Algebra 2-9/2-10: Counting Principle & Factorials

Warm-Up

B P W G

1. You have blue shorts and pink shorts. You also have a white shirt and a green shirt. Assuming you must wear a shirt and shorts, list the different combinations.

BW, BG
PG, PW

$2 \cdot 2 = 4$

How many different combinations are there? 4

2. What is 5 • 4 • 3 • 2 • 1? 120 or 5! (5 factorial)

3. Solve & check.

a. $3.65 = -x$

$\frac{365}{-1} = \frac{-1x}{-1}$

$-3.65 = x$

b. $4.86 = 0y$

$\frac{}{0} \quad \frac{}{0}$

No Solution

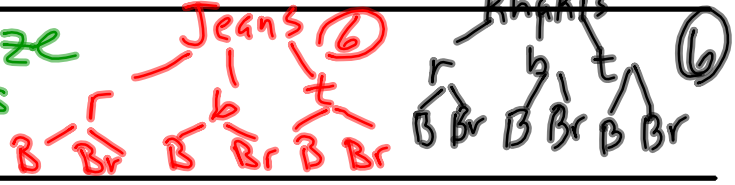
$\emptyset$

c. $\frac{3}{4}x = 12$

$\frac{4}{3} \cdot \frac{3}{4}x = \frac{12}{1} \cdot \frac{4}{3}$

$x = \frac{48}{3} = 16$

October 11, 2013

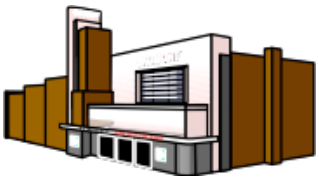
Vocabulary	Definition	Example
Counting Principle	- method to figure out how many choices you have - How many choices do you have? (Draw Blanks) - How many ways do you have for each choice? (put # on blank) - Multiply 12 options	You can wear jeans or khakis, a red, blue, or teal shirt, and brown or black shoes. How many different combinations do you have (assuming you have to wear pants, a shirt, and shoes)? 2 pants · 3 shirts · 2 shoes
Tree-Diagram	helps visualize your choices	
Factorial !	$10! = 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 3,628,000$	
Permutation order matters	• Each item is only used once! • Letters, names, or objects in a specific order	A basketball coach is announcing the starting 5 players. How many different orders could he possibly name the 5 starters? $5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$ 120 ways

Example Problems

1. You are going to the movies. There are 2 movies showing. You can choose popcorn, soda, candy, or a pretzel as a snack. You can sit in the front or the back of the theater. How many different combinations are possible?

$2 \cdot 4 \cdot 2 = 16$ combinations

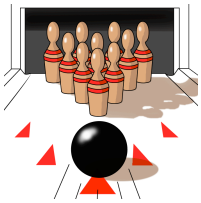
(2 movies, 4 snacks, 2 sit)



2. If there are 4 bowlers bowling, in how many different orders can the bowlers bowl?

$4 \cdot 3 \cdot 2 \cdot 1 = 24$ options

or $4!$



3. Simplify. $\frac{6!}{4!} = \frac{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{4 \cdot 3 \cdot 2 \cdot 1}$

$= 6 \cdot 5$

$= 30$

4. Simplify. $\frac{55!}{53!} = \frac{55 \cdot 54 \cdot 53!}{53!}$

$= 55 \cdot 54$

$= 2{,}970$

2.9
7-11

2.10
3-5, 12-18 a,b, 20-22

7. $\frac{2\cdot2\cdot2\cdot2\cdot2\cdot2\cdot2\cdot2\cdot2}{2\cdot2\cdot2}$

a) $2^{20} = 1{,}048{,}576$

2 [y^x] 20
2 [^] 20

b) $\frac{1}{1{,}048{,}576}$

8. a) $\frac{x\cdot x\cdot 2\cdot 2\cdot 2}{}$

b) $x^2\cdot 2^3$

9) $\frac{g\cdot g\cdot g\cdot g\cdot g\cdot 2\cdot 2\cdot 2\cdot 2\cdot 2}{}$

$g^5\cdot 2^5 = 32g^5$

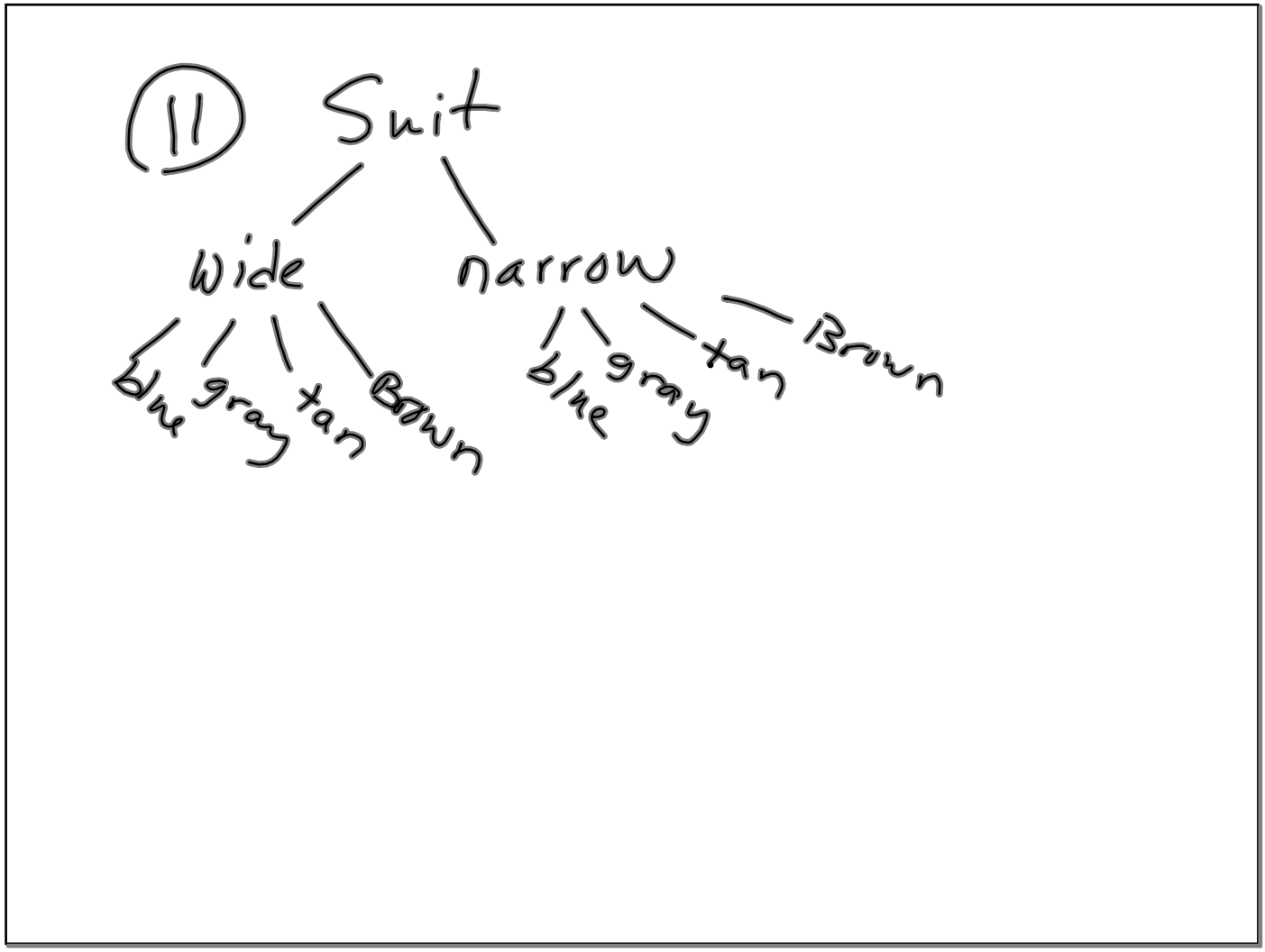
10) $\frac{}{2}$ ___ ___ ___

a) only 2 (won2k)

b) 26 letters

c) $2\cdot 26\cdot 26\cdot 26$

35,152


11
Suit
wide
narrow
blue
gray
tan
Brown
blue
gray
tan
Brown