REVIEW: Permutations

Name _____

Key Concept and Vocabulary

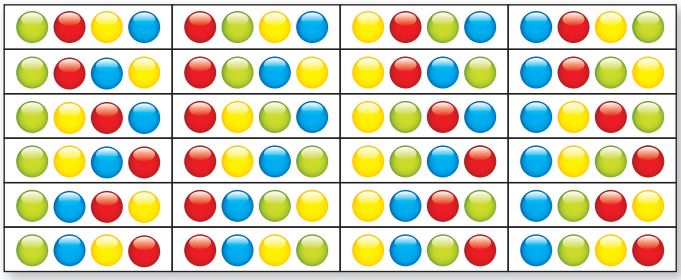
4 marbles can be arranged in $4 \cdot 3 \cdot 2 \cdot 1 = 24$ orders.

$4! = 4 \cdot 3 \cdot 2 \cdot 1$

$= 24$

4 factorial

Visual Model



Skill Examples

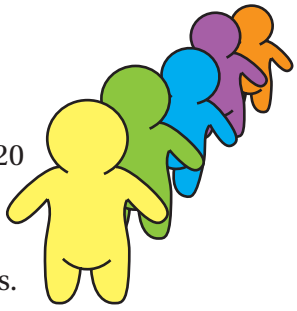
1. $1! = 1$
2. $2! = 2 \cdot 1 = 2$
3. $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$
4. $6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720$
5. $8! = 40{,}320$

Application Example

6. In how many different orders can 5 people stand in line?

5 factorial

$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$



∴ They can stand in 120 different orders.

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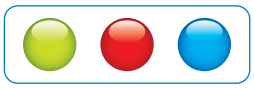
Check your answers at BigIdeasMath.com.

Evaluate the factorial.

7. $3! =$ 6
8. $4! =$ 24
9. $7! =$ 5040

10. **MARBLES** Draw all the different ways that you can order 3 marbles.



G R B	R G B	B G R
G B R	R B G	B R G

11. **DIGITS** Write all the numbers you can form with the digits 1, 2, 3, and 4. *(No repeats.)*

1, 2, 3, 4

1234	1423	2314	3124	3412	4213
1243	1432	2341	3142	3421	4231
1324	2134	2413	3214	4123	4312
1342	2143	2431	3241	4132	4321

12. **CALLING FRIENDS** You are calling six friends to invite them to a party. In how many different orders can you call them? 720

13. **FINISHING A RACE** Four runners are in a race. In how many different orders can they cross the finish line? *(No ties.)* 24

14. **DVDs ON A SHELF** You have 8 DVDs. In how many different ways can you order them on a shelf? 40,320