

Assign 3 Permutations with Repetitions

November 25, 2017 9:29 AM

Math Challengers Permutations with Repeated Obj

Name _____

Date _____

1. How many permutations are there of all the letters in ~~TSAWWASSEN~~?

$$\begin{aligned} n &= 10 \\ a &= 2 \\ s &= 3 \\ w &= 2 \end{aligned} \quad \frac{10!}{2! \cdot 3! \cdot 2!}$$
$$= \frac{10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4}{2 \times 2}$$
$$= \boxed{16 \times 9 \times 7 \times 6 \times 5}$$

2. How many different codes can be made using the letters A, A, B, B, B, C, C, C, D, D if the code must contain all 10 letters?

$$\begin{aligned} n &= 10 \\ a &= 2 \\ b &= 3 \\ c &= 3 \\ d &= 2 \end{aligned} \quad \frac{10!}{2! \cdot 3! \cdot 3! \cdot 2!}$$

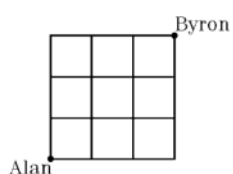
3. Six different coins are tossed once each. How many ways can exactly 3 coins be heads and 3 coins be tails?

$$\begin{aligned} n &= 6 \\ H &= 3 \\ T &= 3 \end{aligned} \quad \frac{6!}{3! \cdot 3!} = 20.$$

4. A soccer team has a record of 12 wins, 6 losses, and 2 ties. In how many different orders could this record have occurred?)

$$\begin{aligned}
 n &= 20 \\
 a &= 12 \\
 b &= 6 \\
 c &= 2
 \end{aligned}
 \qquad
 \frac{20!}{12! \times 6! \times 2!}$$

5. Alan wants to visit his friend Byron. Roads are shown as lines on the grid. He travels only north and east directions. How many paths can Alan take to reach Byron?

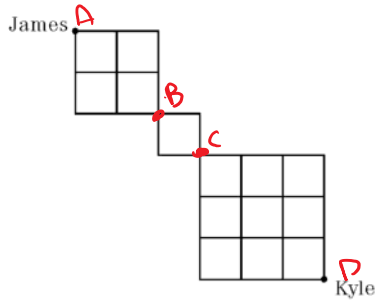


$$\begin{aligned}
 \text{up} &= 3 \\
 \text{R} &= 3
 \end{aligned}
 \qquad
 \frac{6!}{3! \cdot 3!} = 20$$

6. How many 9-letter permutations are there of the letters in the word ~~ATHABASCA~~?

$$\begin{aligned}
 n &= 9 \\
 a &= 4
 \end{aligned}
 \qquad
 \frac{9!}{4!} = 9 \times 8 \times 7 \times 6 \times 5$$

7. James wants to visit Kyle. Roads are shown as lines on the grid. Only south and east travel directions can be used. How many different paths can James take to get to Kyle?



$$A \text{ to } B = \frac{4!}{2!2!} = \frac{4 \times 3}{2} = 6$$

$$BC = 2$$

$$CD = \frac{6!}{3!3!} = 20$$

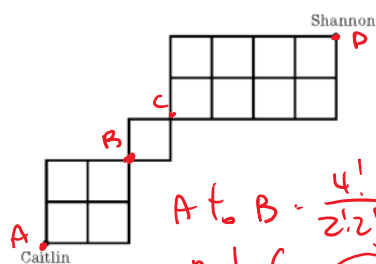
$$\text{Total} = 6 \times 2 \times 20 = 240 //$$

8. On a 8 question multiple choice French 12 quiz, 1 answers is A, 2 answers are B, 2 answers are C, 1 answers is D, and 2 answers are E. How many different answer keys are possible?

$$\begin{aligned} n &= 8 \\ a &= 1 \\ b &= 2 \\ c &= 2 \\ d &= 1 \\ e &= 2 \end{aligned}$$

$$\begin{aligned} &\frac{8!}{2!2!2!} \\ &= 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 \\ &= 5040 \end{aligned}$$

9. Caitlin wants to visit Shannon. Streets are shown as lines on the grid. Only north and east travel directions can be used. How many different paths can Caitlin take to get to Shannon?



$$A \text{ to } B = \frac{4!}{2!2!} = 6$$

$$B \text{ to } C = 2$$

$$C \text{ to } D = \frac{6!}{2!4!} = \frac{6 \times 5}{1 \times 2} = 15$$

$$\begin{aligned} - A \text{ to } D &: 6 \times 2 \times 15 \\ &= 180 \end{aligned}$$

10. How many 7-letter permutations are there of the letters in the word ~~MAMQUAM~~?

$$\begin{aligned} n &= 7 \\ a &= 2 \\ m &= 3 \end{aligned}$$

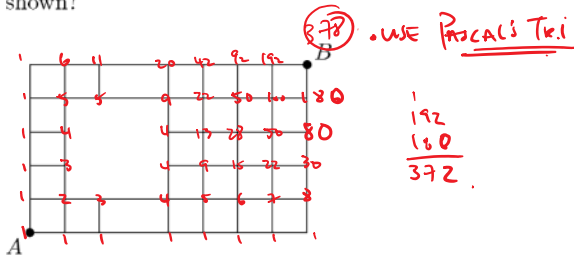
$$\frac{7!}{2!3!}$$

$$= \frac{7 \times 6 \times 5 \times 4}{1 \times 2}$$

$$= 7 \times 6 \times 5 \times 2$$

$$= 420$$

11. How many routes are there to get from A to B if we can only travel to the right or up along the segments shown?



12. In a soccer game, the Mathletes defeated the Sci-fi's 6 to 3. The score progression is a chain of successive goals made by either team such as M-M-S-M-M-S-S-M-M. In how many different ways could the final score have developed?

$$n = 9$$

$$M = 6$$

$$S = 3$$

$$\frac{9!}{3! \cdot 6!} = \frac{9 \times 8 \times 7}{1 \times 2 \times 3} = 84 //$$

13. In a soccer game, the Mathletes defeated the Sci-fi's 6 to 3. If the score at half-time was 4 to 2, in how many different ways could the final score have developed?

(A) 0-0 $\rightarrow \frac{6!}{4! \cdot 2!} = 15$

(B) 4-2 $\rightarrow \frac{3!}{2!} = 3$

(C) 6-3 \rightarrow (crossed out)

(45)

14. In the playoffs for the stanley cup, the Canucks is playing in a seven game series vs the Avalanche. If the Canucks won the series in seven games, in how many ways could the series have progressed?

$$\begin{array}{ccccccc} \text{---} & \text{---} & \text{---} & \text{---} & \text{---} & \text{---} & \text{---} \\ & & & & & & \textcircled{C} \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \end{array}$$

3A's 3C's

$\textcircled{20}$

15. In the playoffs for the stanley cup, the Canucks is playing in a seven game series vs the Avalanche. If the Canucks won the series in five games, in how many ways could the series have progressed?

$$\begin{array}{ccccccc} \text{---} & \text{---} & \text{---} & \text{---} & \text{---} & \text{---} & \text{---} \\ & & & & & & \textcircled{C} \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \end{array}$$

3C's 1A

$\frac{4!}{3!} = \textcircled{4}$

16. In the playoffs for the stanley cup, the Canucks is playing in a seven game series vs the Avalanche. If the Canucks won the series, in how many ways could the series have progressed?

4G $\textcircled{1}$	5G $\textcircled{4}$	6G $\textcircled{10}$	7G. $\textcircled{20}$
	$\text{---} \text{---} \text{---} \text{---} \text{---} \text{---} \text{---}$	$\text{---} \text{---} \text{---} \text{---} \text{---} \text{---} \text{---}$	
	$\text{---} \text{---} \text{---} \text{---} \text{---}$	$\text{---} \text{---} \text{---} \text{---} \text{---} \text{---}$	
		$\frac{5!}{3!2!}$	
		$= \textcircled{10}$	
$\textcircled{35}$			

Answer List

- | | | |
|--------------|---------|-----------|
| 1. 151 200 | 2. | 3. 20 |
| 4. 3 527 160 | 5. 20 | 6. 15 120 |
| 7. 240 | 8. 5040 | 9. 180 |
| 10. 420 | 11. 372 | 12. 372 |
| 13. 372 | 14. 372 | 15. 372 |
| 16. 372 | | |

Catalog List

- | | | |
|---------------|---------------|--------------|
| 1. AW3 FC 7 | 2. | 3. AW3 FC 17 |
| 4. AW3 FC 27 | 5. AW3 FC 29 | 6. AW3 FC 41 |
| 7. AW3 FC 37 | 8. AW3 FC 23 | 9. AW3 FC 39 |
| 10. AW3 FC 43 | 11. MCH EC 92 | 12. |
| 13. | 14. | 15. |
| 16. | | |