

Assignment

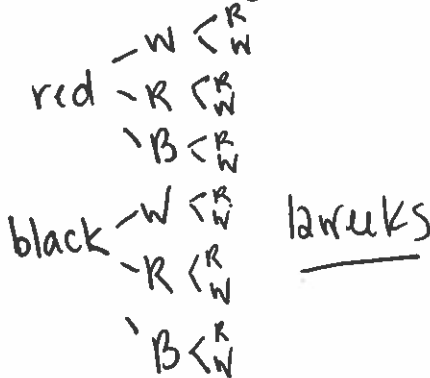
1. A football team has the following kit :
 jersey: red or black
 pants: white, red, or black
 socks: red or white

The team plays in a different uniform each week until it has to repeat a previous uniform.

Determine how many weeks the team can play before repeating a previous uniform by using

a) a tree diagram

b) the fundamental counting principle



$$2 \times 3 \times 2 = 12 \text{ weeks}$$

2. How many ways are there of arranging 6 different books side by side on a shelf?

$$6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720 \text{ ways}$$

3. With the new renovations completed at Prestwick High School, there will be seven entrances. In how many different ways can a student coming for Math tutorials

a) enter and exit through any entrance? $7 \cdot 7 = 49$

b) enter the school and exit through a different entrance? $7 \cdot 6 = 42$

c) enter and exit through the same entrance? $7 \cdot 1 = 7$

4. The score at the end of the second period of a hockey game is:

Oilers 6
 Flames 3

Jarome was attempting to determine how many different possibilities there are for the score at the end of the first period. He used the fundamental counting principle and multiplied 6 by 3 to get an answer of 18. Explain the error in his reasoning.

there are no possibilities for the flames to score

This question has inaccurate data and can therefore not be answered.

so this question is also irrelevant.

5. If each of the students in a class of 30 students is capable of winning any of the class prizes, how many ways are there of awarding

a) a first prize, a second prize, and a third prize in Mathematics? $30 \cdot 29 \cdot 28 = 24360$

b) a Mathematics prize, a Chemistry prize, and a Physics prize? $30 \cdot 30 \cdot 30 = 27000$

6. Three digit numbers are formed using only the digits 2, 3, 5, 6, 7, and 9.

a) If repetitions are not permitted, how many 3-digit numbers can be formed?

$$\underline{6} \cdot \underline{5} \cdot \underline{4} = 120$$

b) How many of these are

i) less than 400?

$$\underline{2} \cdot \underline{5} \cdot \underline{4} = 40$$

2 or 3 = 40

ii) even?

$$\underline{5} \cdot \underline{4} \cdot \underline{2} = 40$$

2 or 6 = 40

iii) odd?

$$\underline{5} \cdot \underline{4} \cdot \underline{4} = 80$$

3 | 5 | 7 | 9 = 80

iv) multiples of 5?

$$\underline{5} \cdot \underline{4} \cdot \underline{1} = 20$$

= 20

7. A vehicle license plate consists of 3 letters followed by 3 digits. How many different license plates are possible if:

a) there are no restrictions on the letters or digits used?

$$\underline{26} \cdot \underline{26} \cdot \underline{26} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} = 17\,576\,000$$

b) no letters may be repeated?

$$\underline{26} \cdot \underline{25} \cdot \underline{24} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} = 15\,600\,000$$

c) the first digit cannot be zero and no digits can be repeated?

$$\underline{26} \cdot \underline{26} \cdot \underline{26} \cdot \underline{9} \cdot \underline{9} \cdot \underline{8} = 11\,389\,248$$

8. How many ways are there of getting from A to C in each diagram, passing through each point at most once?

Answer to Diagram 1

$$5 \cdot 3 = 15$$

Answer to Diagram 2

$$\cancel{3} \cdot 3 = 9$$

$$3 \cdot 2 = 6$$

$$9 + 6 = 15$$

Answer to Diagram 3

$$1 \cdot 3 = 3$$

$$2 \cdot 1 = 2$$

$$3 \cdot 2 = 6$$

$$3 + 2 + 6 = 11$$

Diagram 1

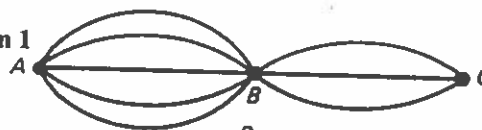


Diagram 2

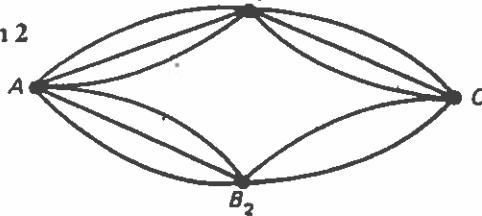
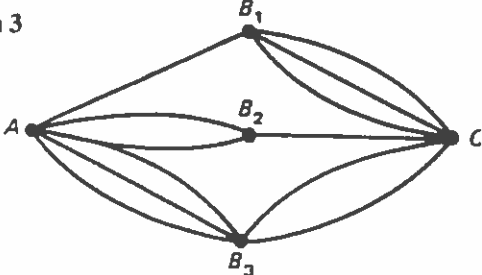


Diagram 3



9. Determine the number of four letter "words" that can be formed from the letters of the word **PRODUCE** if

a) each letter can only be used once $\underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{4} = 840$

b) each letter can only be used once and the "word" must

i) contain only consonants

$$\underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} = 24$$

ii) begin and end with a consonant

$$\underline{4} \quad \underline{5} \quad \underline{4} \quad \underline{3} = 240$$

iii) begin with a vowel

$$\underline{3} \cdot \underline{6} \cdot \underline{5} \cdot \underline{4} = 360$$

iv) contain the letter P

$$P \underline{6} \cdot \underline{5} \cdot \underline{4} \times 4 \text{ places for P}$$

to go

$$= 4(6 \cdot 5 \cdot 4) = 480$$

v) begin with D and end with a vowel

$$\underline{0} \quad \underline{5} \quad \underline{4} \quad \underline{3} = 60$$

10. a) How many different three-digit numerals can be formed from the digits 1, 5, and 8 if the digits cannot be repeated?

$$\underline{3} \cdot \underline{2} \cdot \underline{1} = 6$$

b) How many different three-digit numerals can be formed using the digits 1, 3, 5, 7, and 9 if the digits may be repeated?

$$\underline{5} \cdot \underline{5} \cdot \underline{5} = 125$$

c) How many four-digit numerals can be formed from the digits 0, 2, and 3 if the digits may be repeated? (Note: 0223 is classified as the 3-digit numeral 223).

$$\underline{2} \cdot \underline{3} \cdot \underline{3} \cdot \underline{3} = 54$$

d) How many different non-zero numerals are possible using some or all of the numerals 0, 1, 2, and 3 if the digits cannot be repeated?

$$\begin{array}{l} \underline{3} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} \quad \text{or} \quad \underline{3} \cdot \underline{3} \cdot \underline{2} \quad \text{or} \quad \underline{3} \cdot \underline{3} \quad \text{or} \quad \underline{3} \quad 18+18+9+3 \\ \neq 0 \quad \neq 0 \quad \neq 0 \quad \neq 0 \end{array} \quad \text{+ } \textcircled{48}$$

11. Mr. and Mrs. McDonald want a family picture taken with their children, Hamish, Flora and James. In how many different ways can all five line up in a straight line for the picture if

a) there are no restrictions?

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

b) the parents must be at either end of the line?

$$2 \cdot 3 \cdot 2 \cdot 1 \cdot 1 = 12$$

c) baby James must be in the middle?

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

d) the children alternate with the adults?

$$3 \cdot 2 \cdot 2 \cdot 1 \cdot 1 = 12$$

12. a) How many odd six digit numbers have no repeating digits?

$$\underline{8} \cdot \underline{8} \cdot \underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{5} = 67200$$

- b) How many even six digit numerals have no repeating digits?

$$\begin{array}{l} \underline{9} \cdot \underline{8} \cdot \underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{0} \cdot \underline{1} \text{ or } \underline{8} \cdot \underline{8} \cdot \underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{4} \\ \neq 0 \quad \quad \quad 0 \quad \quad \quad \neq 0 \quad \quad \quad \neq 0 \quad \quad \quad \neq 0 \\ 15120 + 53760 = 68880 \end{array}$$

Use the following information to answer the next question.

The word **PRODUCT** has been spelled using letter tiles. An illustration is shown.



13. Using only these tiles, determine the number of four letter arrangements if the arrangement

- a) has any letter in any position

$$\underline{7} \cdot \underline{6} \cdot \underline{5} \cdot \underline{4} = 840$$

- b) begins with PR

$$\underline{R} \underline{R} \underline{5} \cdot \underline{4} = 20$$

- c) has two vowels in the middle

$$\underline{5} \cdot \underline{2} \cdot \underline{1} \cdot \underline{4} = \underline{40}$$

- d) has two consonants in the middle

$$\underline{5} \cdot \underline{5} \cdot \underline{4} \cdot \underline{4} = \underline{400}$$

14. Dania had two pennies, four nickels, two quarters, and five dollar coins in her purse. She correctly determined that there are 269 different sums of money she could make using one or more of the coins. Explain her reasoning.

pennies	nickels:	quarters:	dollars
0, 1, 2	0, 1, 2, 3, 4	0, 1, 2	0, 1, 2, 3, 4, 5
<u>3</u>	<u>5</u>	<u>3</u>	<u>6</u>

$$= 270$$

- cannot choose zero of each coin so $270 - 1 = \underline{269}$

15. Ocean-going ships have use coloured flags hung vertically for signalling. By changing the order of the coloured flags, the ships can send out different signals.

If ships carry six different coloured flags, one flag of each colour, how many different signals are possible if

- a) all six flags are used?

$$6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = \underline{720}$$

- b) four flags are used?

$$\underline{6} \cdot \underline{5} \cdot \underline{4} \cdot \underline{3} = 360$$

- c) at least two flags are used?

$$\underline{6} \cdot \underline{5} \text{ or } \underline{6} \cdot \underline{5} \cdot \underline{4} \text{ or } 360 \text{ or } \underline{6} \cdot \underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \text{ or } 720$$

$$30 + 120 + 360 + 720 + 720$$

$$= \underline{1950}$$

Multiple
Choice

16. How many even 5-digit whole numbers are there? Note that 31248 is acceptable, but 01248 is not.

A. 13 776

B. 15 120

C. 45 000

D. 50 000

$$\begin{array}{l} \underline{9} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{5} = 45000 \\ \neq 0 \qquad \qquad \qquad 0|2|4|6|8 \end{array}$$

17. The final of a 100-metre race contains 8 competitors. The number of possible ways in which the gold, silver, and bronze medals can be awarded is

A. 21

B. 24

C. 336

D. 512

$$\underline{8} \cdot \underline{7} \cdot \underline{6} = 336$$

Numerical
Response

18. Sandra is taking an examination which consists of two parts, A and B, with the following instructions.

- Part A consists of three questions and the student must do two.
- Part B consists of four questions and the student must do two.
- Part A must be completed before starting Part B.
- At the end of the exam the student has to list the order in which she attempted the questions.

The number of different possible orders is _____.

(Record your answer in the numerical response box from left to right.)

7	2		
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$$\begin{array}{c|c} \text{A} & \text{B} \\ \hline \underline{3} \cdot \underline{2} & \underline{4} \cdot \underline{3} \end{array}$$

$$3 \times 2 \times 4 \times 3 = \underline{72}$$