PREC12

Section 11.1 Extra Practice

1. Use an organized list or a tree diagram to identify the possible arrangements for each situation. If you use abbreviations, state what each represents.
a) How many ways can an ice cream cone be constructed with 3 different scoops of ice cream flavours: strawberry, vanilla, and chocolate?
b) How many two-letter arrangements can be made using the letters in the word DUCK?
c) How many different outfits can you put together if you own 3 shirts, 2 pairs of pants, and 2 pairs of runners?

2. How many five-digit numbers can be made from the digits 2, 3, 4, 7, and 9 if no digit can be repeated?

3. Write an expression for each, using factorial notation.
a) ${}_8P_r$
b) ${}_nP_5$
c) ${}_nP_r$

4. Evaluate each expression.
a) ${}_9P_2$
b) ${}_8P_3$
c) ${}_5P_4$

5. How many two-digit numbers can be made from the digits 2, 3, 4, 7, and 9 if no digit can be repeated?

6. How many arrangements can be made using all the letters of each word?
a) VICTORIA
b) ABBOTSFORD
c) OSOYOOS

7. A lacrosse team's record over a season was 15 wins, 4 losses, and 2 ties.
a) In how many different orders could this record have occurred?
b) If you know that the team started the season strongly with five straight wins, how many orders are possible for the team's results?

8. Determine the number of arrangements of the letters of the word TATTOO under each condition:
a) without further restriction
b) begins with a T
c) begins with two Ts
d) begins with three Ts

9. Express $501 \times 500 \times 499 \times 498$ in the form ${}_nP_r$.

10. Solve for the variable.
a) ${}_nP_2 = 56$
b) ${}_nP_6 = 5({}_nP_5)$

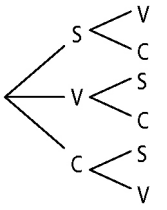
KEY 11.1 Extra Practice

1. a) 6

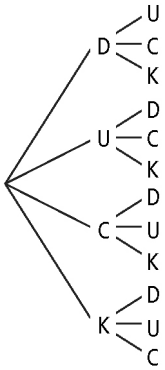
strawberry–S, vanilla–V, chocolate–C

SVC
SCV
VSC
VCS
CSV
CVS

or



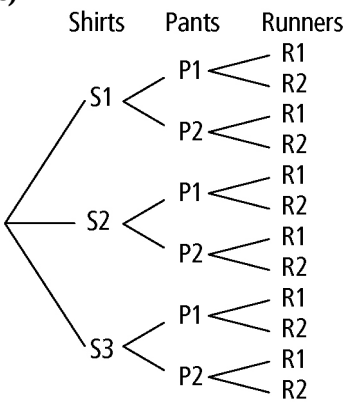
b) 12



or

DU
DC
DK
UD
UC
UK
CD
CU
CK
KD
KU
KC

c) 12



2. 5! = 120

3. a) $\frac{8!}{(8-r)!}$ **b)** $\frac{n!}{(n-5)!}$ **c)** $\frac{n!}{(n-r)!}$

4. a) 72 **b)** 336 **c)** 120

5. ${}_5P_2$ or $5 \times 4 = 20$

6. a) 20 160 **b)** 907 200 **c)** 105

7. a) 813 960 **b)** 120 120

8. a) 60 **b)** 30 **c)** 12 **d)** 3

9. ${}_{501}P_4$

10. a) $n = 8$ **b)** $n = 10$

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Section 11.2 Extra Practice

1. Decide whether each involves a combination or a permutation. Briefly describe why. You do not need to solve the problem.

a) In how many ways can 3 cards be selected from a standard deck of cards?

b) How many different 3-course meals can be selected if there are 3 choices for appetizers, 4 choices for entrees, and 2 dessert choices?

c) Fifteen students try out for a team of 8 volleyball players. How many different teams could be selected?

d) How many different 3-character combinations can be created using a letter for the first character, a whole number for the second character, and an even number for the third character?

2. For each solution, create a word problem. Rewrite each solution using ${}_nC_r$ or ${}_nP_r$ notation.

a) $10 \times 9 \times 8 \times 7$

b) $\dfrac{28 \times 27 \times 26 \times 25}{4!}$

3. Evaluate.

a) ${}_9C_4$

b) ${}_{11}P_3$

c) ${}_5C_2 \times {}_4C_2$

d) ${}_7P_5 \times {}_6P_3$

4. A class has 30 students.

a) How many ways can a committee of 3 people be selected from the class?

b) How many ways can an executive committee consisting of 3 people (president, vice-president, and secretary) be selected from the class?

c) If there are 10 boys and 20 girls in the class, how many ways can a committee of 3 people be selected from the class if the committee must have 1 boy and 2 girls?

5. How many odd 3-digit whole numbers are there? For example, 203 is acceptable but 023 is not.

6. Solve for n.

a) ${}_nC_2 = 36$

b) ${}_nC_4 = 15$

c) ${}_nC_{n-2} = 10$

d) ${}_{n+1}C_{n-1} = 21$

7. A theatre company has 13 actors—8 men and 5 women. How many different ways are there to choose from the company a group of 6 that includes at least 4 women?

8. Simplify ${}_nC_2$.

9. Allen, Breanne, Cody, Dave, and Eric sit in 5 adjacent seats in a movie theatre. How many ways can this be done?

a) without further restrictions?

b) if Breanne sits next to Dave?

c) if Dave refuses to sit next to Eric?

KEY Section 11.2 Extra Practice

1. a) combination; order does not matter
b) permutation; order matters
c) combination; order does not matter
d) permutation; order matters
2. Example:
a) How many 4-digit codes can be created using whole numbers if no repetition is allowed? A code such as 0245 is allowed; (${}_{10}P_4$)
b) How many teams of 4 can be chosen from a group of 28 people?; (${}_{28}C_4$)
3. a) 126 **b)** 990 **c)** 60 **d)** 302 400
4. a) ${}_{30}C_3 = 4060$ **b)** ${}_{30}P_3 = 24\ 360$
c) ${}_{10}C_1 \times {}_{20}C_2 = 1900$
5. 450
6. a) $n = 9$ **b)** $n = 6$ **c)** $n = 5$ **d)** $n = 6$
7. 148; Case 1—four women: ${}_5C_4 \times {}_8C_2 = 140$;
Case 2—five women: ${}_5C_5 \times {}_8C_1 = 8$
8. $\frac{1}{2}\left(n^2 - n\right)$
9. a) 120 **b)** 48 **c)** 72

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Section 11.3 Extra Practice

1. List the values in the given row of Pascal's triangle.
a) row 3
b) row 5
c) row 7

2. Express each circled term in the given row of Pascal's triangle as a combination.
a) 1 4 ⑥ 4 1
b) 1 7 21 35 ㉟ 21 7 1
c) 1 10 45 120 210 252 210 120 ㊺ 10 1

3. How many terms are in the expansion of each expression?
a) $(x - 5)^7$
b) $(2x + y)^9$
c) $(1 - 2t)^n$

4. Use the binomial theorem to expand.
a) $(a + b)^4$
b) $(x - 2)^5$
c) $(4 + y)^3$

5. Expand and simplify using the binomial theorem.
a) $(3x - 4)^3$
b) $(2x + 5y)^4$
c) $(a - 2b)^5$

6. Determine the simplified value of the specified term.
a) the fifth term of $(x - y)^7$
b) the eighth term of $(2a + 3b)^8$
c) the middle term of $(5x - 3)^{10}$

7. Express each expansion in the form $(a + b)^n$, $n \in \mathrm{N}$.
a) ${}_5C_0x^5 - {}_5C_1x^4y + {}_5C_2x^3y^2 - {}_5C_3x^2y^3 + {}_5C_4xy^4 - {}_5C_5y^5$
b) ${}_3C_0(8) + {}_3C_1(4)x + {}_3C_2(2)x^2 + {}_3C_3x^3$

8. Determine the middle term of $\left(3 - \frac{y}{2}\right)^6$.

9. In the expansion of $(2a - 3b)^6$, determine the coefficient of the term containing a^4b^2.

10. Given the binomial $\left(3x^3 + \frac{1}{x^3}\right)^6$, determine the constant term.

KEY Section 11.3 Extra Practice

1. a) 1 2 1 **b)** 1 4 6 4 1 **c)** 1 6 15 20 15 6 1

2. a) ${}_4C_2$ **b)** ${}_7C_4$ **c)** ${}_{10}C_8$

3. a) 8 **b)**10 **c)** $(n + 1)$

4. a) $a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$

b) $x^5 - 10x^4 + 40x^3 - 80x^2 + 80x - 32$

c) $64 + 48y + 12y^2 + y^3$

5. a) $27x^3 - 108x^2 + 144x - 64$

b) $16x^4 + 160x^3y + 600x^2y^2 + 1000xy^3 + 625y^4$

c) $a^5 - 10a^4b + 40a^3b^2 - 80a^2b^3 + 80ab^4 - 32b^5$

6. a) $35x^3y^4$ **b)** $34\,992ab^7$ **c)** $-191\,362\,500x^5$

7. a) $(x - y)^5$ **b)** $(2 + x)^3$

8. $-\frac{135}{2}y^3$

9. 2160

10. 540