









# Fancy Factorials

## Working with Simple Factorials

**Directions:** Study the Facts and Reminders page for this unit. Place four crayons—one red, one blue, one green, and one yellow—on your desk. Find out how many different ways you can arrange them. Complete the chart below.

	red	blue	green	yellow	
	red	blue	yellow	green	
	red	green	blue	yellow	
	red	green	yellow	blue	
	red	yellow	green	blue	
	red	yellow	blue	green	
	blue	red	green	yellow	
	blue	red	yellow	green	
	blue	green	red	yellow	
	blue	green	yellow	red	
	blue	yellow	green	red	
	blue	yellow	red	green	
	green	blue	red	yellow	
	green	blue	yellow	_____	
	green	red	_____	_____	
	green	_____	_____	_____	
	_____	_____	_____	_____	
	yellow	_____	_____	_____	
	_____	_____	_____	_____	
	_____	_____	_____	_____	
	_____	_____	_____	_____	
	_____	_____	_____	_____	

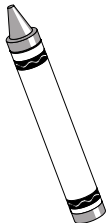
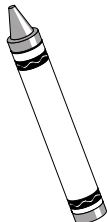
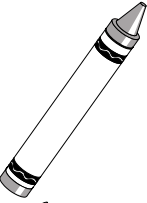
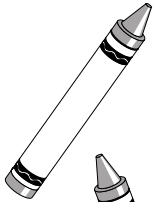
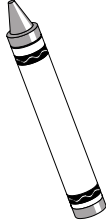
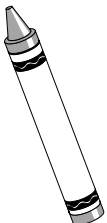


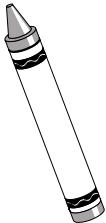
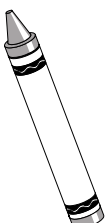
**Directions:** Use a factorial to help you answer these questions.

1. You received three trophies: one for soccer, one for baseball, and one for track. How many different ways could you arrange these three trophies on your dresser? \_\_\_\_\_
2. You have four coins: one dime, one nickel, one penny, and one quarter. How many different ways can you arrange them in order on your desk? \_\_\_\_\_
3. You have a pencil and a pen. How many different ways can you arrange them in order in your shirt pocket? \_\_\_\_\_

# Fancy Factorials

## Working with Larger Factorials

**Directions:** Study the Facts and Reminders page for this unit. Place five crayons—one red, one blue, one green, one yellow, and one orange—on your desk. Find out how many different ways you can arrange them. Fill in the blanks on this chart. (*Note:* R = red, B = blue, G = green, Y = yellow, and O = orange)

	R	B	G	Y	O	
	R	B	G	O	Y	
	R	B	Y	O	G	
	R	B	Y	G	O	
	R	B	O	Y	G	
	R	B	O	G	Y	
	R	G	B	Y	O	
	R	G	B	O	Y	
	R	G	Y	O	B	
	R	G	Y	B	O	
	R	G	O	Y	B	
	R	G	O	B	Y	
	R	Y	G	B	O	
	R	Y	G	O	B	
	R	_____	_____	_____	_____	
	R	_____	_____	_____	_____	
	R	_____	_____	_____	_____	
	R	_____	_____	_____	_____	
	R	O	_____	_____	_____	
	R	O	_____	_____	_____	
	R	_____	_____	_____	_____	
	R	_____	_____	_____	_____	
	R	_____	_____	_____	_____	
	R	_____	_____	_____	_____	
	R	_____	_____	_____	_____	
	R	_____	_____	_____	_____	

1. This chart shows only the arrangements with red as the first color. How many different arrangements would you estimate for all five colors?

$$5! = 5 \times 4 \times 3 \times 2 \times 1 =$$

2. Write a factorial to indicate how many ways six crayons could be arranged. Then compute the numerical value of 6!.

3. Write a factorial to indicate how many ways seven crayons could be arranged.

# Fancy Factorials

## Computing Larger Factorials

**Directions:** Write out each factorial as a multiplication problem. Use a calculator to help you compute the numerical values for these factorials. The first one is started for you.

- $6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1$  numerical value: \_\_\_\_\_
- $7! =$  \_\_\_\_\_ numerical value: \_\_\_\_\_
- $8! =$  \_\_\_\_\_ numerical value: \_\_\_\_\_
- $9! =$  \_\_\_\_\_ numerical value: \_\_\_\_\_
- $10! =$  \_\_\_\_\_ numerical value: \_\_\_\_\_

**Directions:** Study the Facts and Reminders page for this unit. Write out each factorial as a multiplication problem. Use a calculator to help you compute the numerical values for these factorials. The first one is started for you.

- $2! \times 3! = 2 \times 1 \times 3 \times 2 \times 1 =$   
numerical value: \_\_\_\_\_
- $3! \times 4! =$  \_\_\_\_\_  
numerical value: \_\_\_\_\_
- $2! \times 5! =$  \_\_\_\_\_  
numerical value: \_\_\_\_\_
- $6! \times 3! =$  \_\_\_\_\_  
numerical value: \_\_\_\_\_

**Directions:** Use the Facts and Reminders sheet to help you divide these factorials. Cancel numbers which are the same above and below the fraction bar. The first one is started for you.

$$10. \frac{4!}{2!} = \frac{4 \times 3 \times 2 \times 1}{2 \times 1} =$$

$$11. \frac{5!}{3!} = \frac{5 \times 4 \times 3 \times 2 \times 1}{3 \times 2 \times 1} =$$

$$12. \frac{9!}{7!} = \underline{\hspace{2cm}} =$$

$$13. \frac{10!}{9!} = \underline{\hspace{2cm}} =$$

$$14. \frac{10!}{4!} = \underline{\hspace{2cm}} =$$

$$15. \frac{12!}{8!} = \underline{\hspace{2cm}} =$$