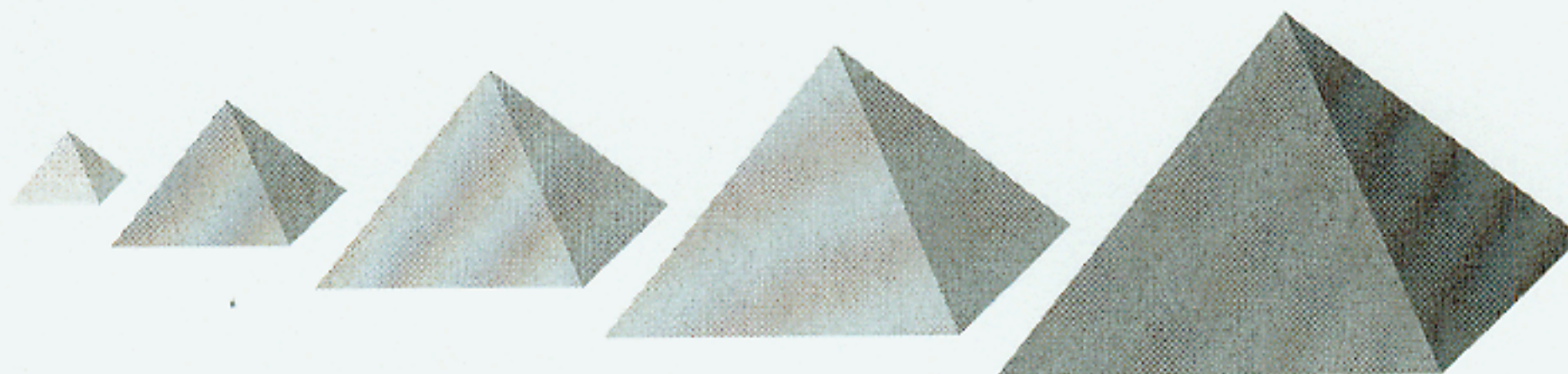**7.6**   **Surface Areas and Volumes of Similar Solids** (continued)

b.

Radius	1	2	3	4	5
Height	1	2	3	4	5
Surface Area					
Volume					

2   **ACTIVITY:** Comparing Volumes and Surface Areas

Work with a partner. Complete the table. Describe the pattern. Are the solids similar? Explain.

Base Side	6	12	18	24	30
Height	4	8	12	16	20
Slant Height	5	10	15	20	25
Surface Area					
Volume					

The Great Pyramid

When the pyramid was 1/4 its finished height, what percent of the 2.3 million blocks of stone had been used?
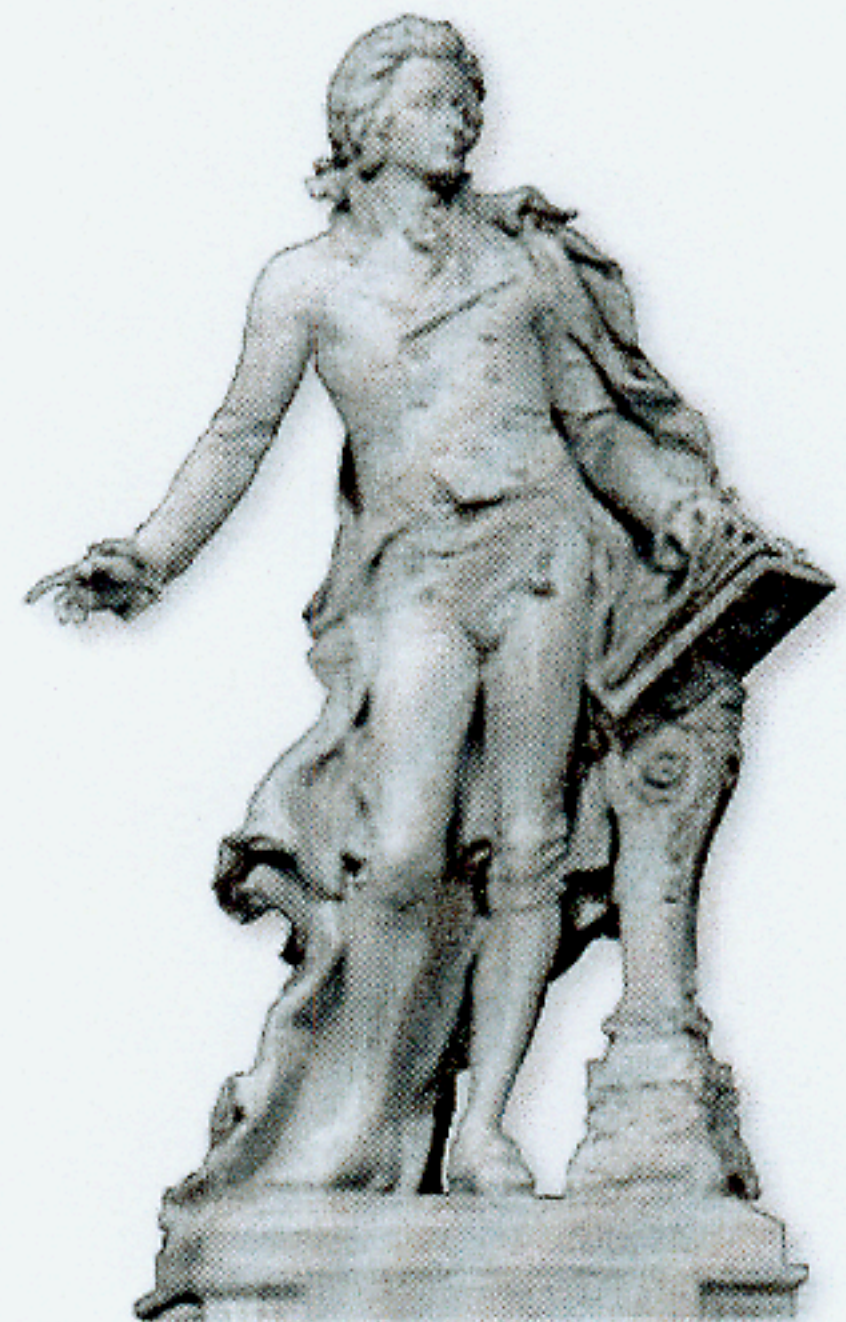
Approximately how long did it take to build the lower half of the pyramid?

Wolfgang Mozart

A small marble statue of Wolfgang Mozart is 10 inches tall and weighs 16 pounds. The original statue in Vienna is 7 feet tall.

- Estimate the weight of the original statue. Explain your reasoning.
- If the original statue were 20 feet tall, how much would it weigh?

Wolfgang Mozart