



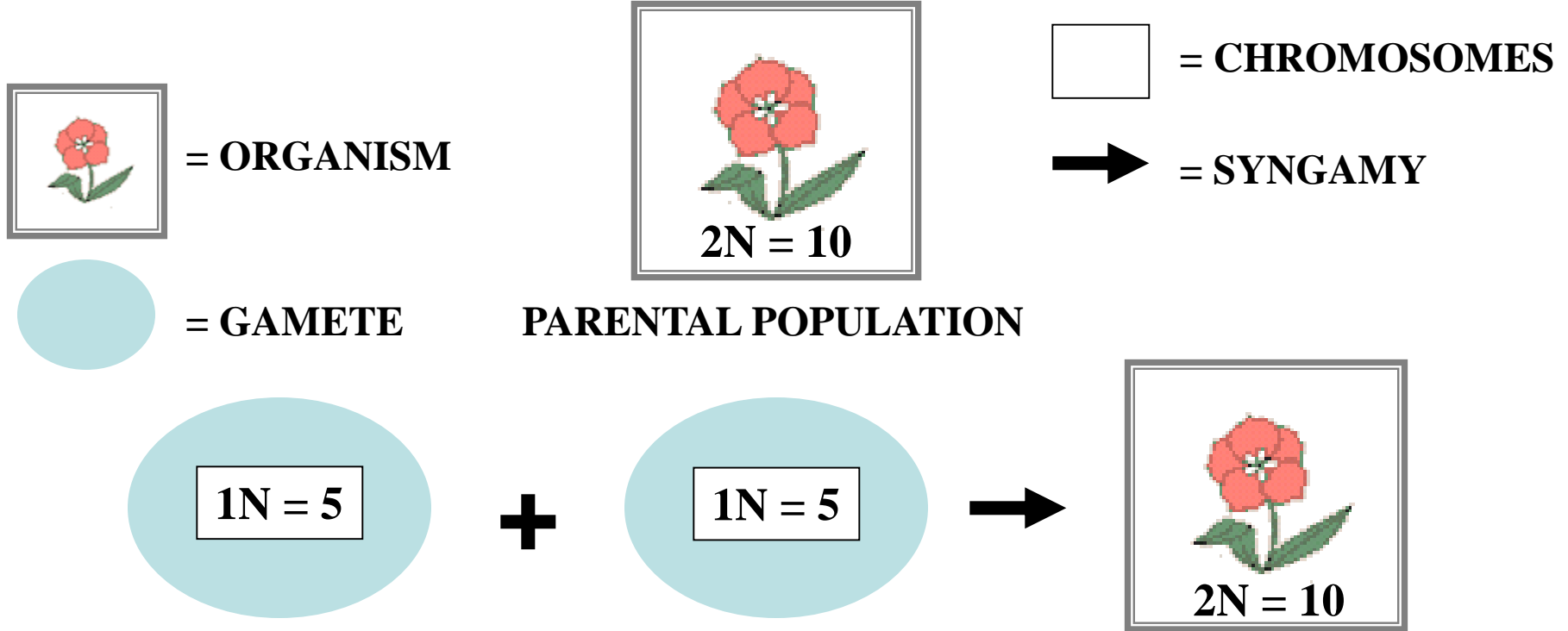
MEIOSIS

ANAPHASE-II

NON-DISJUNCTION

OUTCOME

NON-DISJUNCTION: OUTCOME M



DISJUNCTION

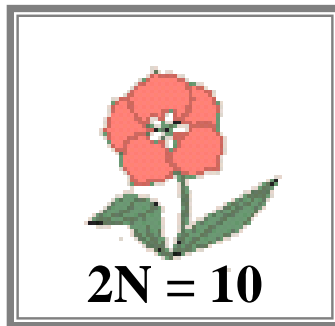
NON-DISJUNCTION: OUTCOME

N

?



= ORGANISM



$2N = 10$

MEIOSIS



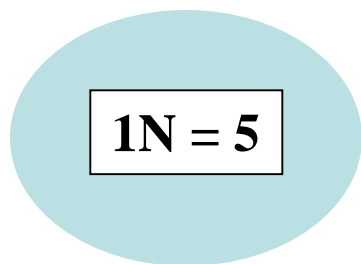
= CHROMOSOMES



= SYNGAMY

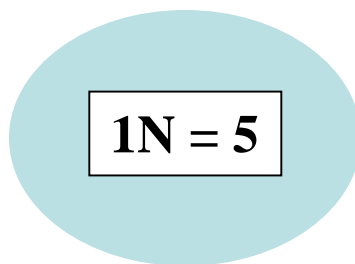


= GAMETE

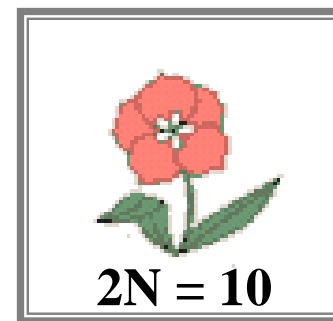


$1N = 5$

+



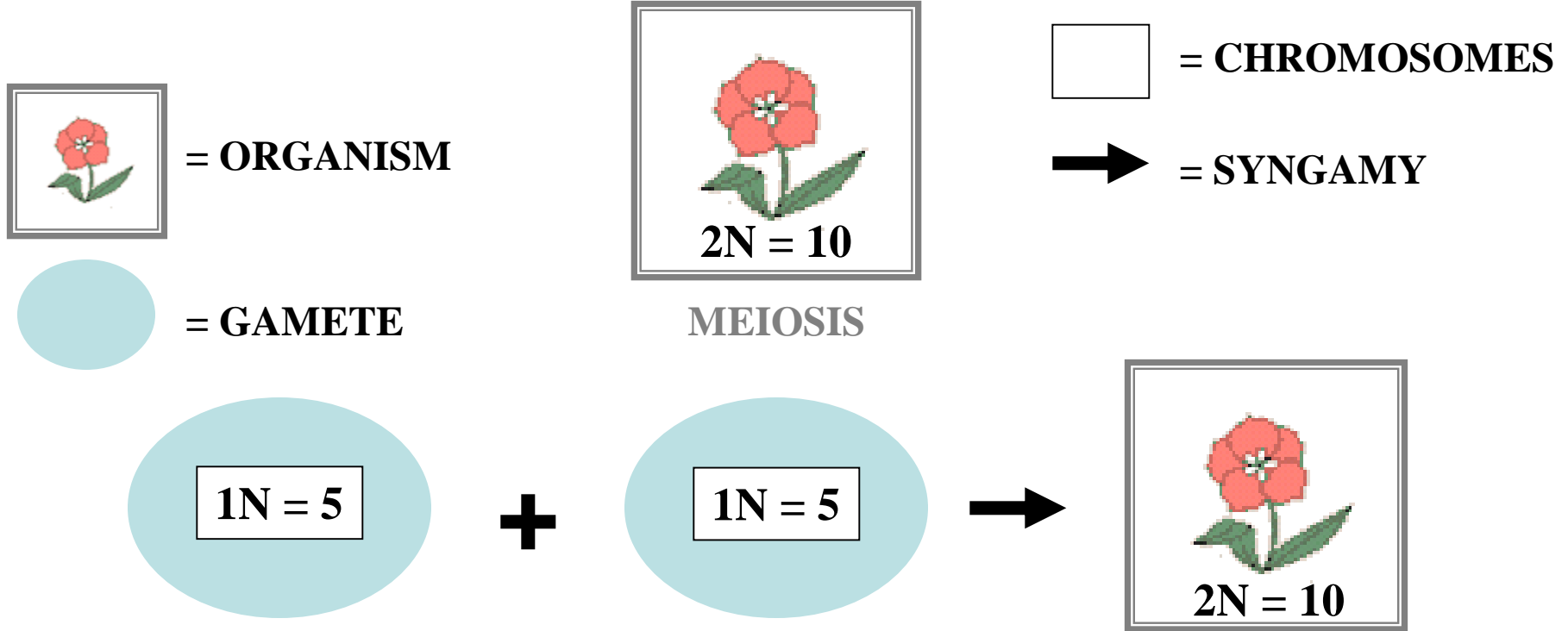
$1N = 5$



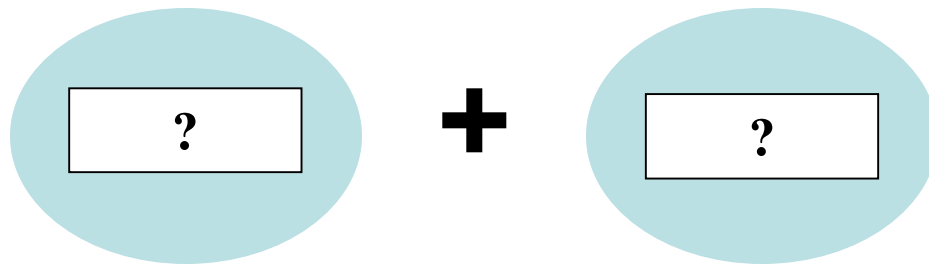
$2N = 10$

DISJUNCTION

NON-DISJUNCTION: OUTCOME 10



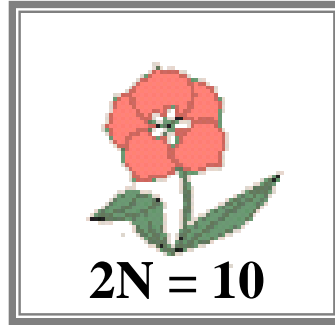
NON-DISJUNCTION



NON-DISJUNCTION: OUTCOME ?



= ORGANISM



$2N = 10$

MEIOSIS



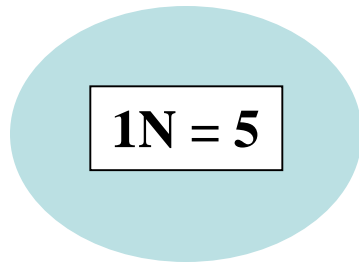
= CHROMOSOMES



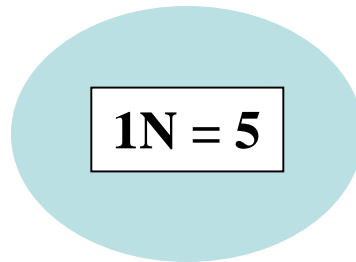
= SYNGAMY



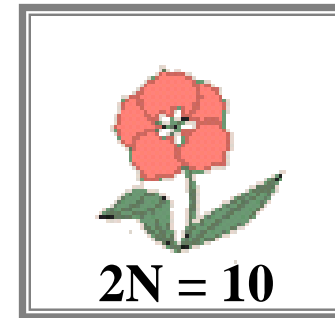
= GAMETE



$1N = 5$

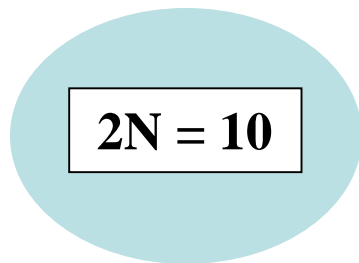


$1N = 5$

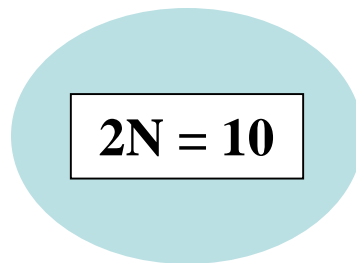


$2N = 10$

NON-DISJUNCTION



$2N = 10$

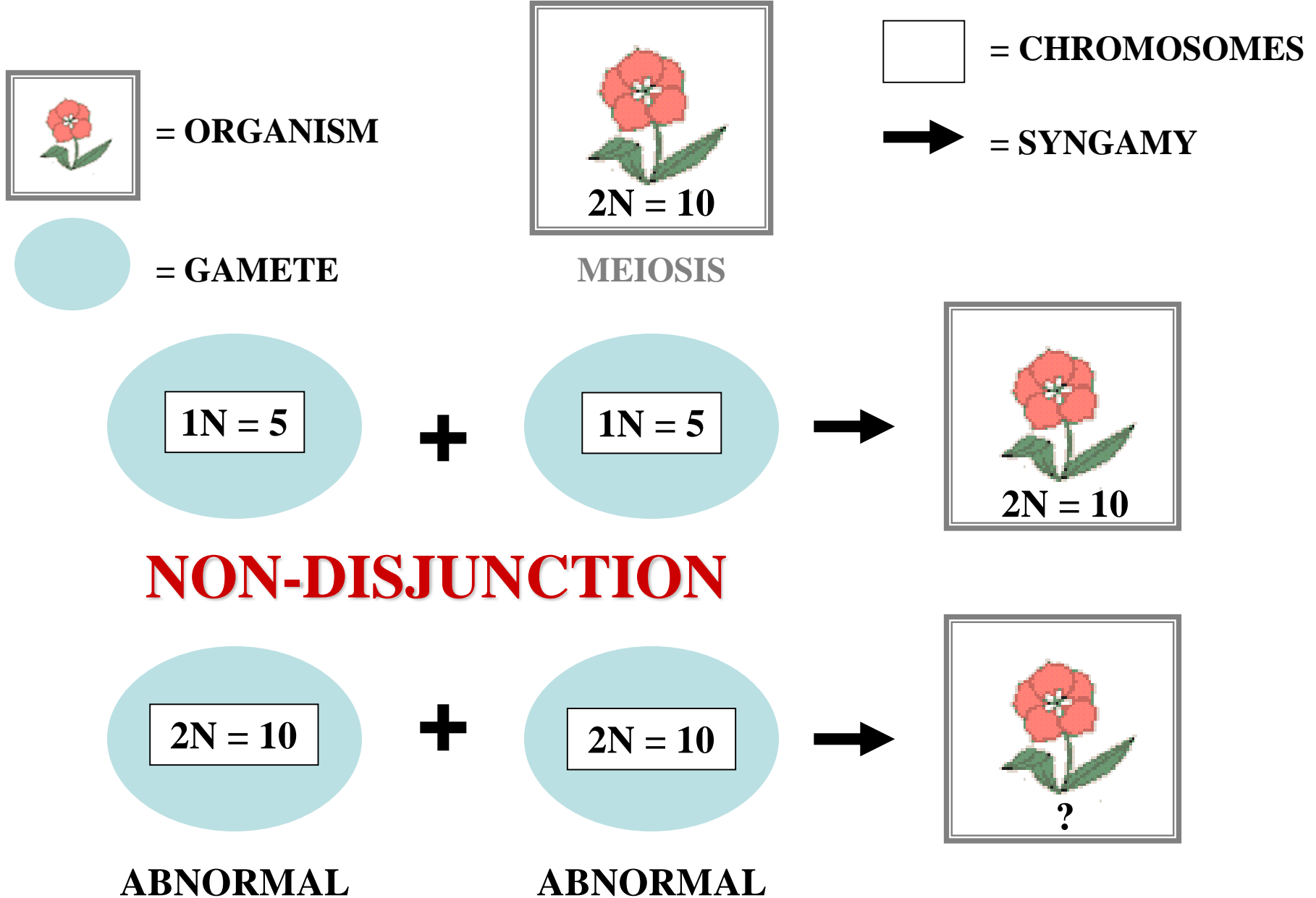


$2N = 10$

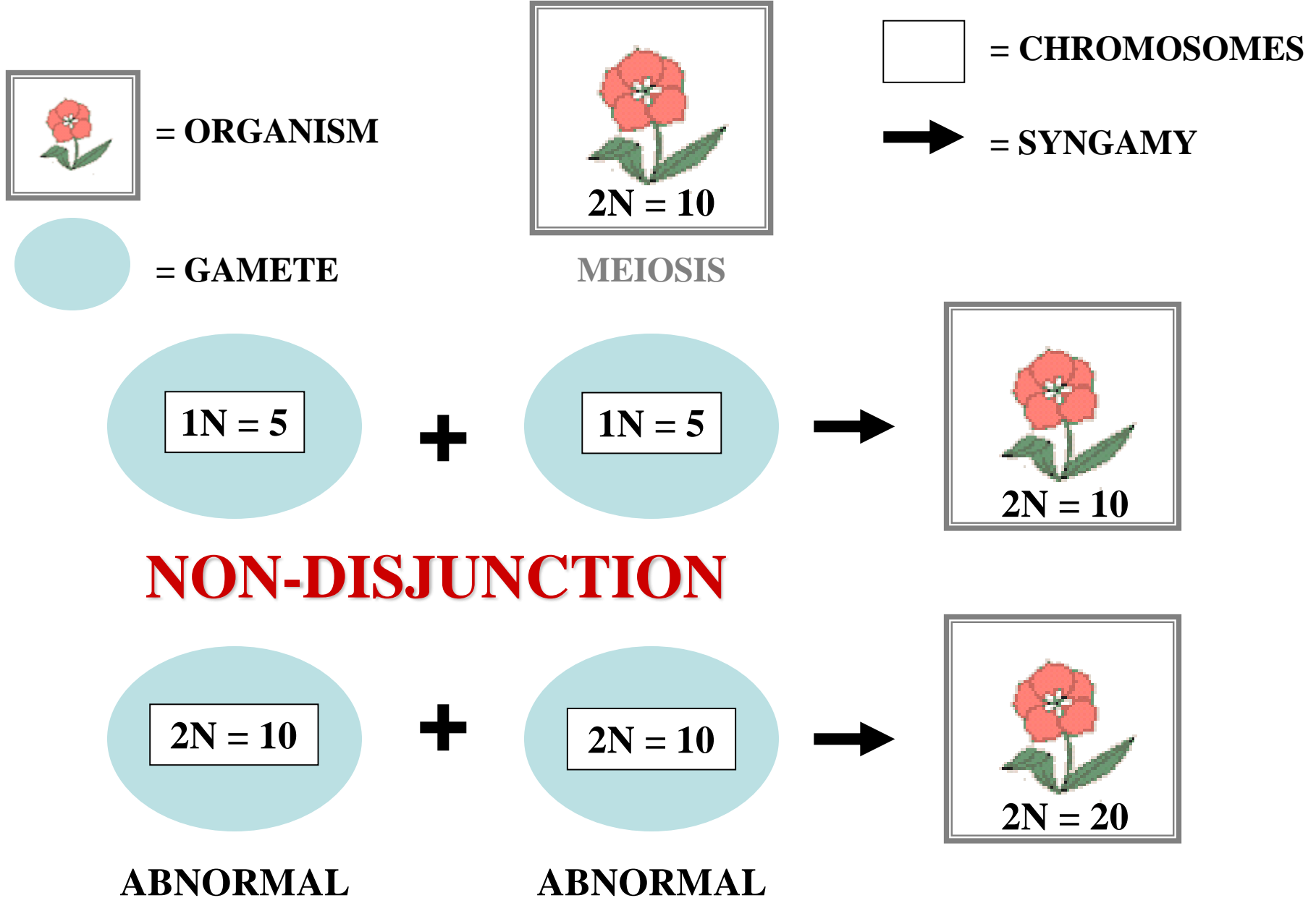
ABNORMAL

ABNORMAL

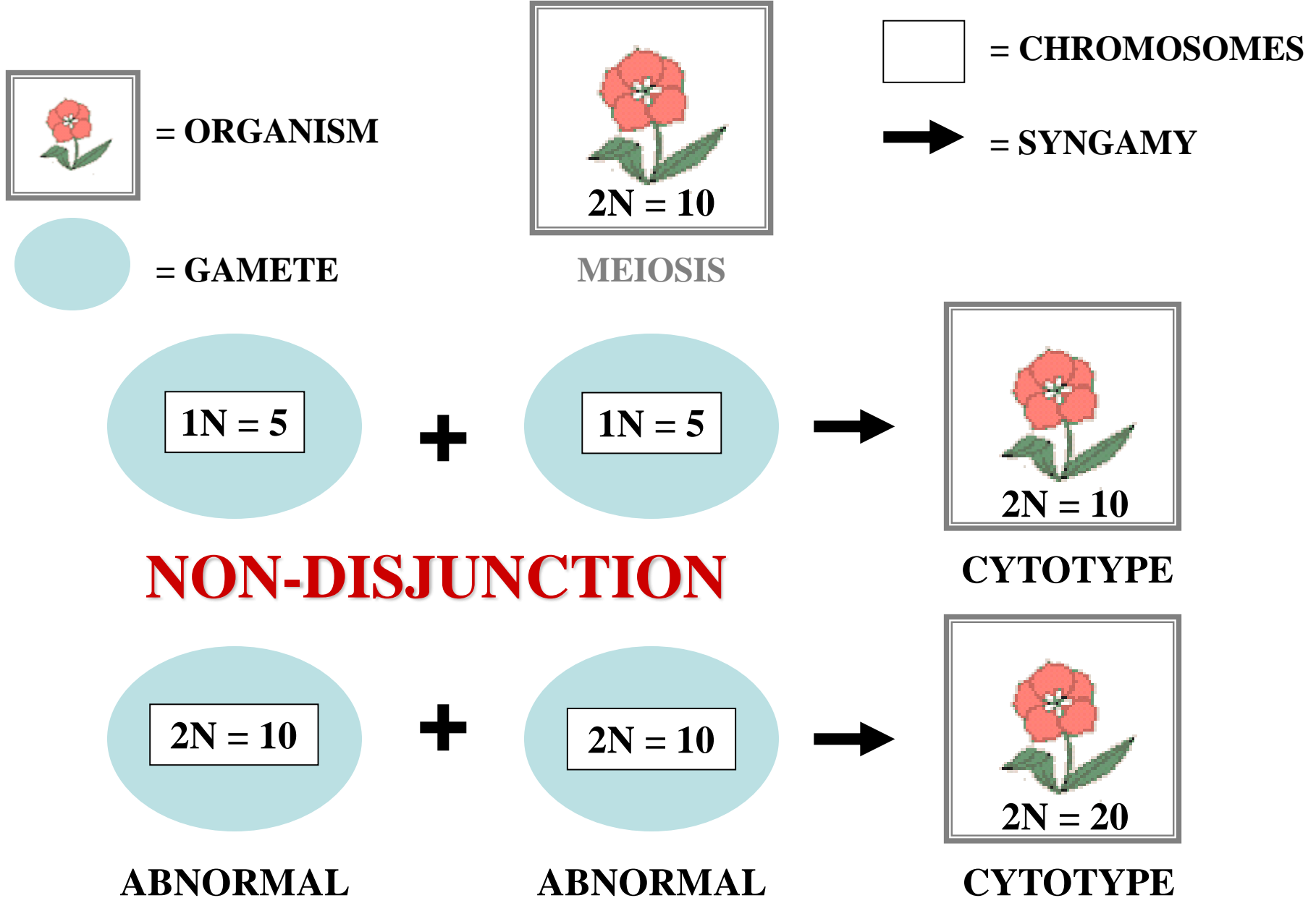
NON-DISJUNCTION: OUTCOME 20



NON-DISJUNCTION: OUTCOME C



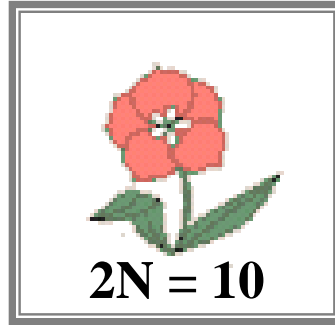
NON-DISJUNCTION: OUTCOME P



NON-DISJUNCTION: OUTCOME +



= ORGANISM



$2N = 10$

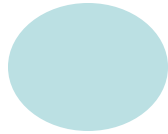
MEIOSIS



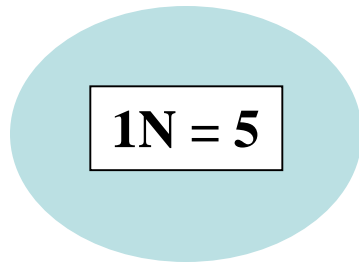
= CHROMOSOMES



= SYNGAMY

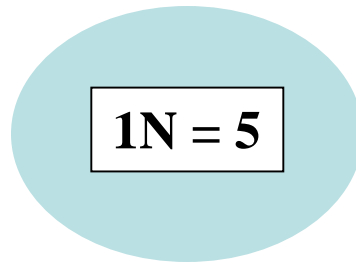


= GAMETE

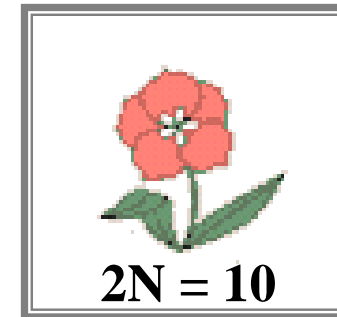


$1N = 5$

+



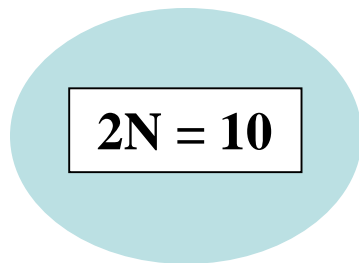
$1N = 5$



$2N = 10$

POLYPLOID

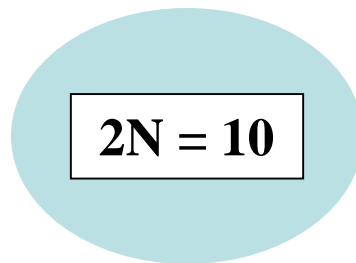
NON-DISJUNCTION



$2N = 10$

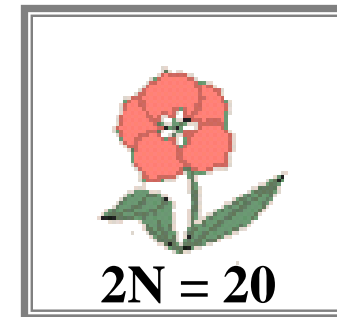
ABNORMAL

+



$2N = 10$

ABNORMAL



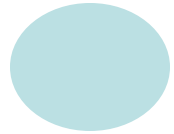
$2N = 20$

POLYPLOID

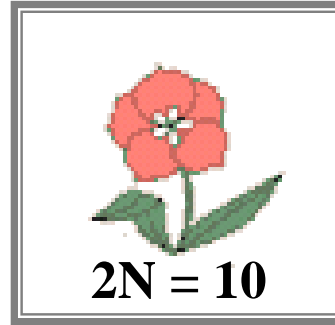
NON-DISJUNCTION: OUTCOME PR



= ORGANISM



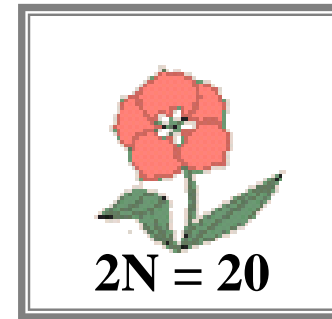
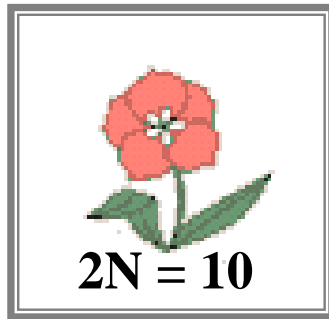
= GAMETE



= CHROMOSOMES



= SYNGAMY

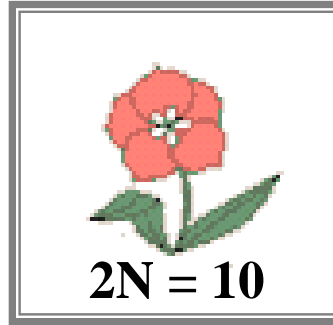


CYTOTYPES & POLYPLOIDS

NON-DISJUNCTION: OUTCOME



= ORGANISM



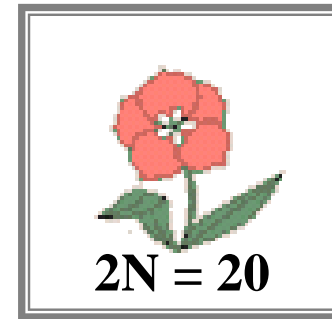
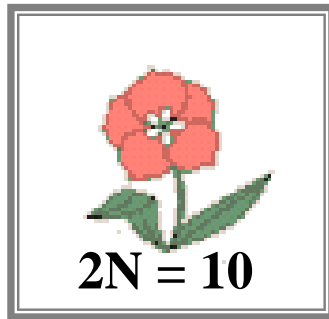
= CHROMOSOMES



= SYNGAMY



= GAMETE



CYTOTYPES & POLYPLOIDS

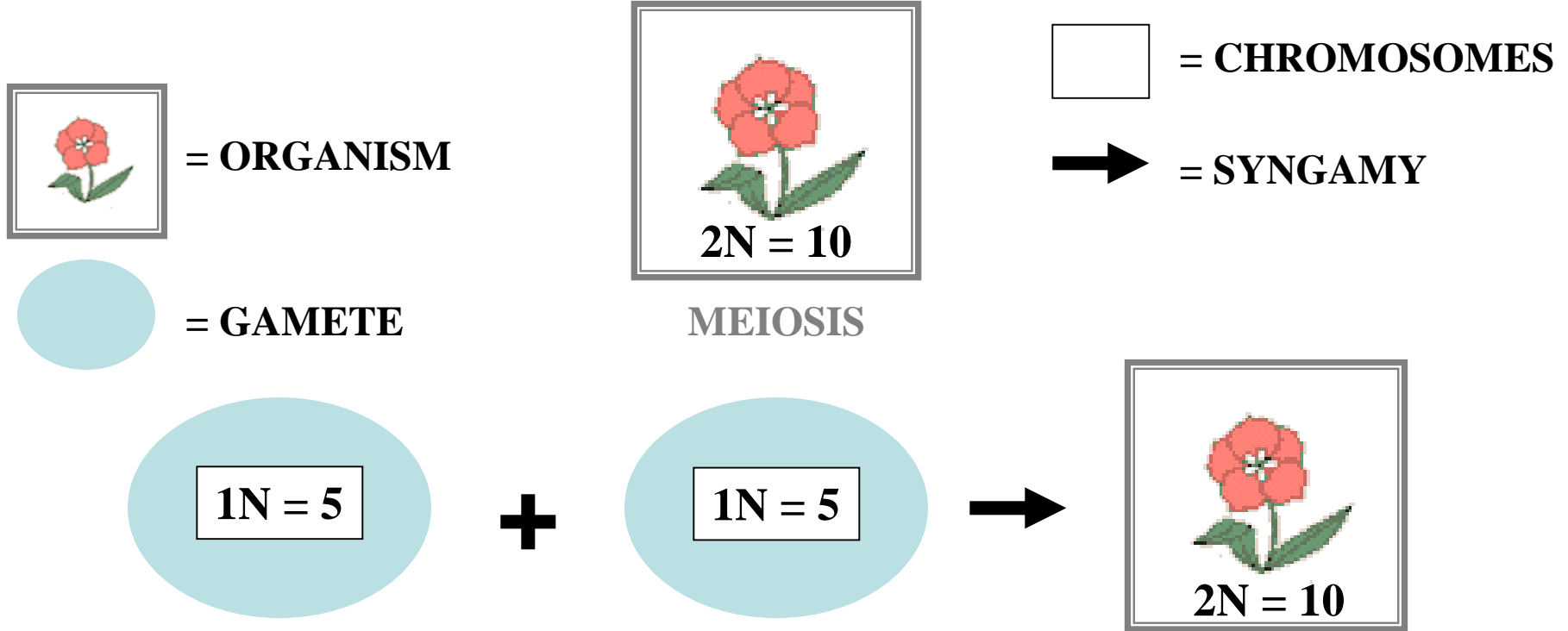
PRESENT

**CYTOTYPES
&
POLYPLOIDS
SUMMARY**



MEIOSIS
ANAPHASE-II
DISJUNCTION
OUTCOME

DISJUNCTION: OUTCOME



DISJUNCTION

CYTOTYPES & POLYPLOIDS

ABSENT



MEIOSIS

ANAPHASE-II

NON-DISJUNCTION

OUTCOME

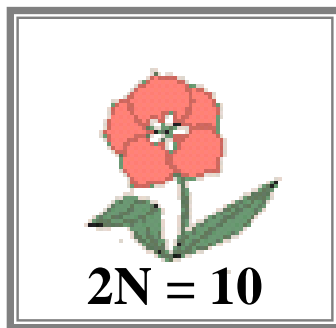
NON-DISJUNCTION: OUTCOME



P



= ORGANISM



$2N = 10$

MEIOSIS



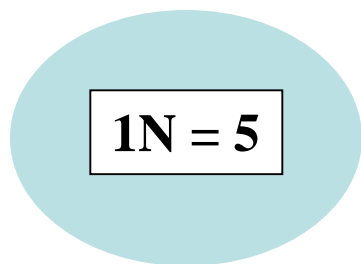
= CHROMOSOMES



= SYNGAMY

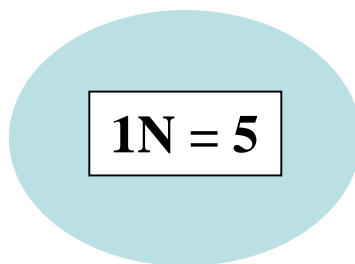


= GAMETE

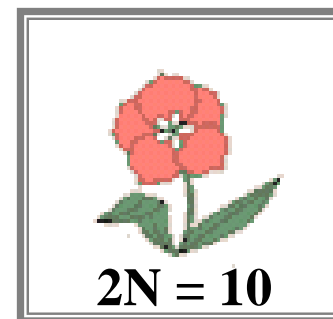


$1N = 5$

+



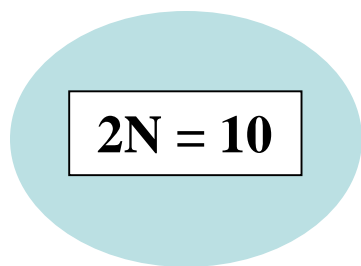
$1N = 5$



$2N = 10$

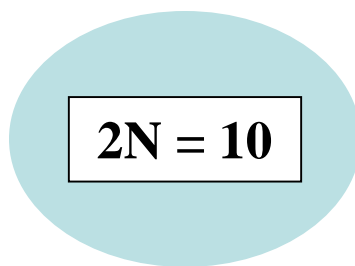
CYTOTYPE

NON-DISJUNCTION

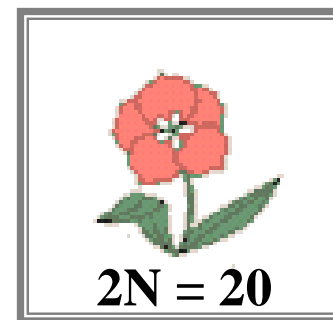


$2N = 10$

+



$2N = 10$



$2N = 20$

CYTOTYPE

ABNORMAL

ABNORMAL

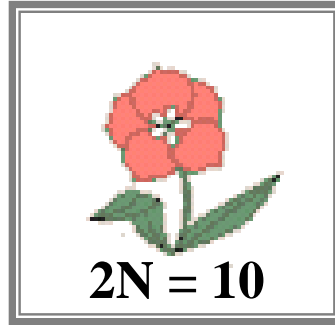
NON-DISJUNCTION: OUTCOME



PR



= ORGANISM



$2N = 10$

MEIOSIS



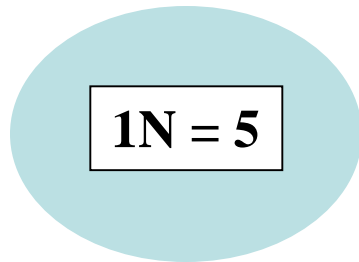
= CHROMOSOMES



= SYNGAMY

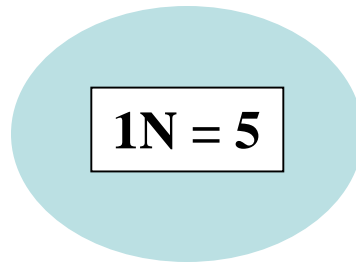


= GAMETE

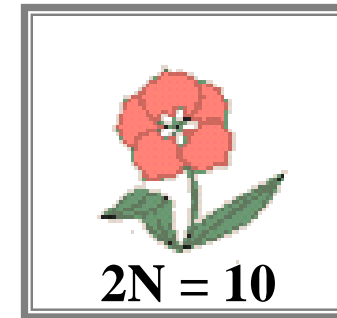


$1N = 5$

+



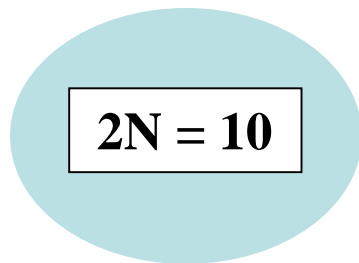
$1N = 5$



$2N = 10$

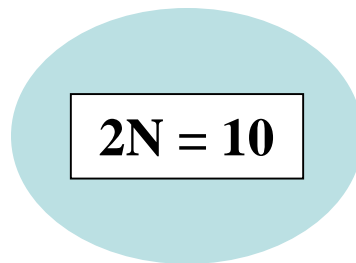
POLYPLOID

NON-DISJUNCTION

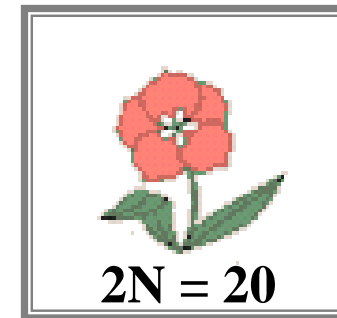


$2N = 10$

+



$2N = 10$



$2N = 20$

POLYPLOID

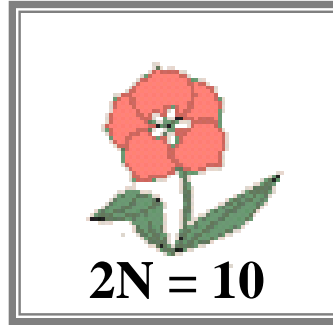
ABNORMAL

ABNORMAL

NON-DISJUNCTION: OUTCOME



= ORGANISM



$2N = 10$



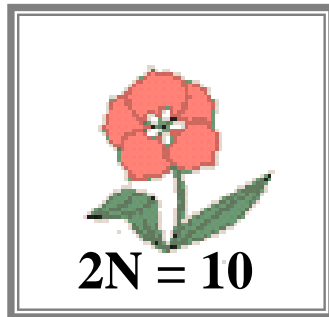
= CHROMOSOMES



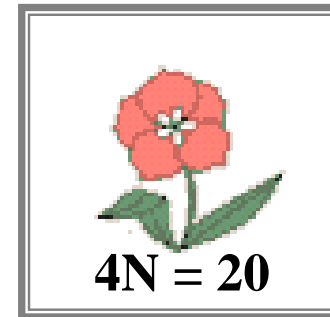
= SYNGAMY



= GAMETE



$2N = 10$



$4N = 20$

CYTOTYPES & POLYPLOIDS

PRESENT

SYMPATRIC SPECIATION TYPES

**SYMPATRIC
SPECIATION
TYPES**

AUTOPOLYPLOID SPECIATION

**SYMPATRIC
SPECIATION
TYPES**



**SYMPATRIC
SPECIATION
TYPES**

**AUTOPOLYPLOID SPECIATION
ALLOPOLYPLOID SPECIATION**

**SYMPATRIC
SPECIATION
TYPES**



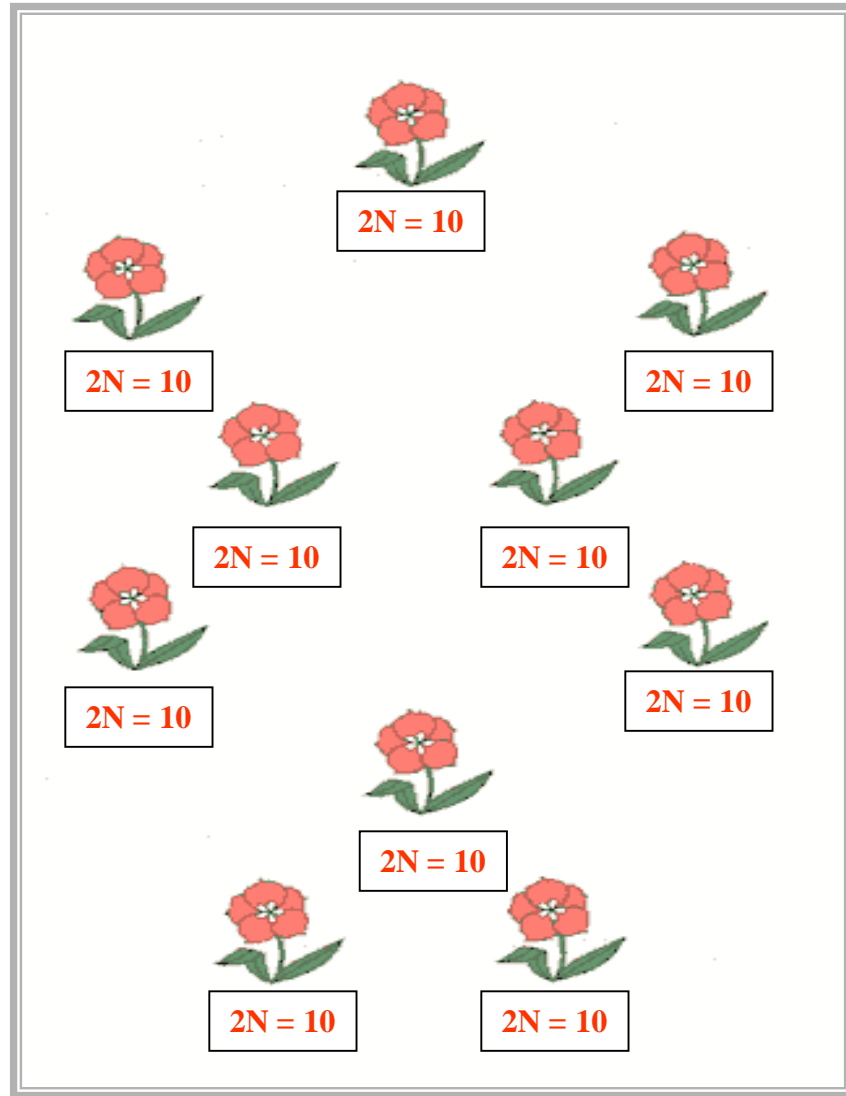
SYMPATRIC
AUTOPOLYPLOID
SPECIATION



**SYMPATRIC
AUTOPOLYPLOID
SPECIATION
SCENARIO**

AUTOPOLYPLOID SPECIATION

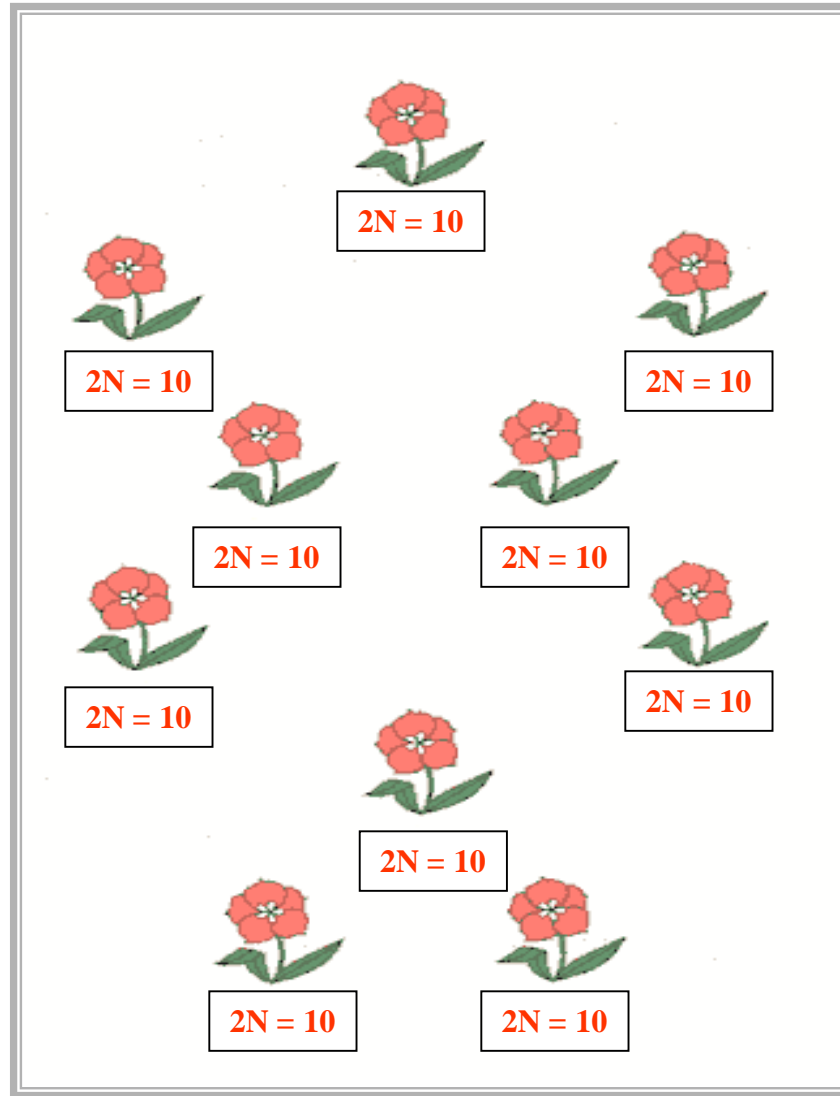
GEOGRAPHIC
AREA



GEOGRAPHIC
AREA

PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION

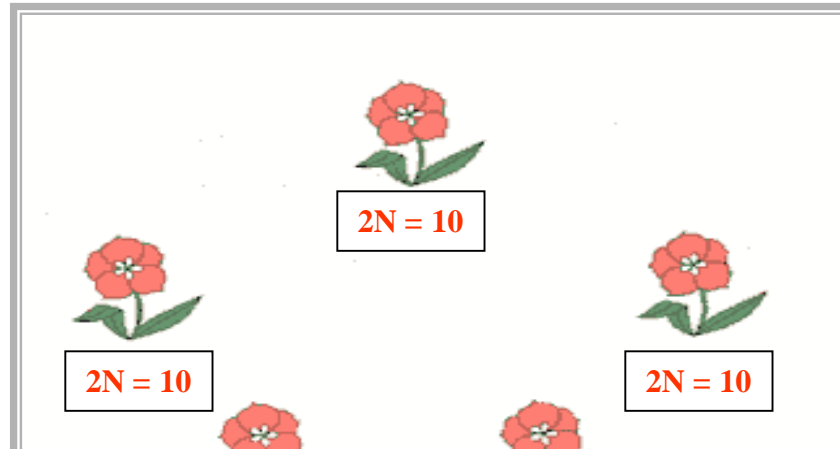


**SAME
GEOGRAPHIC
AREA**

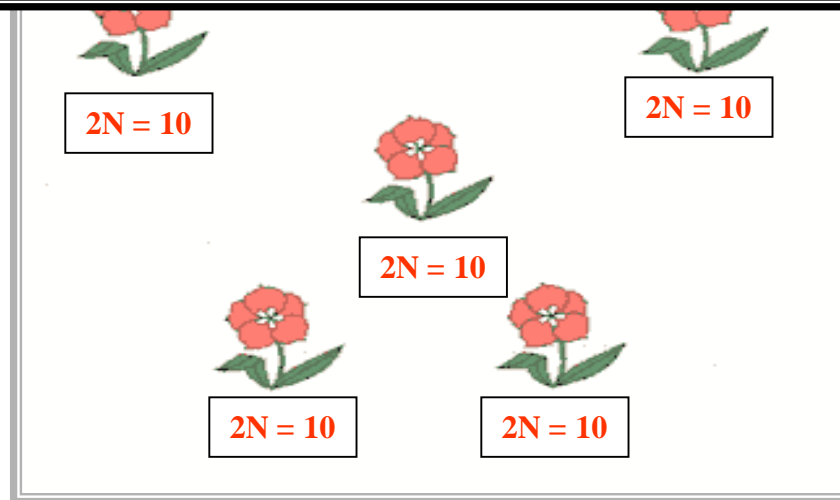
**SAME
GEOGRAPHIC
AREA**

PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION



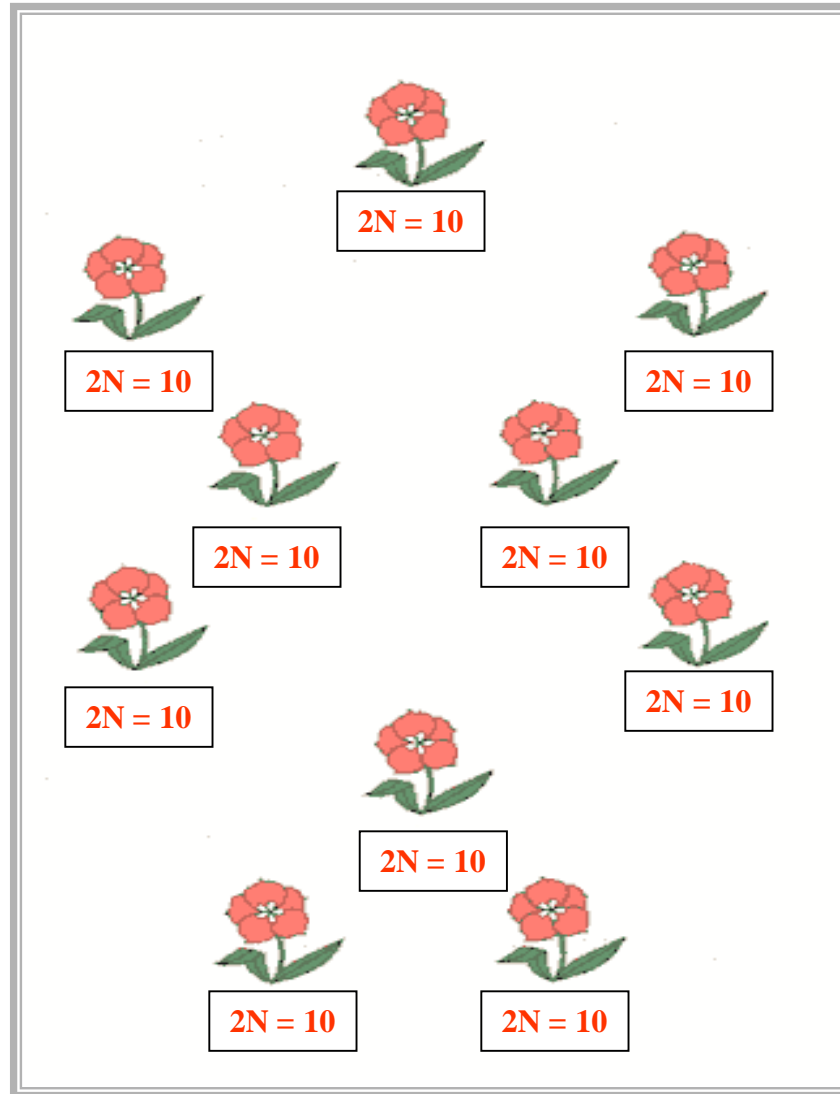
SYMPATRIC POPULATION



PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION

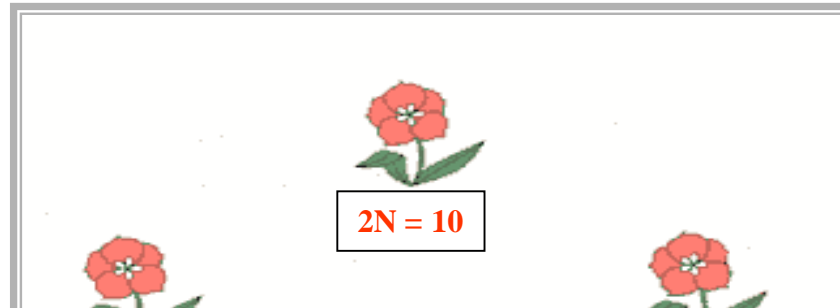
SAME
GEOGRAPHIC
AREA



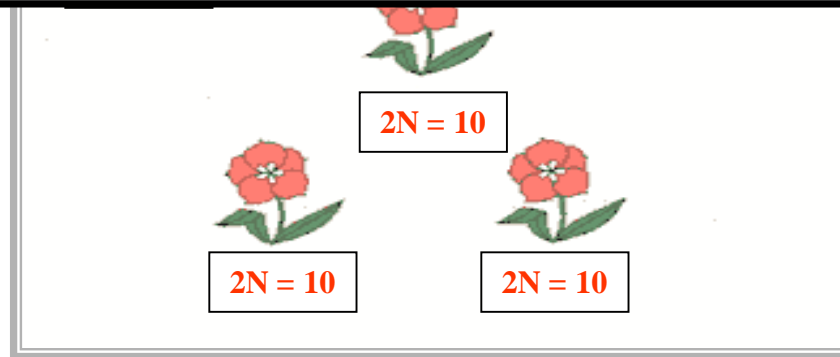
SAME
GEOGRAPHIC
AREA

PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION

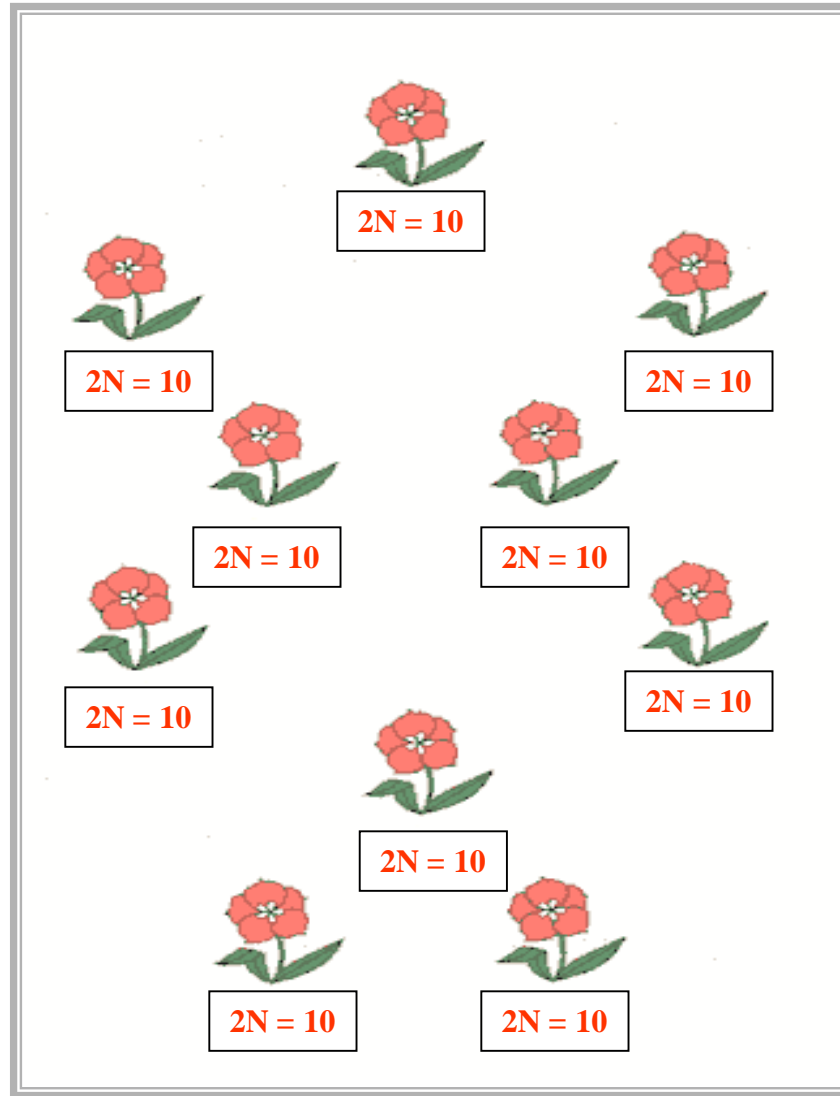


**PARENTAL POPULATION
REMAINS
SYMPATRIC THROUGHOUT**



PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION

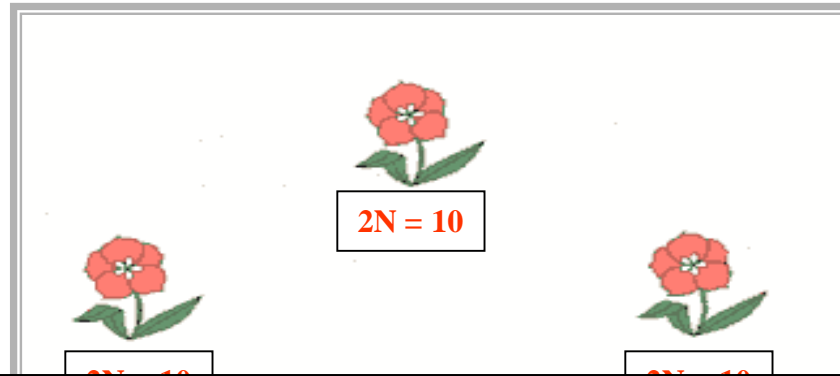


**SAME
GEOGRAPHIC
AREA**

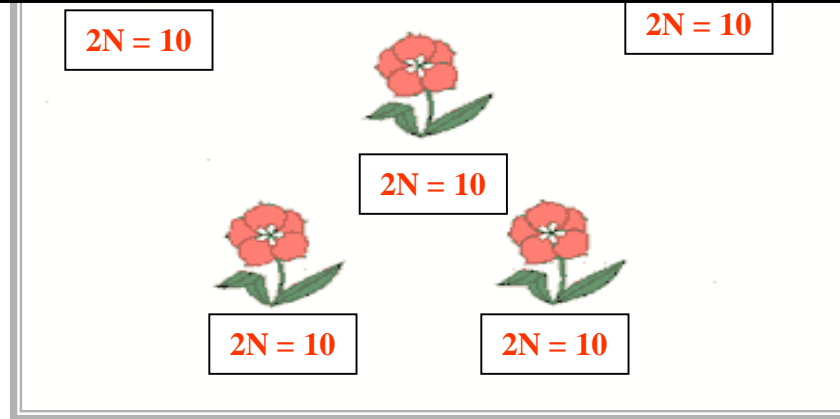
**SAME
GEOGRAPHIC
AREA**

PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION



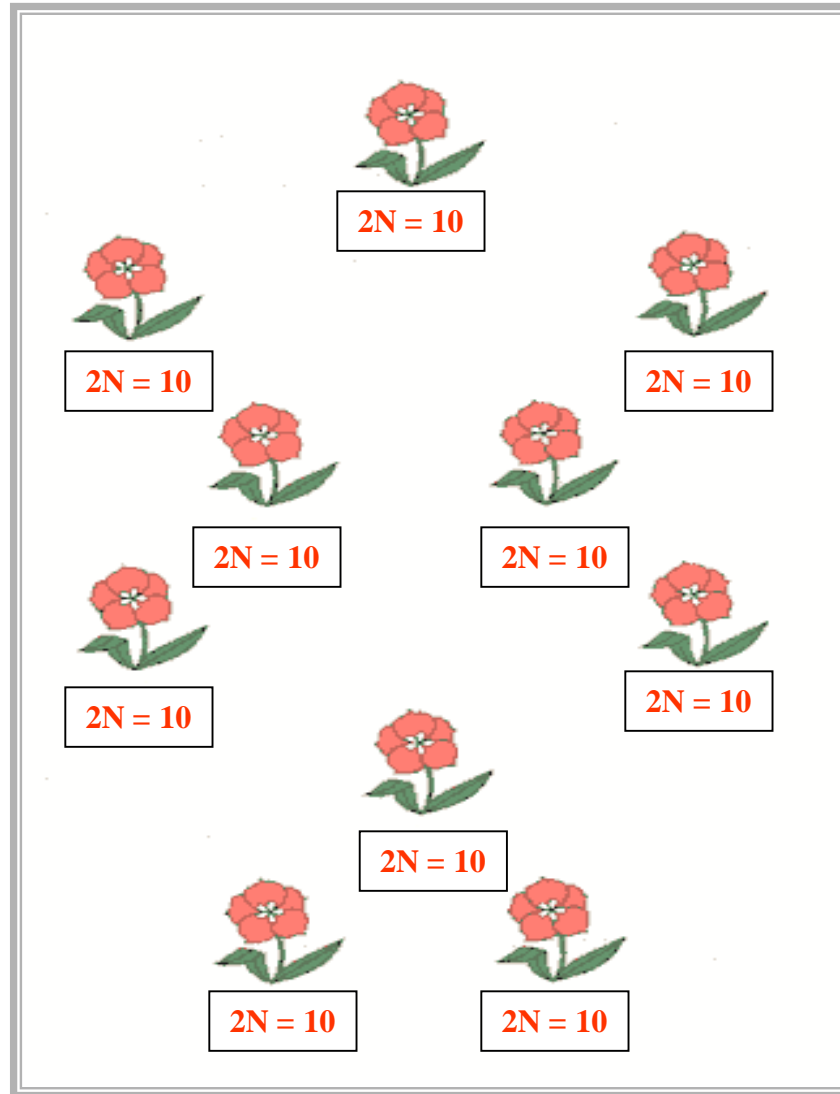
**GEOLOGIC BARRIER
DOES NOT ARISE**



PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION

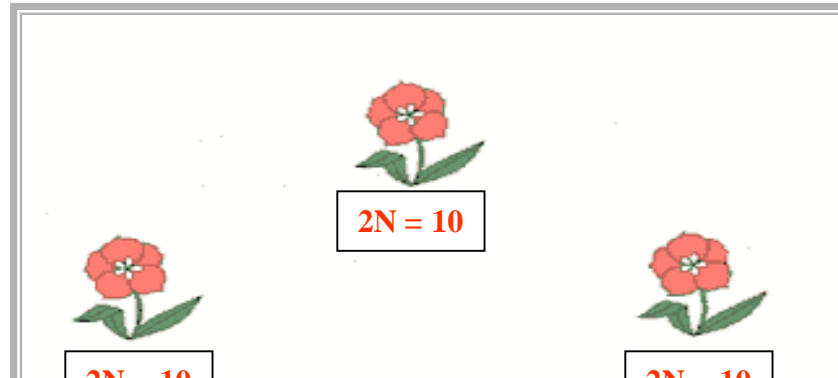
SAME
GEOGRAPHIC
AREA



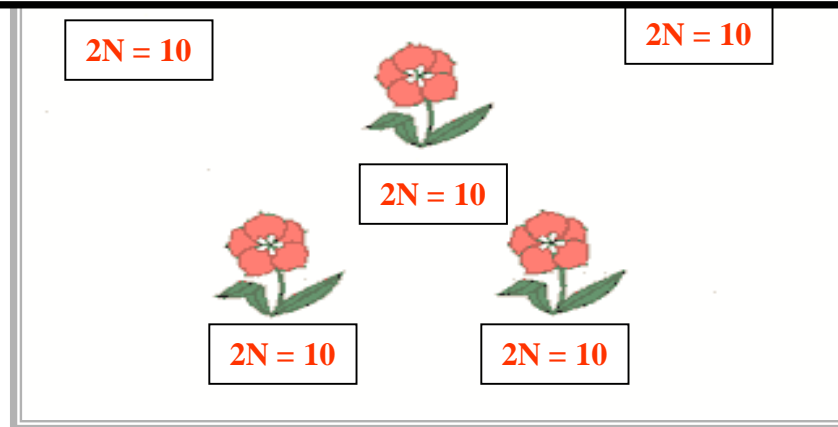
SAME
GEOGRAPHIC
AREA

PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION

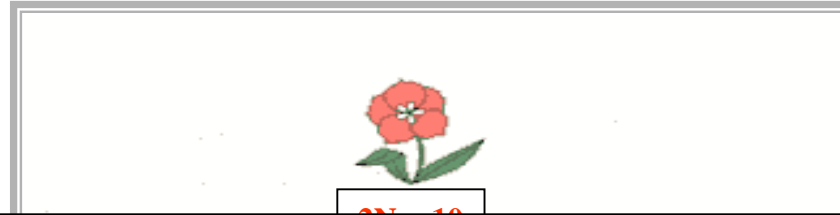


**PLOIDY LEVEL
CHANGE OCCURS**



PARENTAL POPULATION

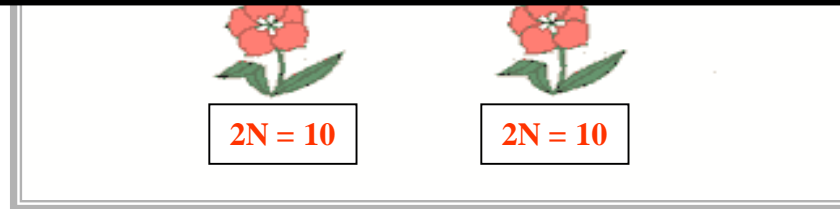
AUTOPOLYPLOID SPECIATION



**PLOIDY LEVEL
CHANGE OCCURS**

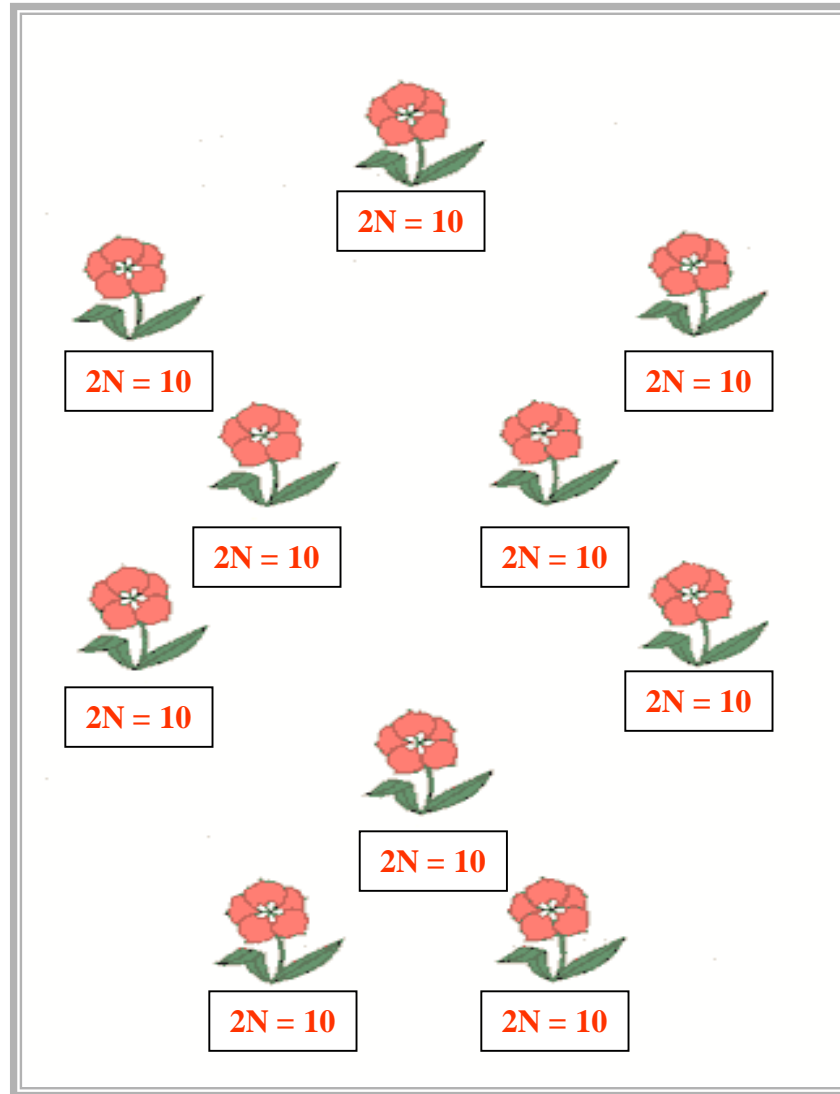


**VIA ANAPHASE-II
NON-DISJUNCTION**



PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION

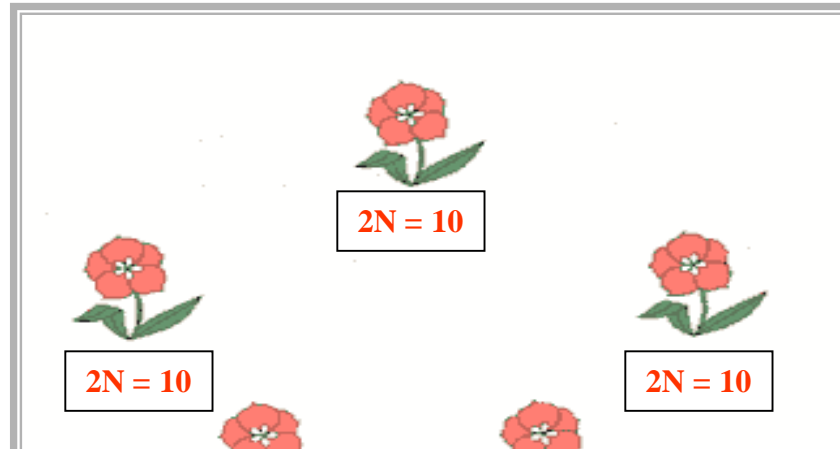


**SAME
GEOGRAPHIC
AREA**

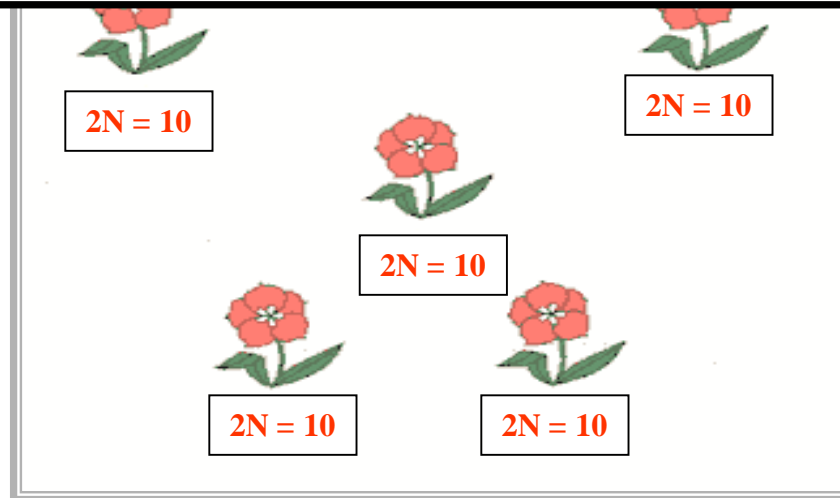
**SAME
GEOGRAPHIC
AREA**

PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION



CYTOTYPES ARISE



CYTOTYPES

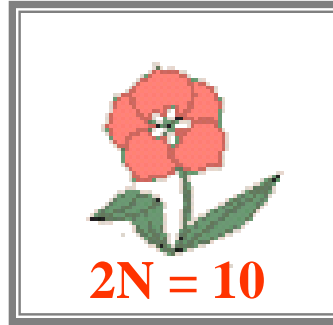
CYTOTYPES



= ORGANISM



= GAMETE



PARENTAL POPULATION



= CHROMOSOMES



= SYNGAMY

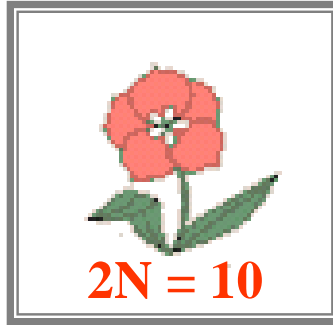
CYTOTYPES

?

D



= ORGANISM



$2N = 10$

MEIOSIS



= CHROMOSOMES



= SYNGAMY

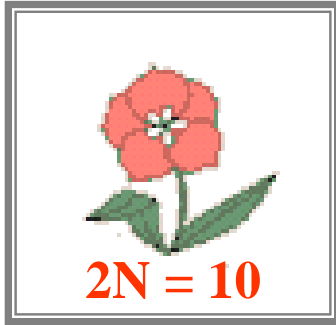


= GAMETE

CYTOTYPES



= ORGANISM



2N = 10

MEIOSIS



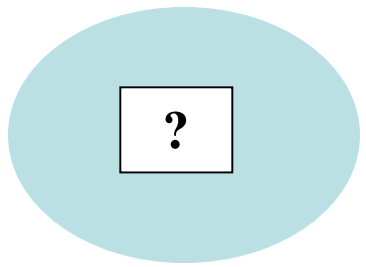
= CHROMOSOMES



= SYNGAMY

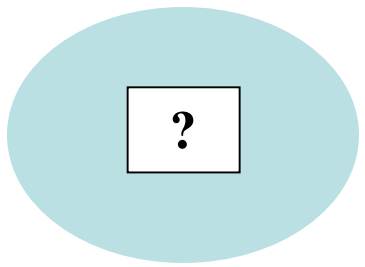


= GAMETE



?

+



?

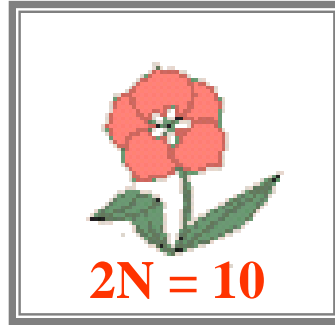
DISJUNCTION

CYTOTYPES

10



= ORGANISM



$2N = 10$

MEIOSIS



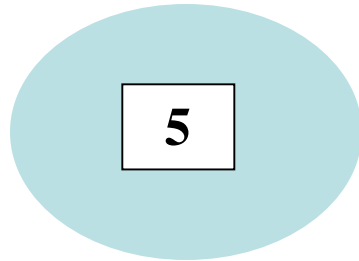
= CHROMOSOMES



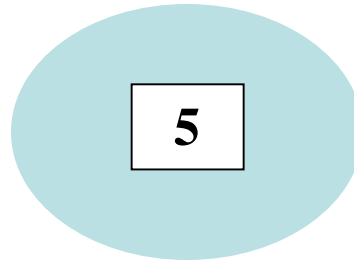
= SYNGAMY



= GAMETE



5



5

DISJUNCTION

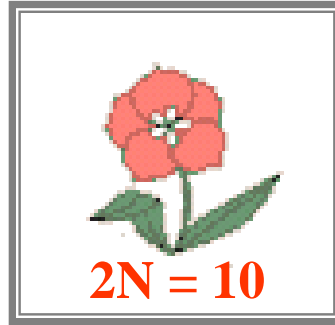
CYTOTYPES

?

N



= ORGANISM



$2N = 10$

MEIOSIS



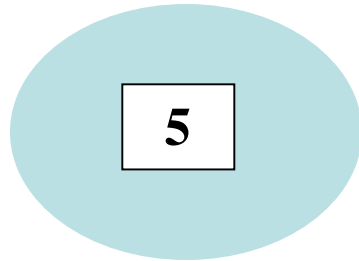
= CHROMOSOMES



= SYNGAMY

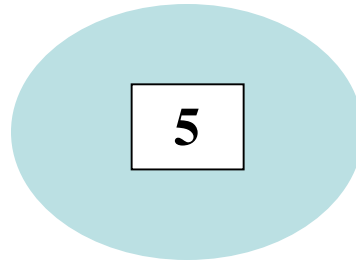


= GAMETE

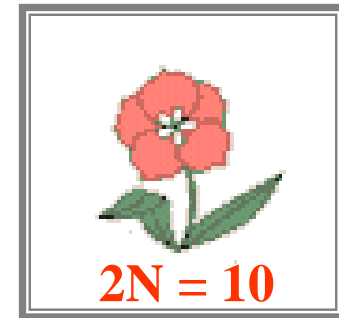


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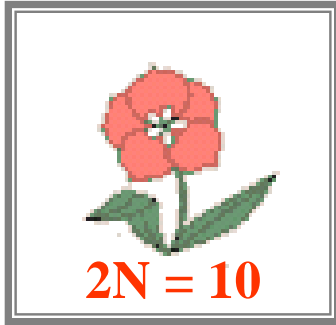
$2N = 10$

DISJUNCTION

CYTOTYPES



= ORGANISM

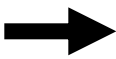


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MEIOSIS



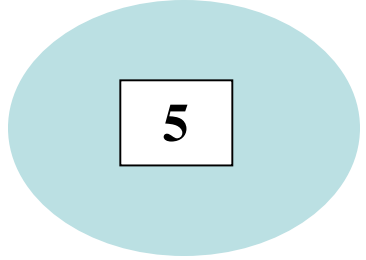
= CHROMOSOMES



= SYNGAMY



= GAMETE

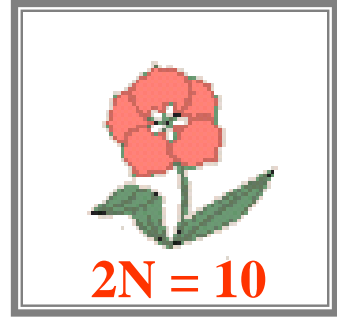


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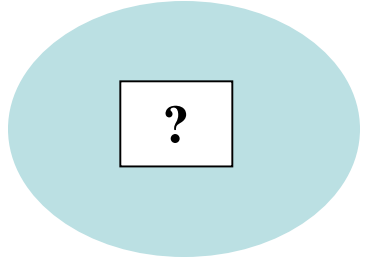


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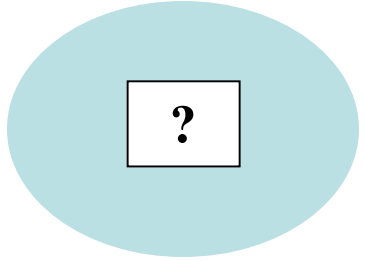
2N = 10

NON-DISJUNCTION



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+



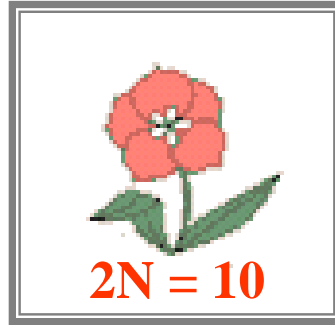
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CYTOTYPES

?



= ORGANISM



$2N = 10$

MEIOSIS



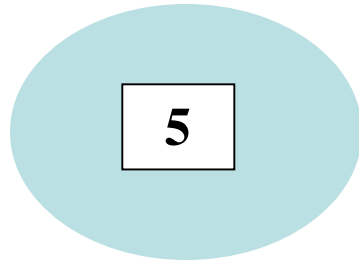
= CHROMOSOMES



= SYNGAMY

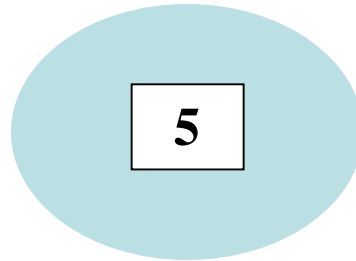


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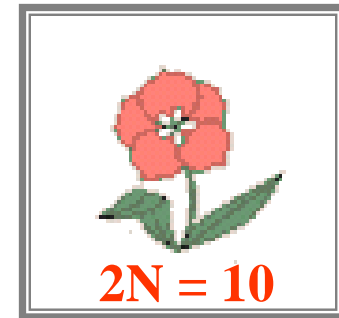


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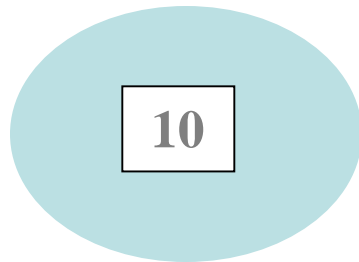


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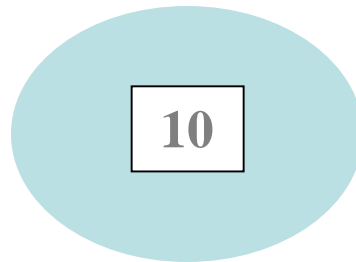
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NON-DISJUNCTION



10

+



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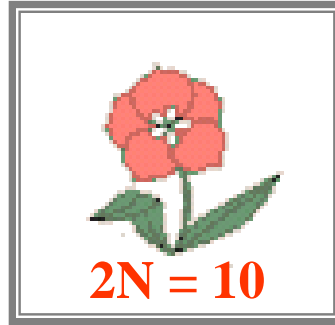
ABNORMAL

ABNORMAL

CYTOTYPES



= ORGANISM



2N = 10

MEIOSIS



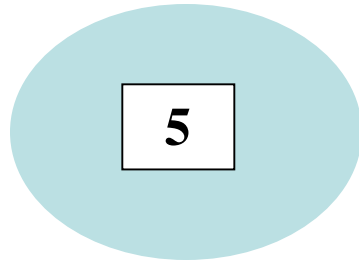
= CHROMOSOMES



= SYNGAMY

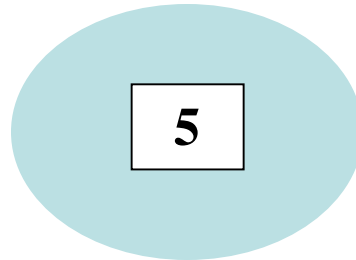


= GAMETE

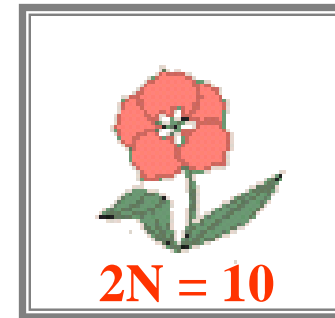


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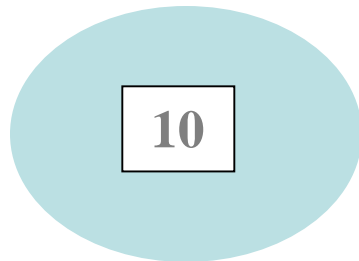


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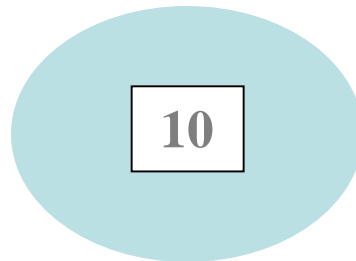
2N = 10

NON-DISJUNCTION

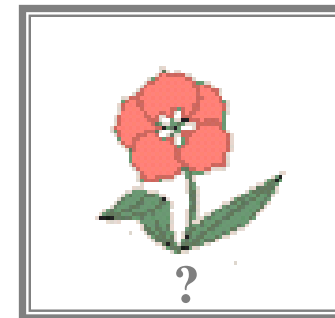


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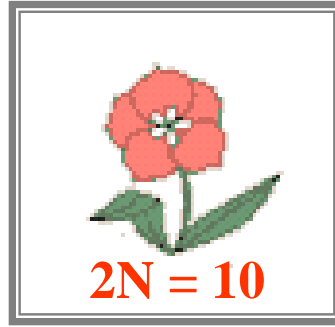
ABNORMAL

ABNORMAL

CYTOTYPES



= ORGANISM



2N = 10

MEIOSIS



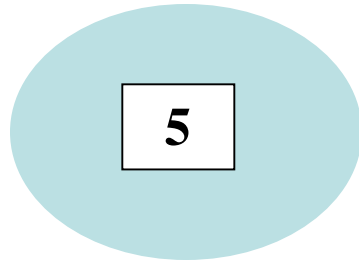
= CHROMOSOMES



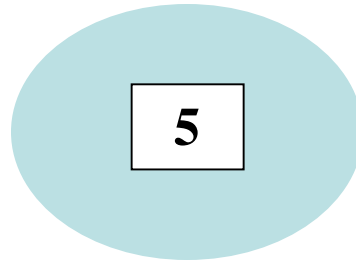
= SYNGAMY



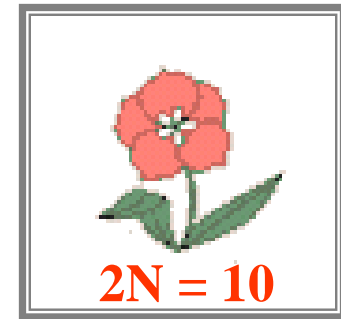
= GAMETE



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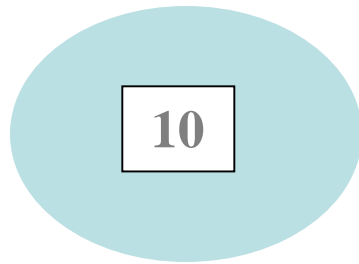


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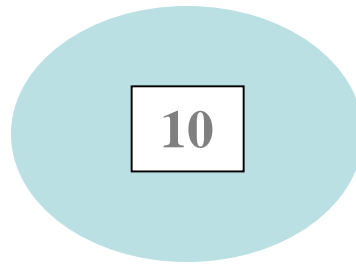


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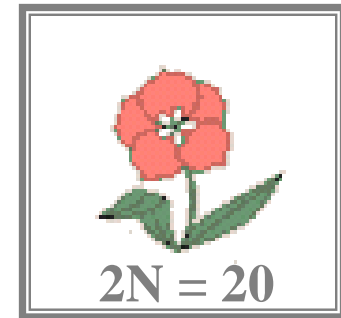
NON-DISJUNCTION



10



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2N = 20

ABNORMAL

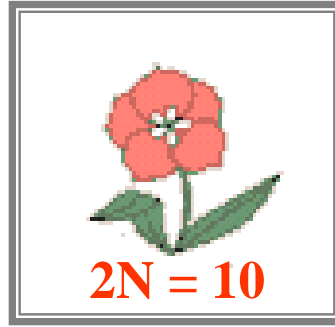
ABNORMAL



CYTOTYPES



= ORGANISM



$2N = 10$

MEIOSIS



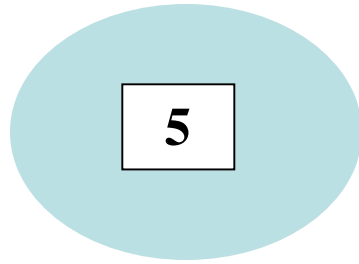
= CHROMOSOMES



= SYNGAMY

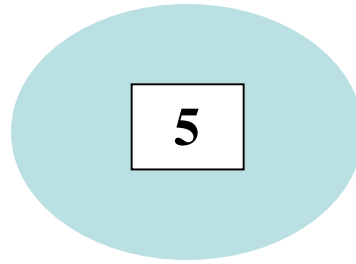


= GAMETE

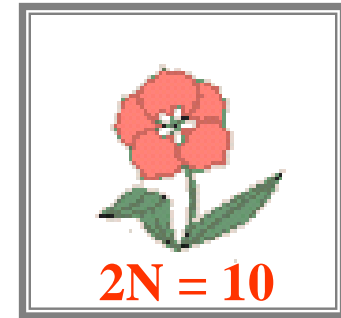


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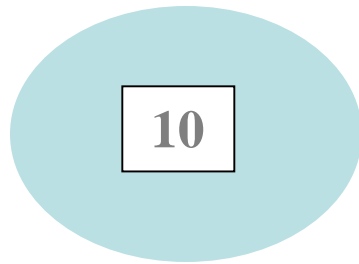
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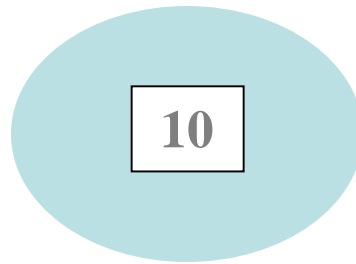
CYTOTYPE

NON-DISJUNCTION

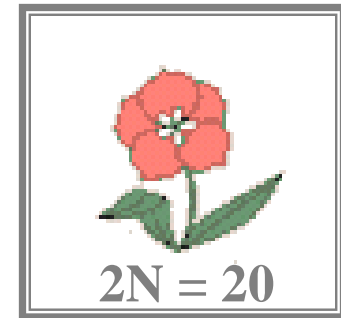


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$2N = 20$

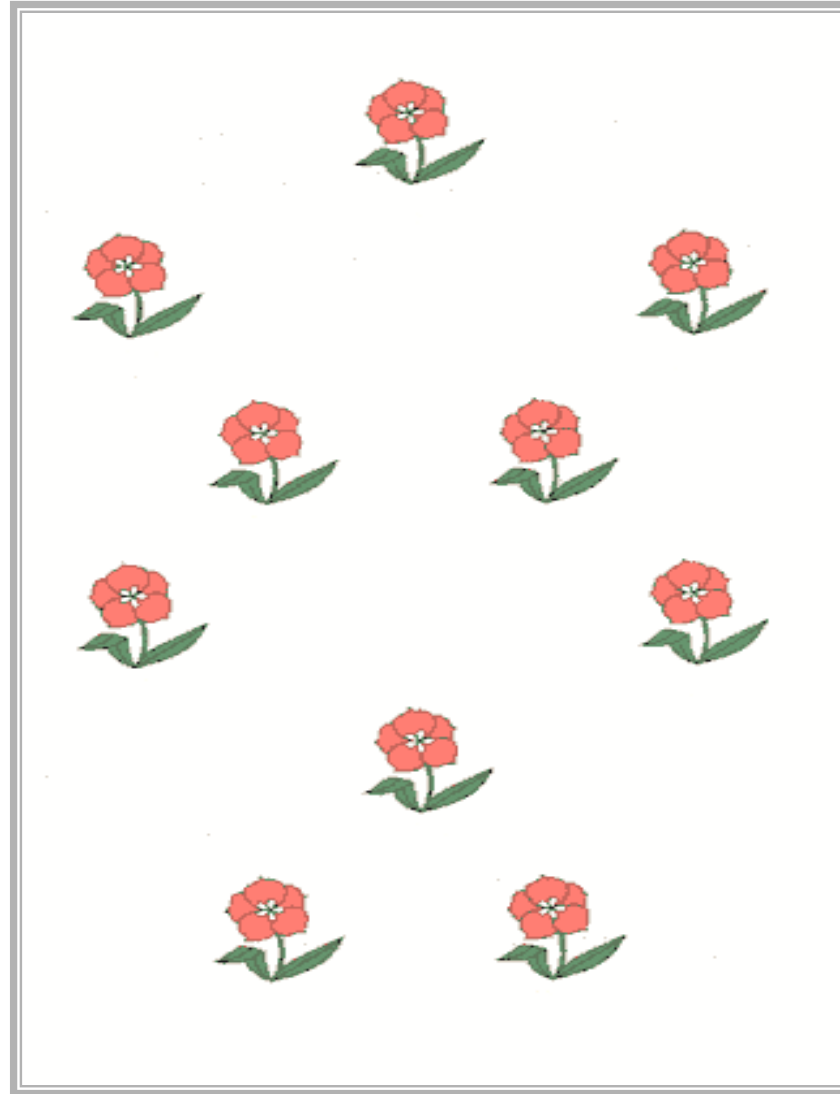
CYTOTYPE

ABNORMAL

ABNORMAL

AUTOPOLYPLOID SPECIATION

**SAME
GEOGRAPHIC
AREA**

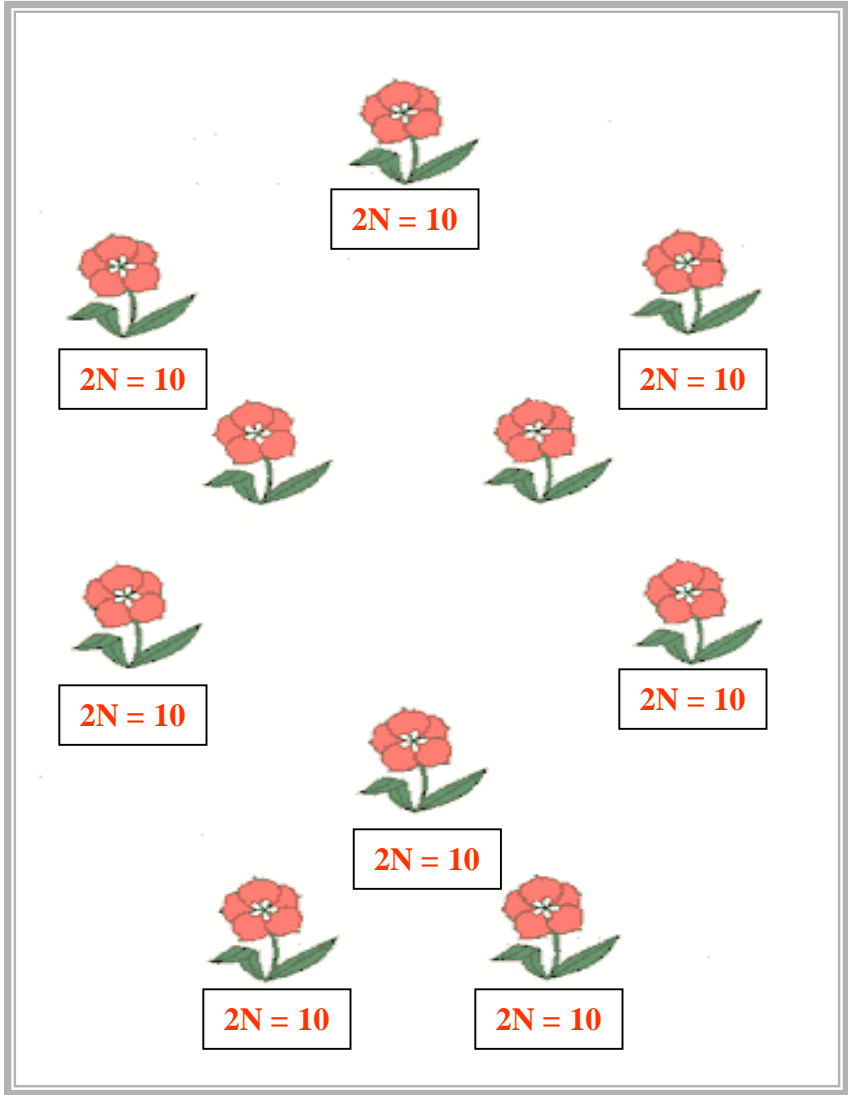


**SAME
GEOGRAPHIC
AREA**

CYTOTYPES

AUTOPOLYPLOID SPECIATION

**SAME
GEOGRAPHIC
AREA**

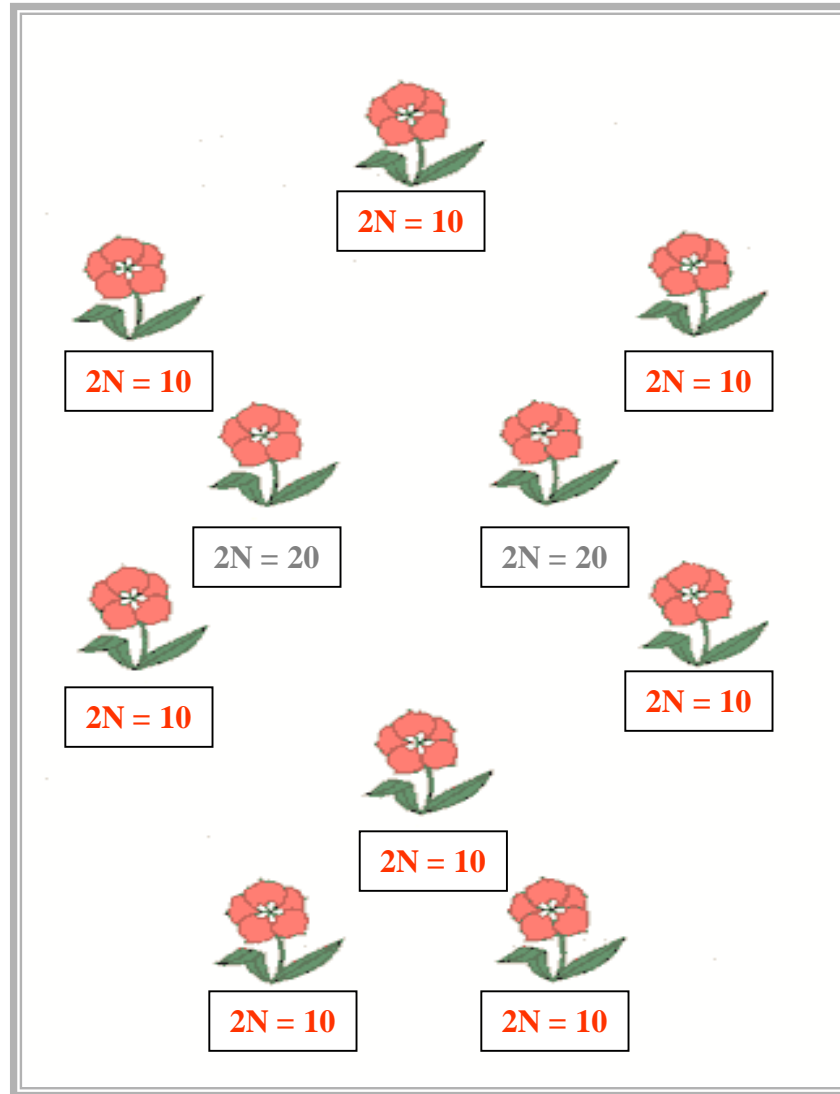


**SAME
GEOGRAPHIC
AREA**

CYTOTYPES

AUTOPOLYPLOID SPECIATION

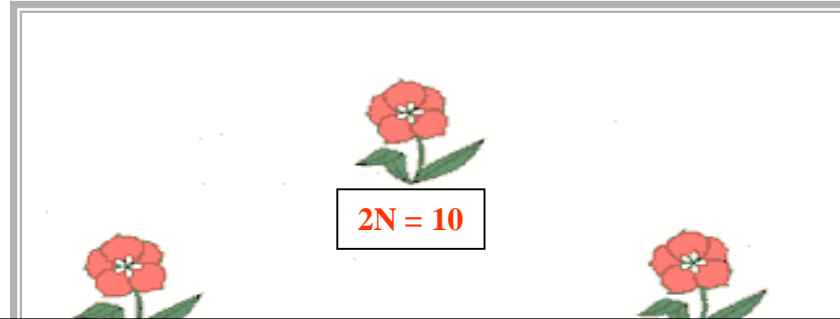
SAME
GEOGRAPHIC
AREA



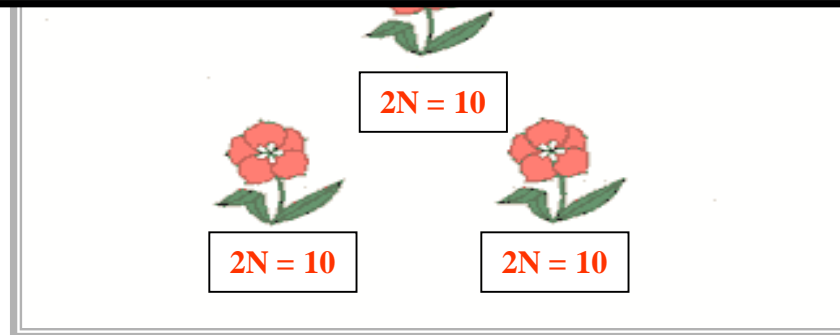
SAME
GEOGRAPHIC
AREA

CYTOTYPES

AUTOPOLYPLOID SPECIATION

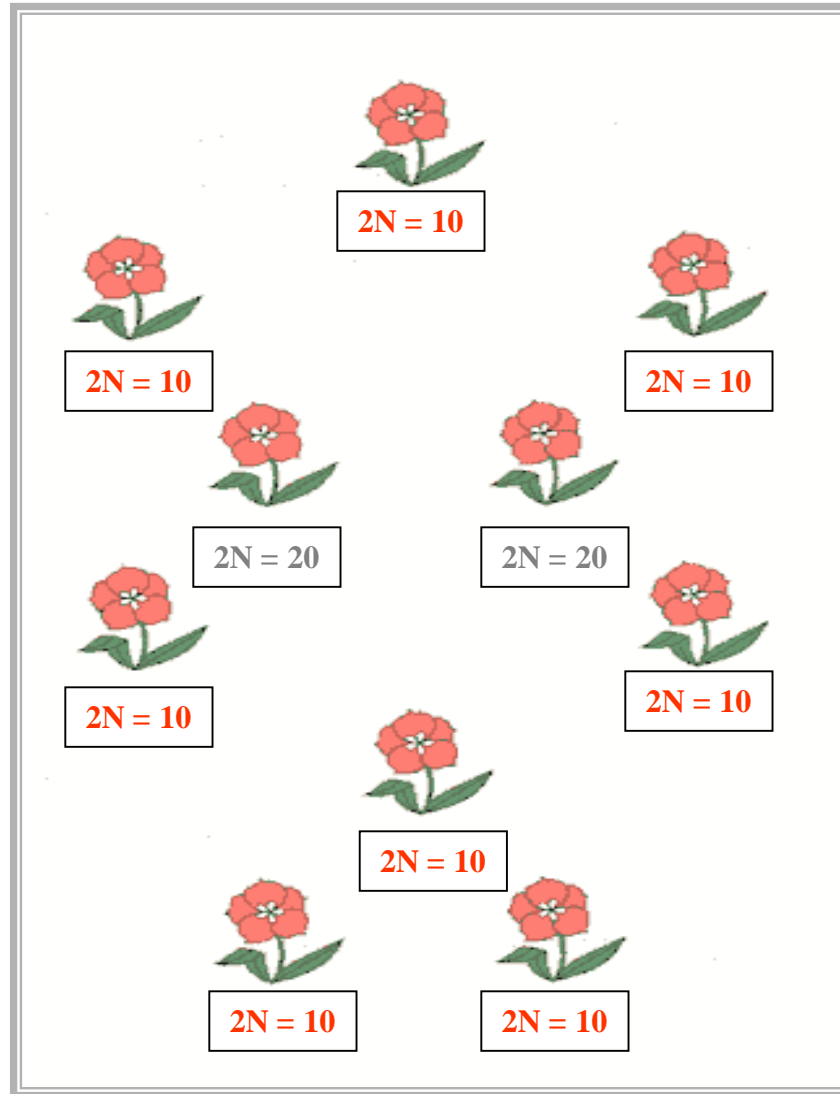


**CYTOTYPES INITIALLY
MORPHOLOGICALLY
IDENTICAL**



CYTOTYPES

AUTOPOLYPLOID SPECIATION

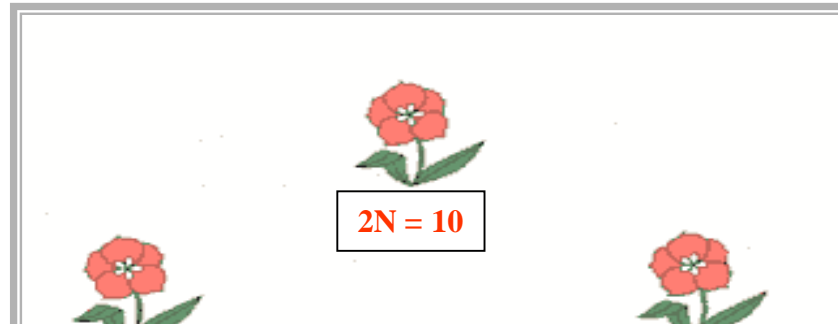


**SAME
GEOGRAPHIC
AREA**

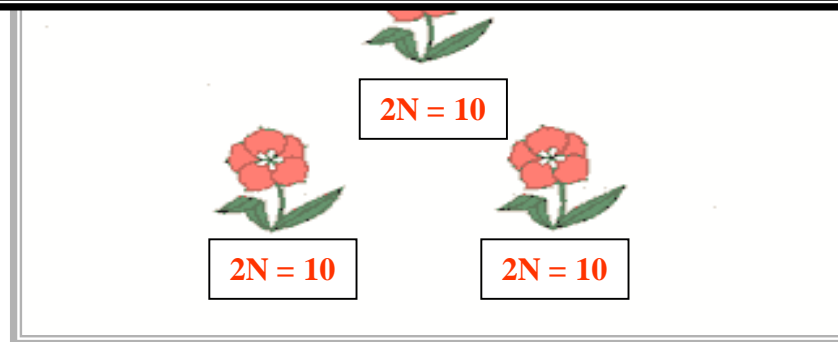
**SAME
GEOGRAPHIC
AREA**

CYTOTYPES

AUTOPOLYPLOID SPECIATION

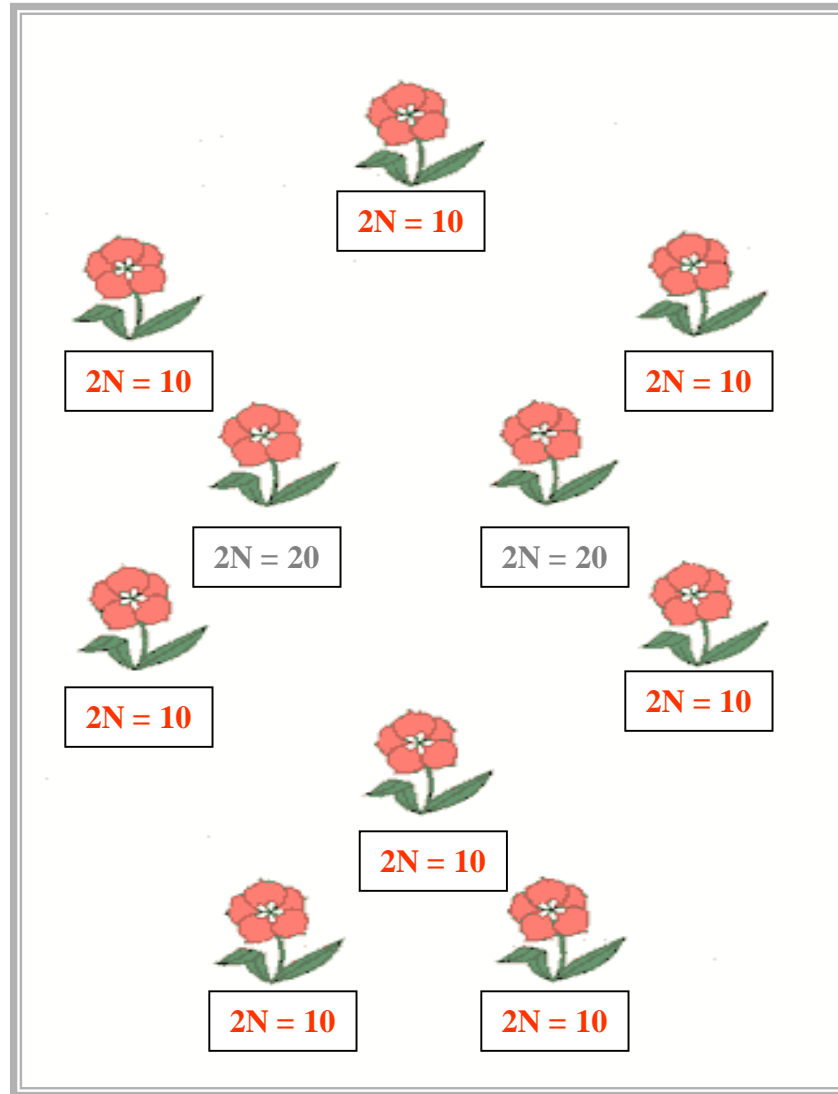
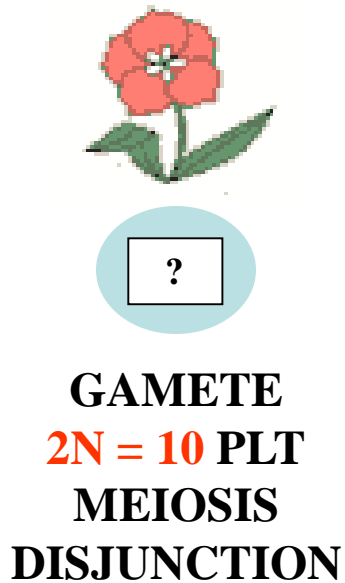


**CYTOTYPES
REPRODUCTIVELY
ISOLATED**



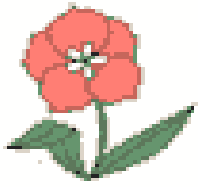
CYTOTYPES

AUTOPOLYPLOID SPECIATION



CYTOTYPES

AUTOPOLYPLOID SPECIATION



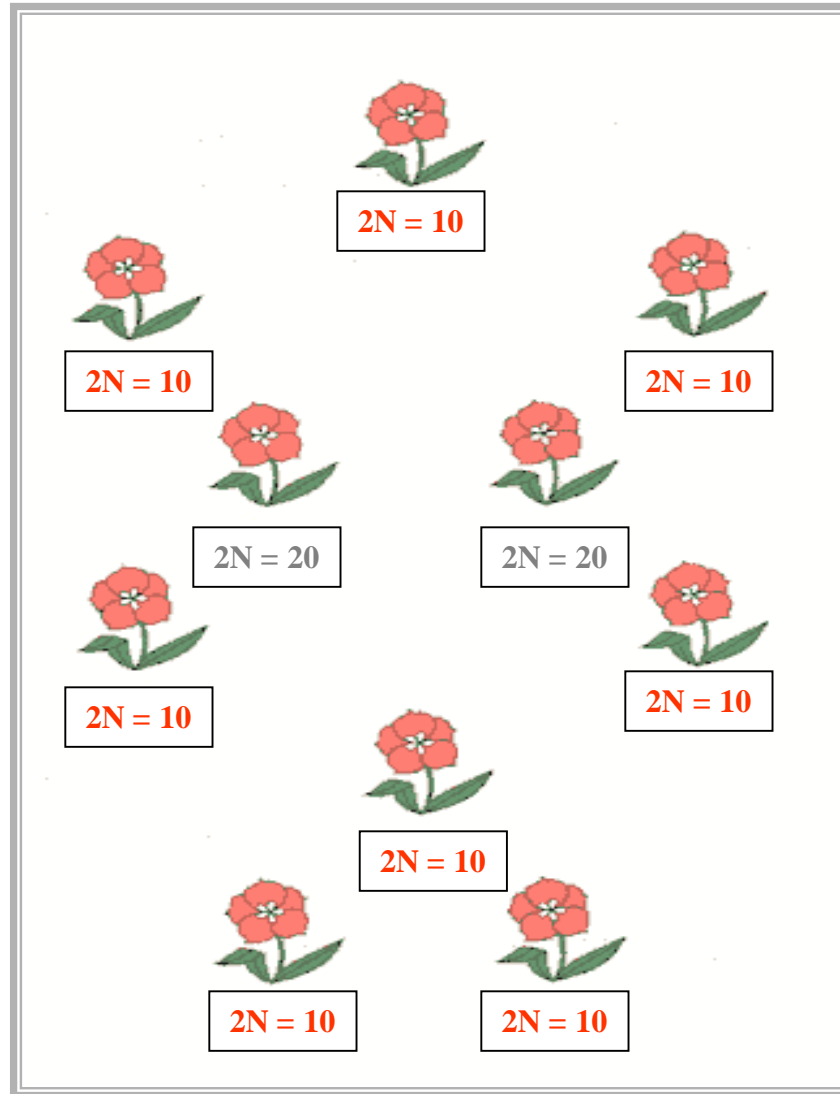
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GAMETE

$2N = 10$ PLT

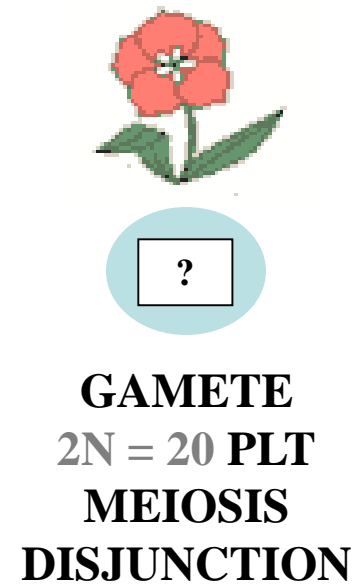
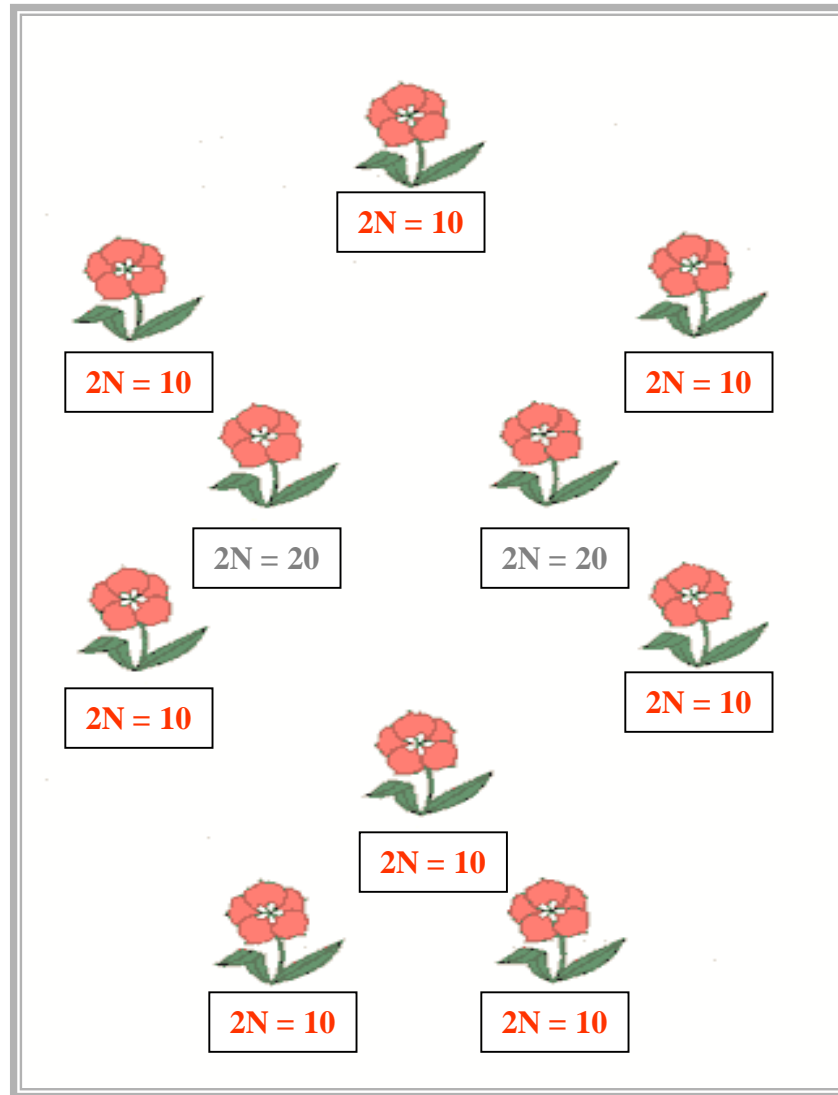
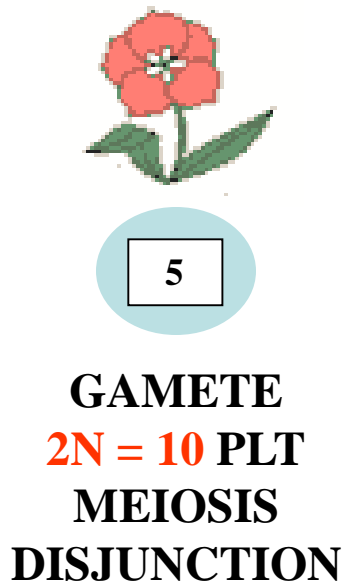
MEIOSIS

DISJUNCTION



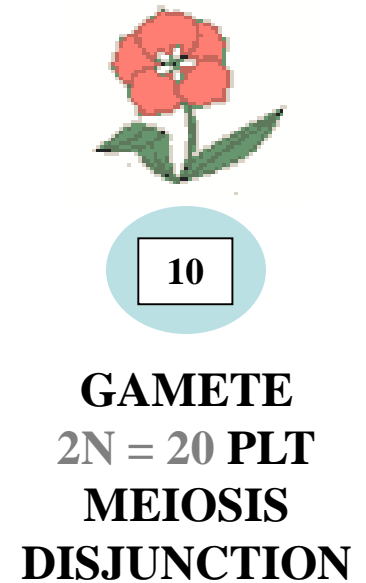
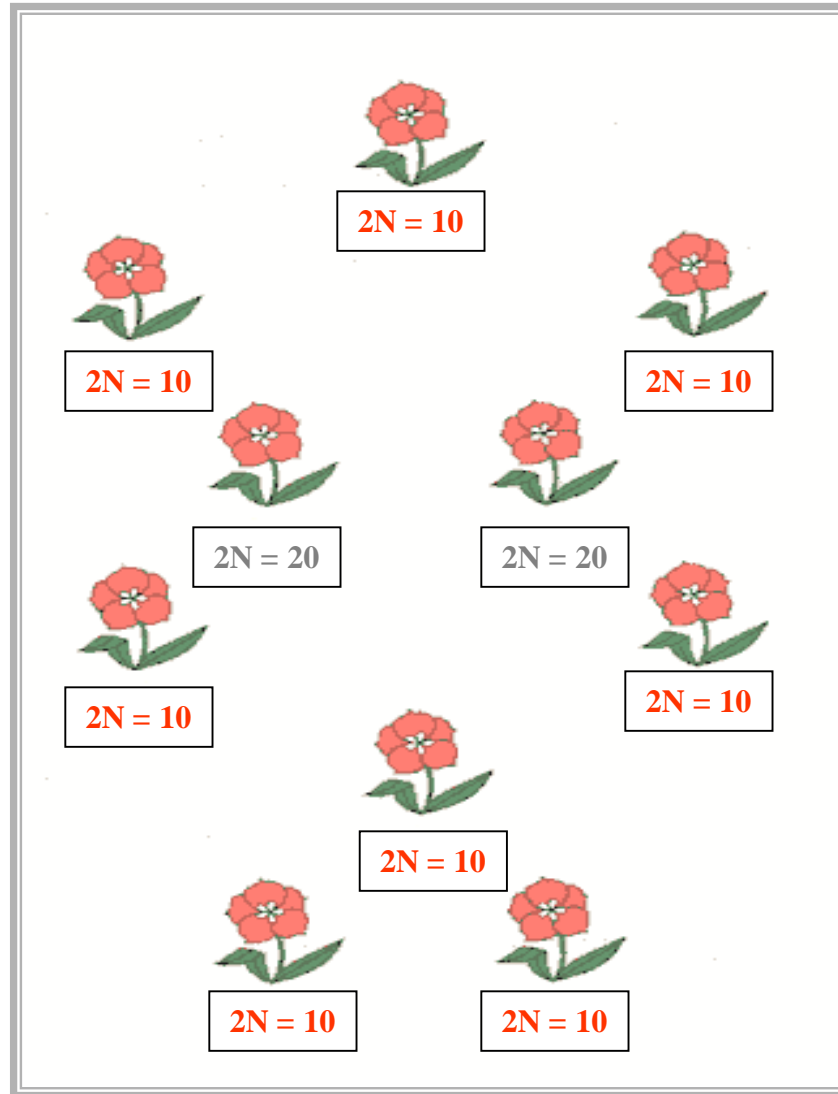
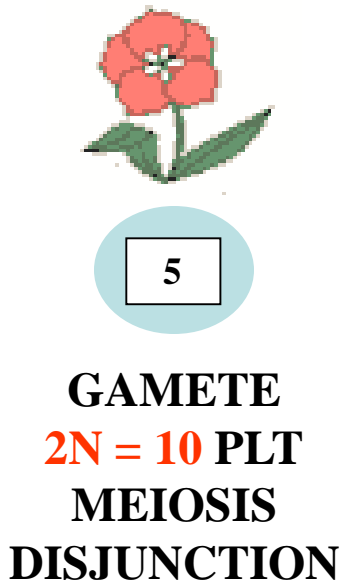
CYTOTYPES

AUTOPOLYPLOID SPECIATION



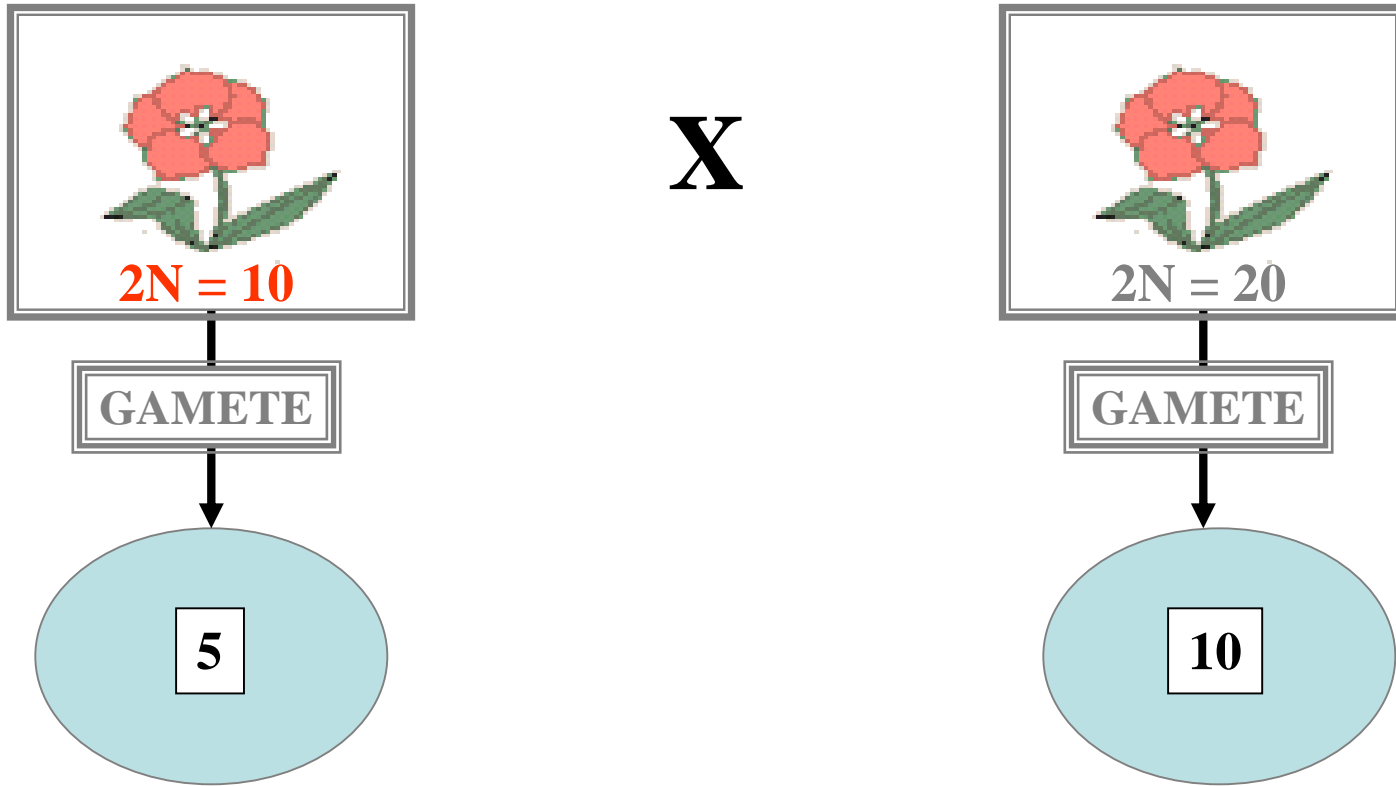
CYTOTYPES

AUTOPOLYPLOID SPECIATION



CYTOTYPES

AUTOPOLYPLOID SPECIATION

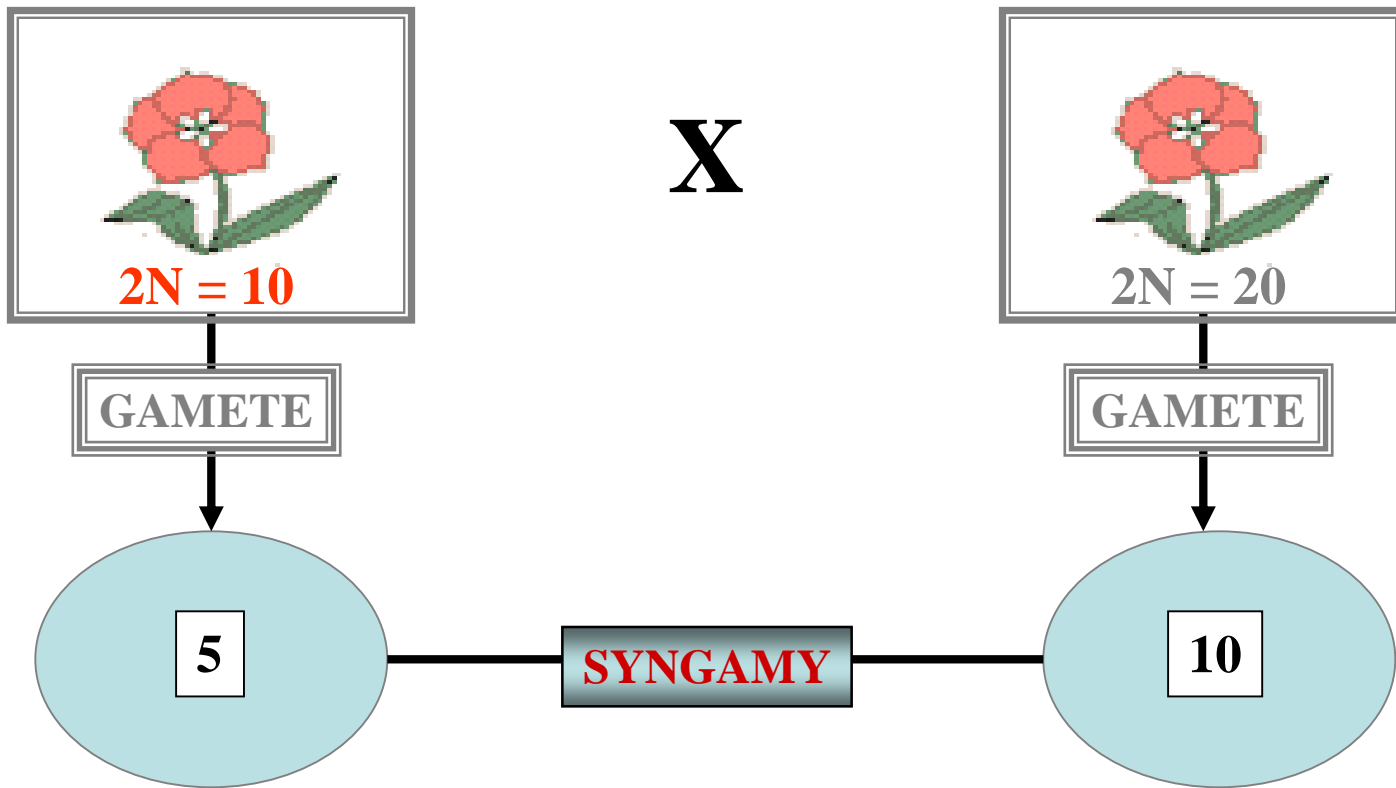


 = GAMETE

 = CHROMOSOMES

CYTOTYPES

AUTOPOLYPLOID SPECIATION

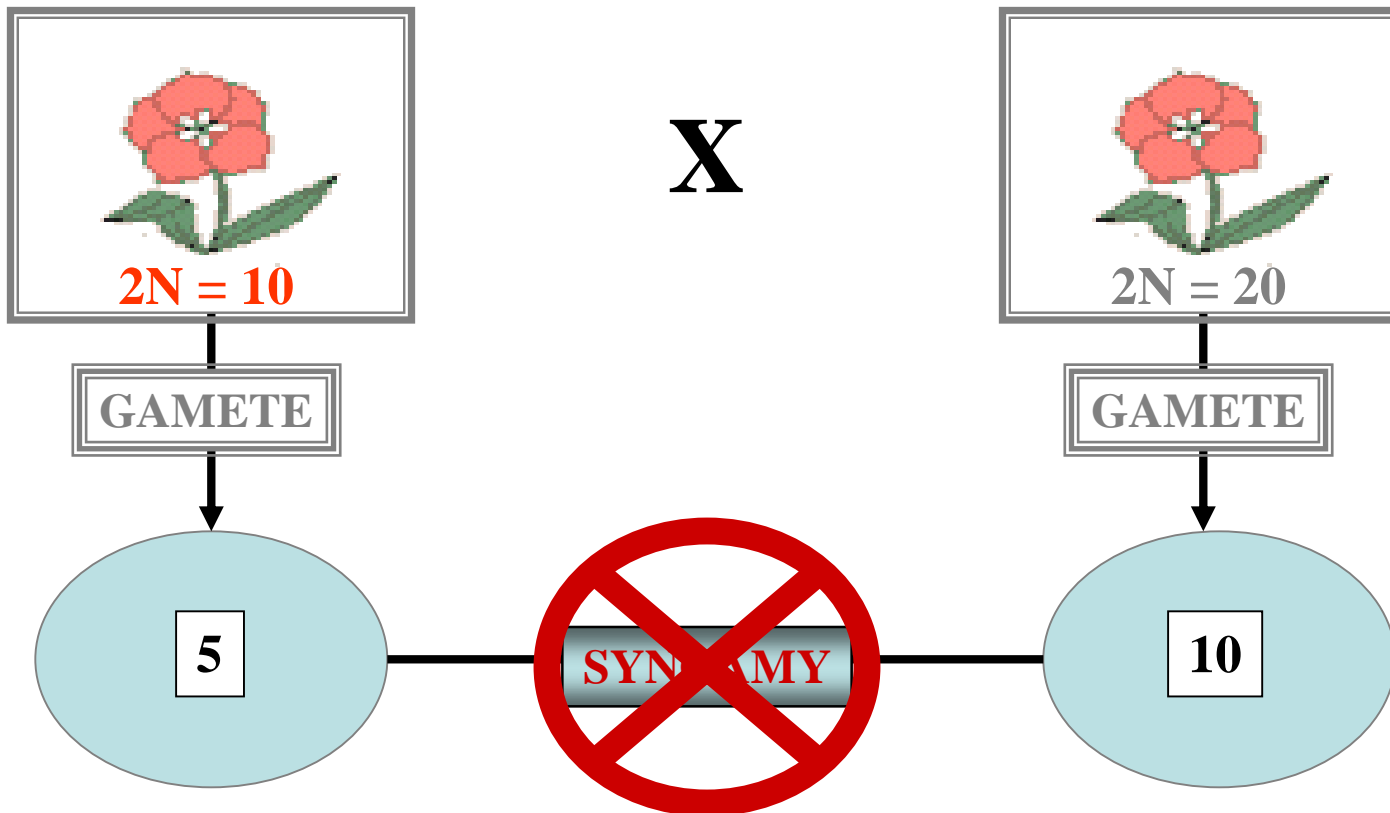
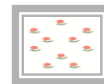


 = GAMETE

 = CHROMOSOMES

CYTOTYPES

AUTOPOLYPLOID SPECIATION

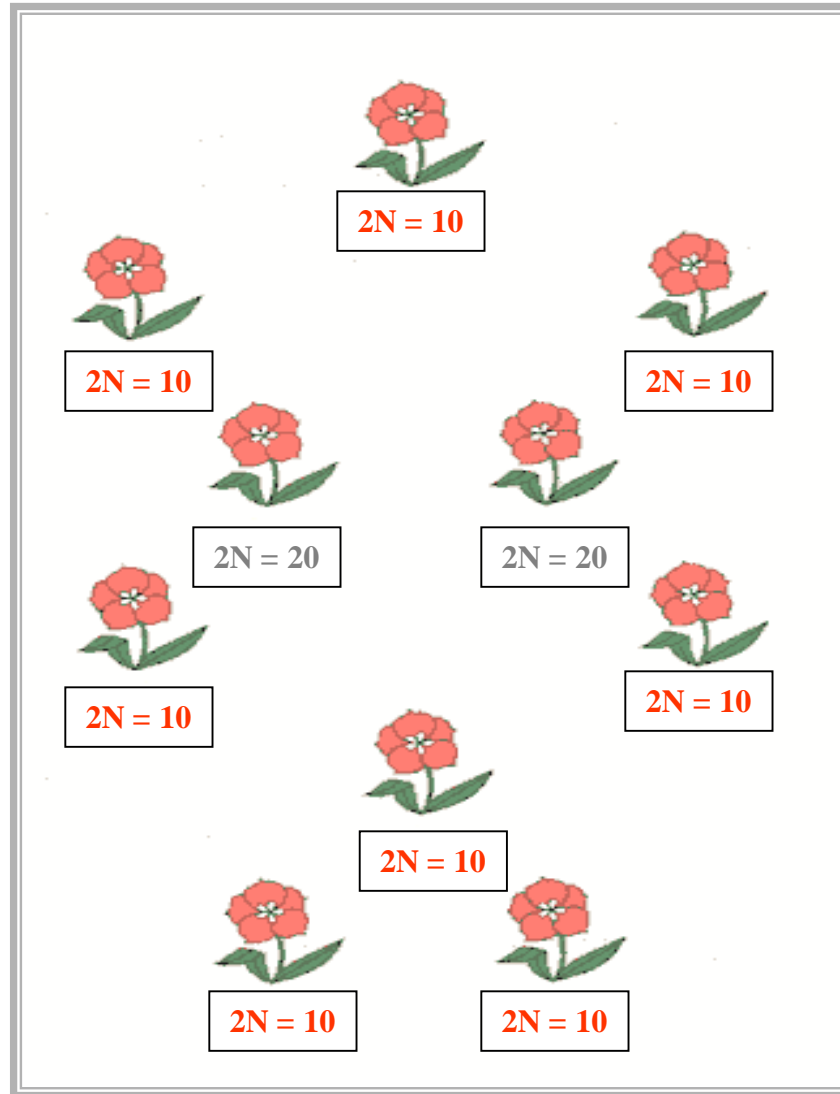


 = GAMETE

 = CHROMOSOMES

CYTOTYPES

AUTOPOLYPLOID SPECIATION



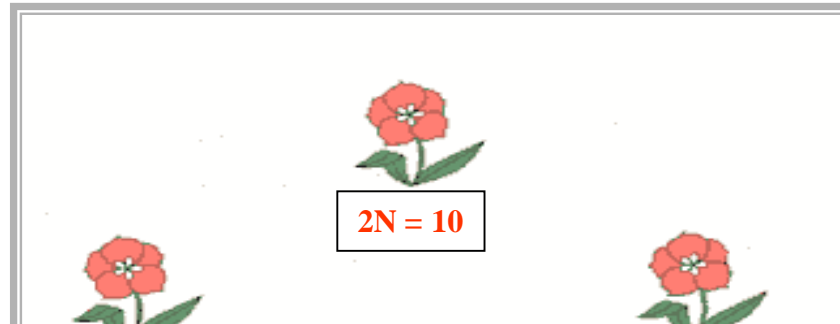
**SAME
GEOGRAPHIC
AREA**

**SAME
GEOGRAPHIC
AREA**

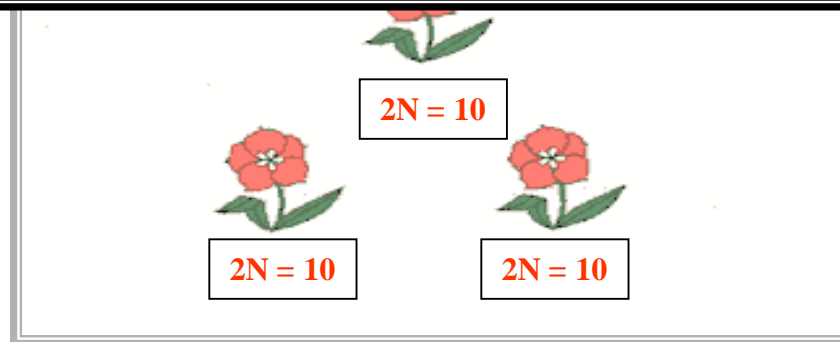
CYTOTYPES

AUTOPOLYPLOID SPECIATION

T



**CYTOTYPES
REPRODUCTIVELY
ISOLATED**

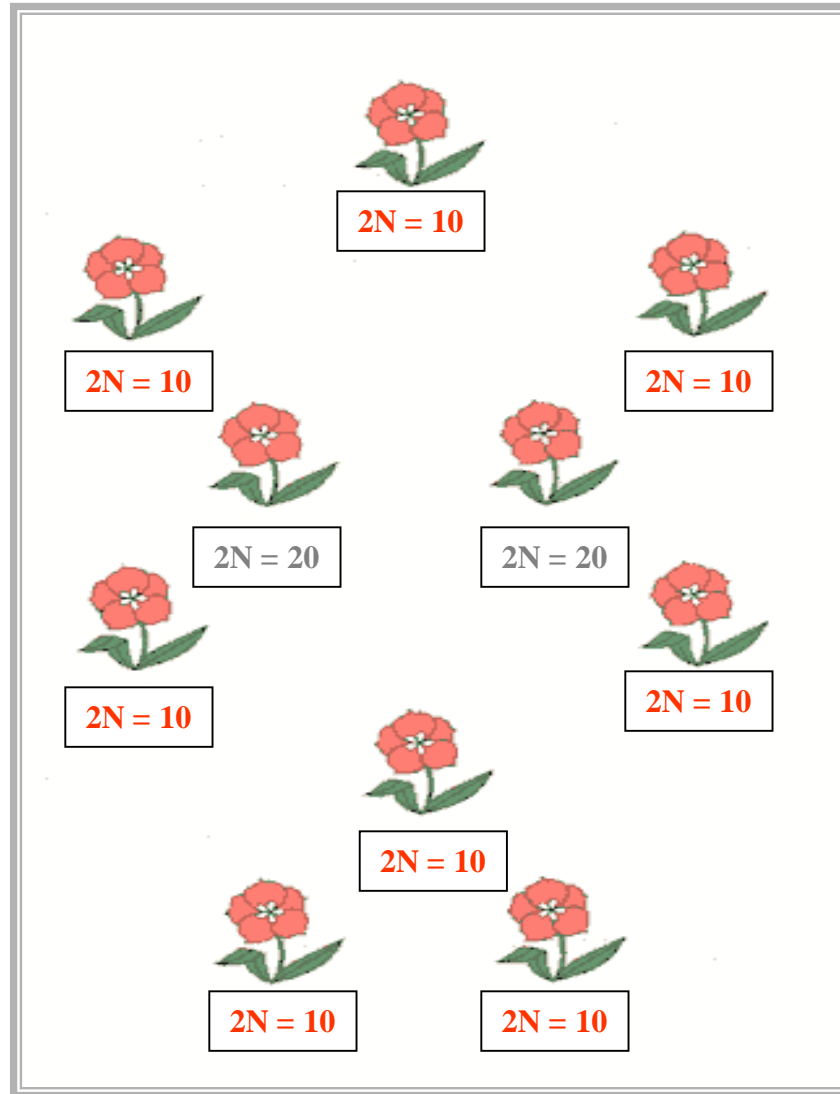


CYTOTYPES

AUTOPOLYPLOID SPECIATION



TIME



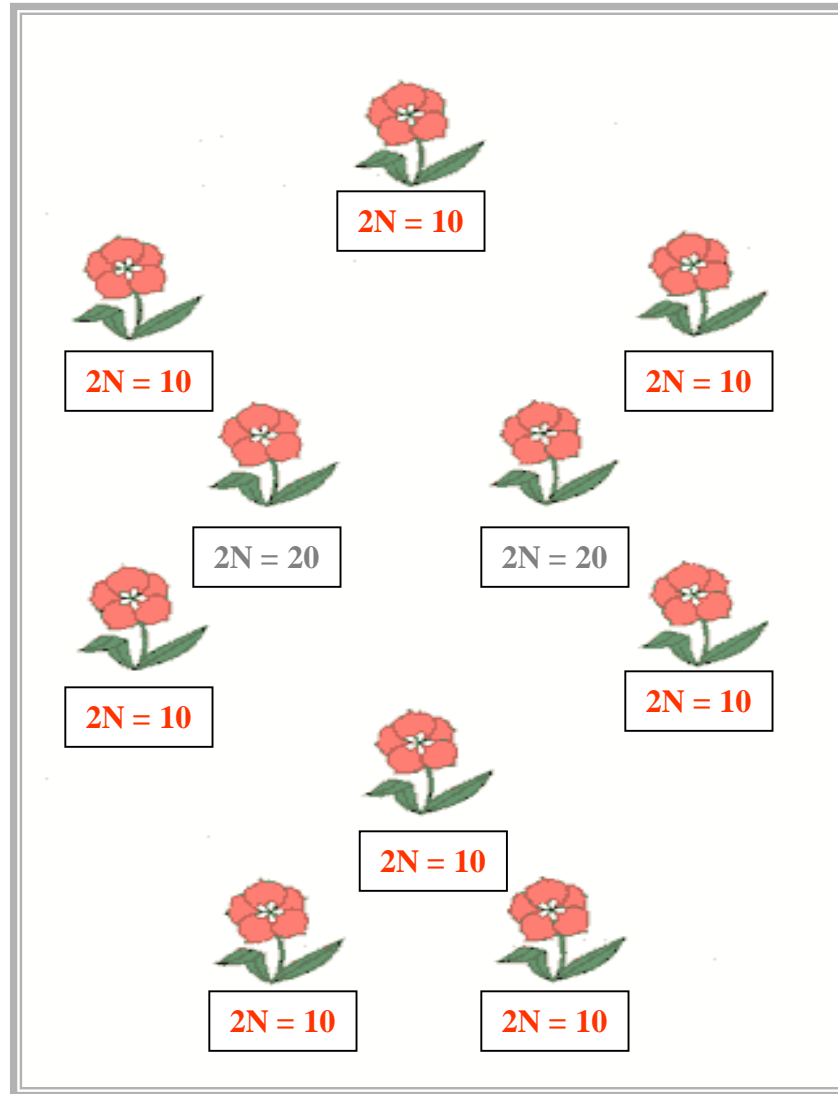
TIME

CYTOTYPES REPRODUCTIVELY ISOLATED

AUTOPOLYPLOID SPECIATION

T

**CYTOTYPES
UNDERGO
SEPARATE
MUTATIONS
&
SELECTION**



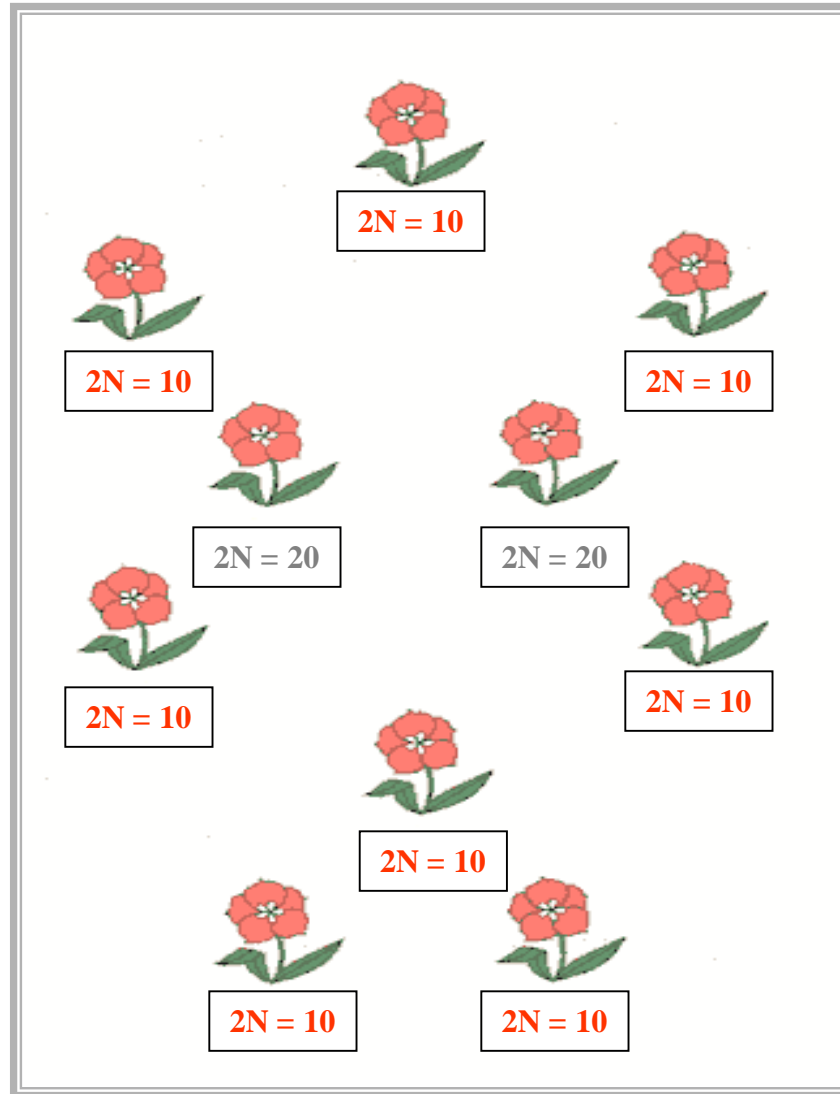
**CYTOTYPES
UNDERGO
SEPARATE
MUTATIONS
&
SELECTION**

CYTOTYPES REPRODUCTIVELY ISOLATED

AUTOPOLYPLOID SPECIATION

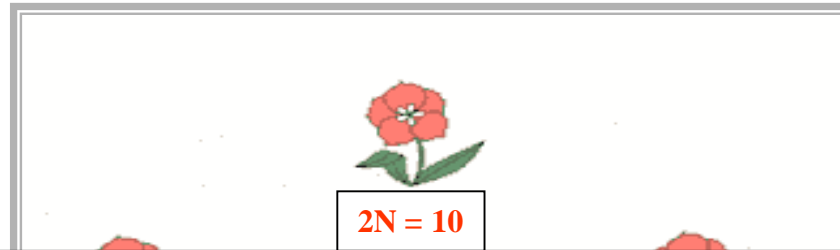
E

TIME

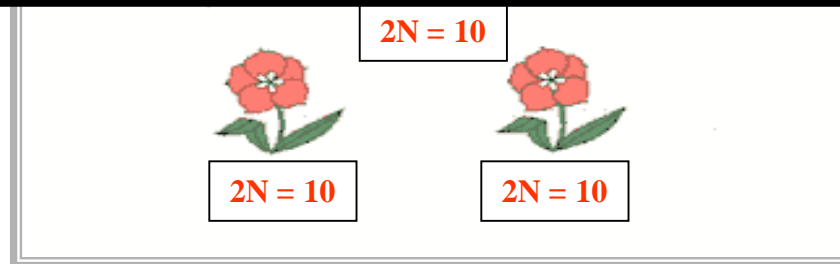


CYTOTYPES REPRODUCTIVELY ISOLATED

AUTOPOLYPLOID SPECIATION

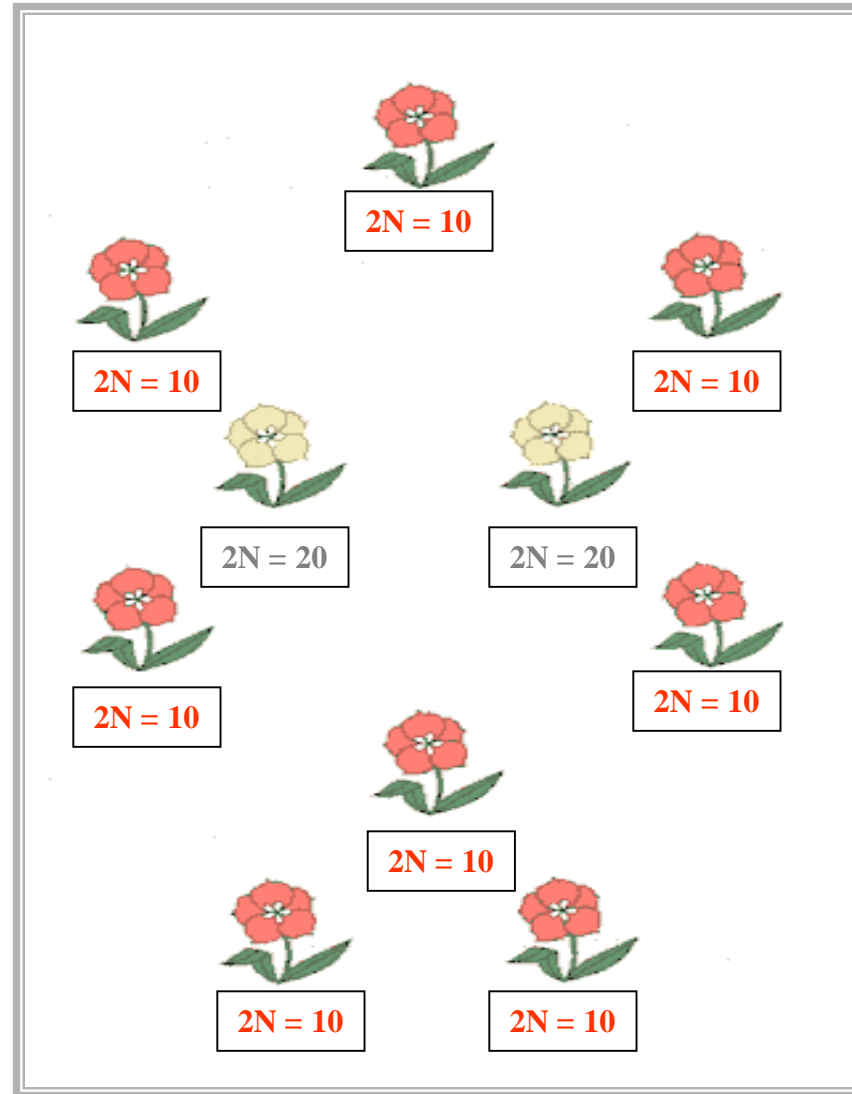


**CYTOTYPES
EVOLVE
MORPHOLOGICAL
CHANGES**



CYTOTYPES REPRODUCTIVELY ISOLATED

AUTOPOLYPLOID SPECIATION



**SAME
GEOGRAPHIC
AREA**

**SAME
GEOGRAPHIC
AREA**

$2N = 20$ CYTOTYPE EVOLVES WHITE FLOWERS

AUTOPOLYPLOID SPECIATION



**MORPHOLOGICALLY
DISTINCT**



$2N = 10$



$2N = 20$

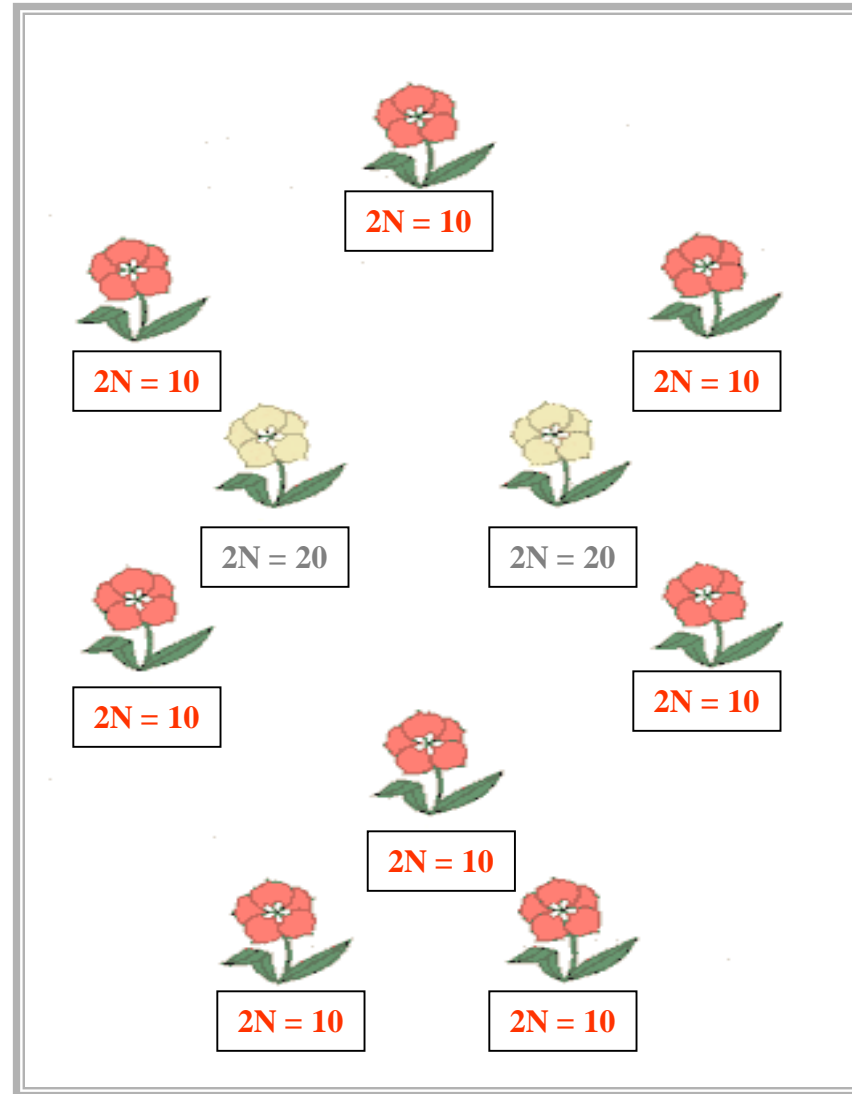
&

**REPRODUCTIVELY
ISOLATED
POPULATIONS**

$2N = 20$ CYTOTYPE EVOLVES WHITE FLOWERS

AUTOPOLYPLOID SPECIATION

D

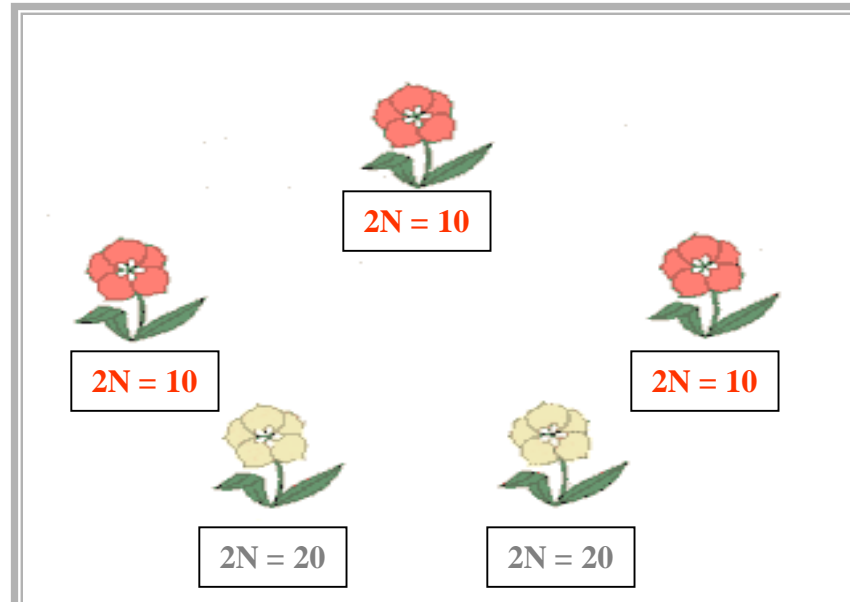


SAME
GEOGRAPHIC
AREA

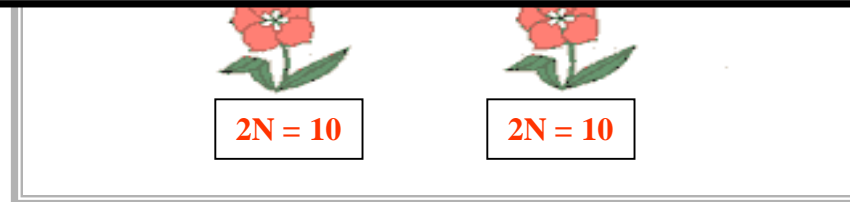
SAME
GEOGRAPHIC
AREA

SYMPATRIC SPECIATION

AUTOPOLYPLOID SPECIATION



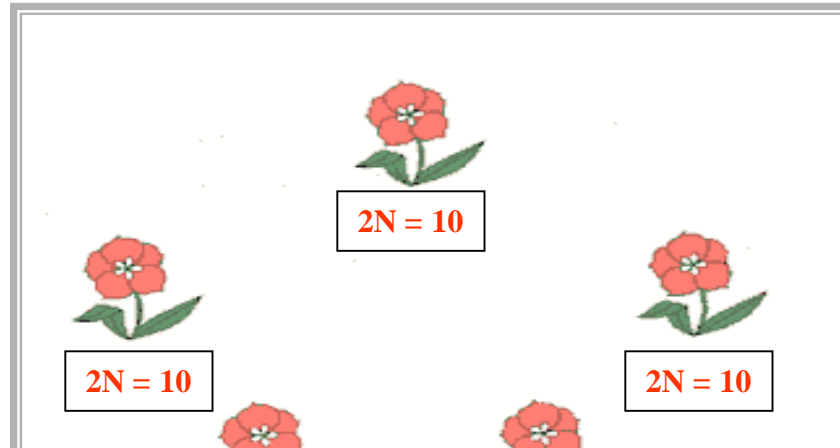
**DAUGHTER SPECIES
EVOLVES**



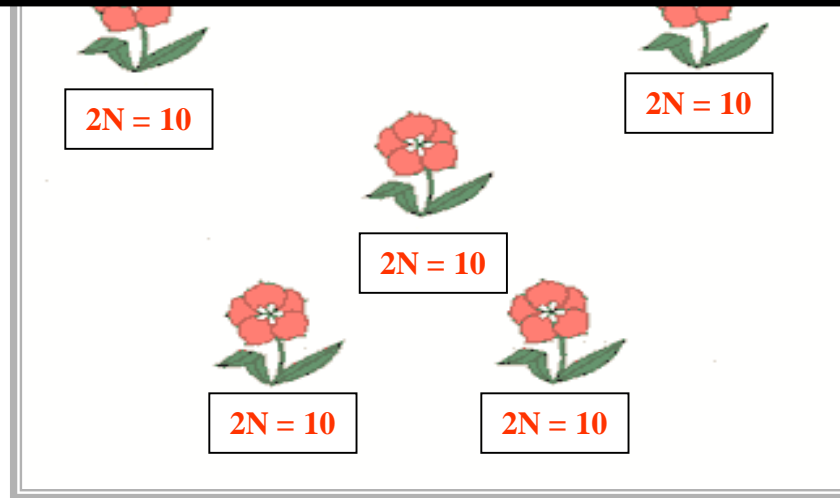
DAUGHTER SPECIES EVOLVES

**SYMPATRIC
AUTOPOLYPLOID
SPECIATION
OUTCOME**

AUTOPOLYPLOID SPECIATION

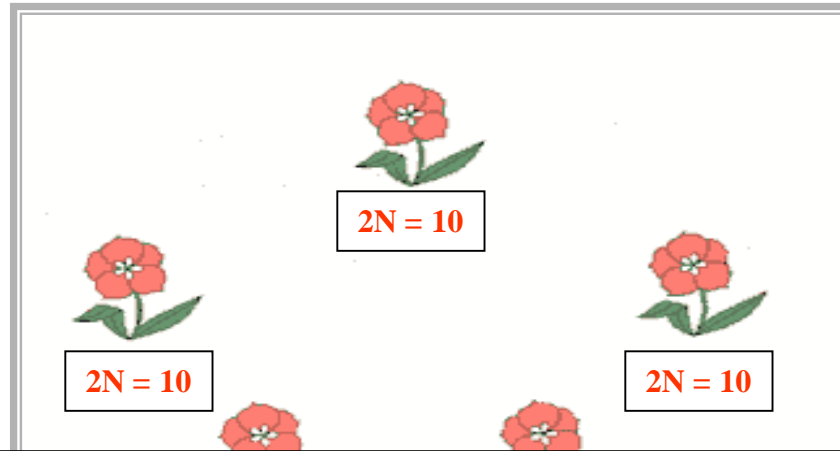


PARENTAL SPECIES

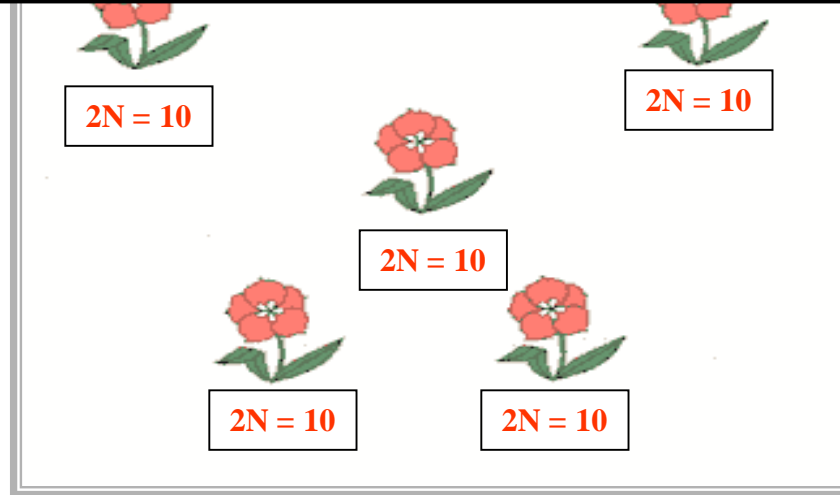


PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION AS

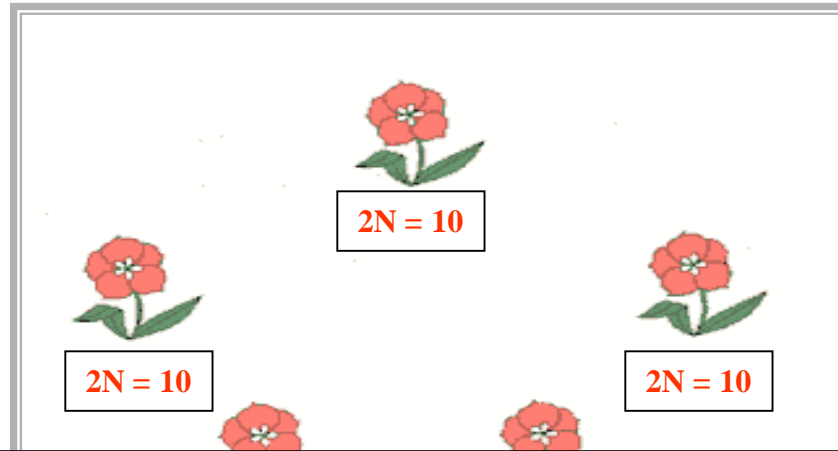


EVOLVES

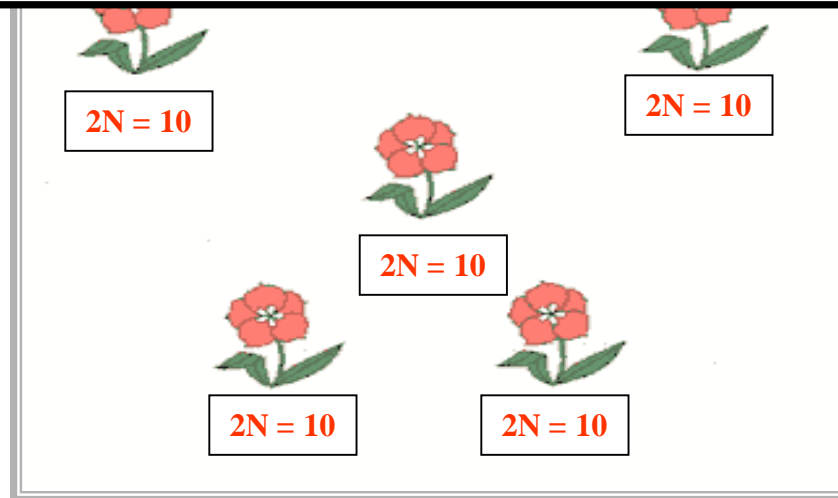


PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION DS

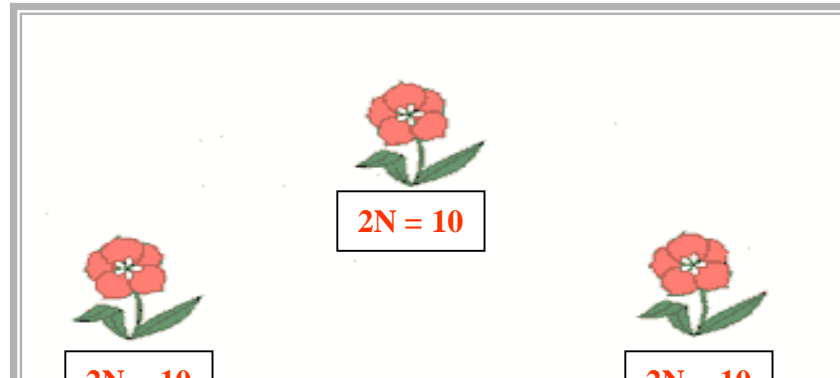


AUTOPOLYPLOID SPECIATION

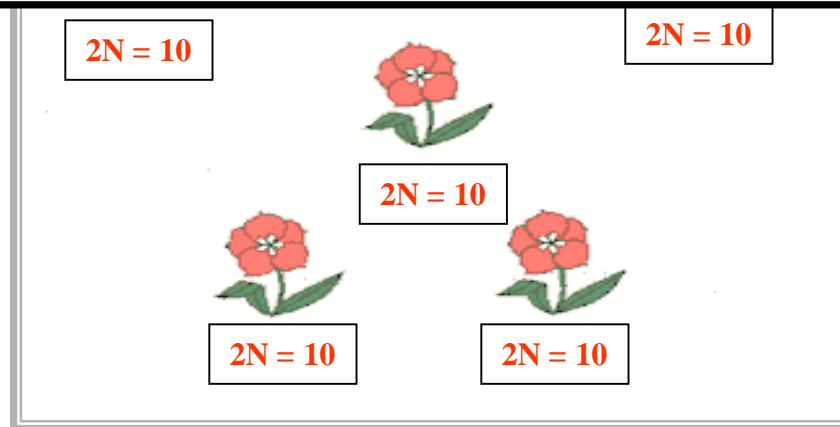


PARENTAL POPULATION

AUTOPOLYPLOID SPECIATION



**DAUGHTER SPECIES
EVOLVES**

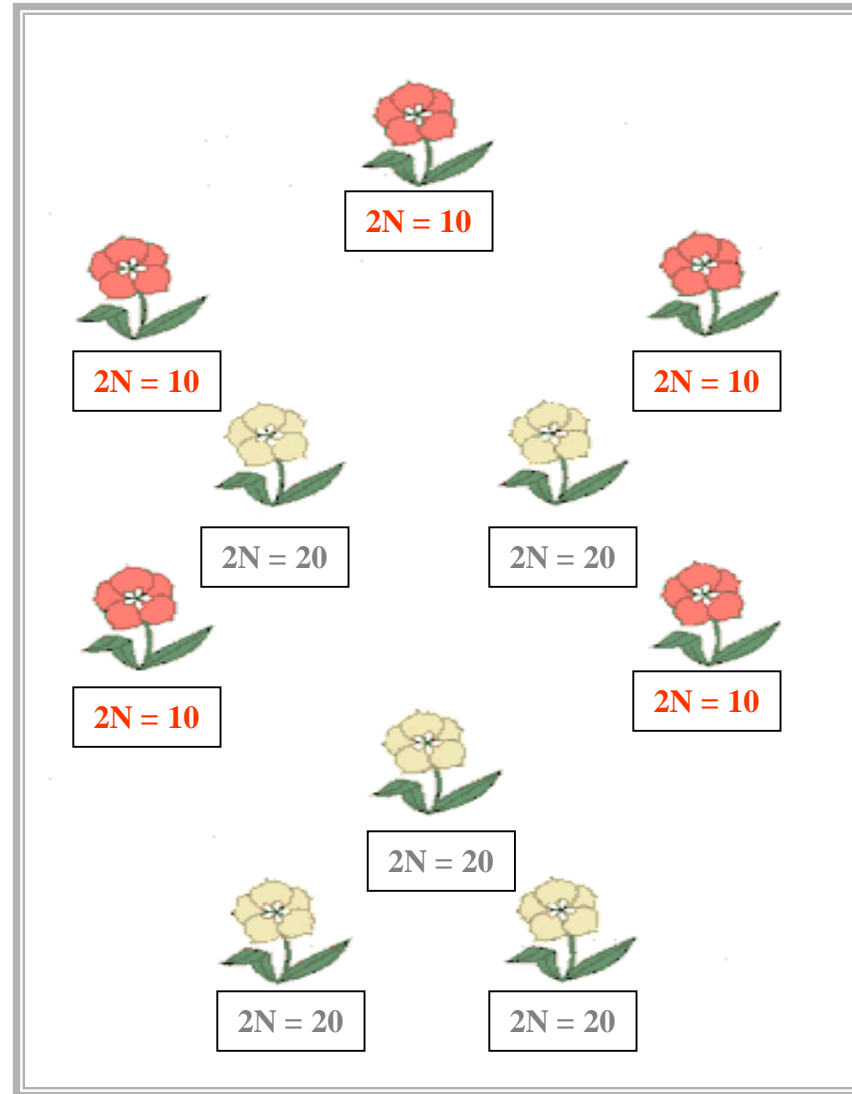


DAUGHTER SPECIES EVOLVES

AUTOPOLYPLOID SPECIATION



I



SAME
GEOGRAPHIC
AREA

SAME
GEOGRAPHIC
AREA

1 PARENTAL SPECIES & 1 DAUGHTER SPECIES

AUTOPOLYPLOID SPECIATION



I

INCREASE PLANT DIVERSITY

AUTOPOLYPLOID SPECIATION



INCREASE PLANT DIVERSITY



SYMPATRIC
ALLOPOLYPLOID
SPECIATION

**SYMPATRIC
ALLOPOLYPLOID
SPECIATION
COMPONENTS**

**SYMPATRIC
ALLOPOLYPLOID
SPECIATION
COMPONENTS**

AUTOPOLYPLOID COMPONENT

**SYMPATRIC
ALLOPOLYPLOID
SPECIATION
COMPONENTS**

**SYMPATRIC
ALLOPOLYPLOID
SPECIATION
COMPONENTS**



**AUTOPOLYPLOID COMPONENT
ALLOPOLYPLOID COMPONENT**

**SYMPATRIC
ALLOPOLYPLOID
SPECIATION
COMPONENTS**



AUTOPOLYPLOID
COMPONENT

!!!*PRECEDES*!!!

ALLOPOLYPLOID
COMPONENT



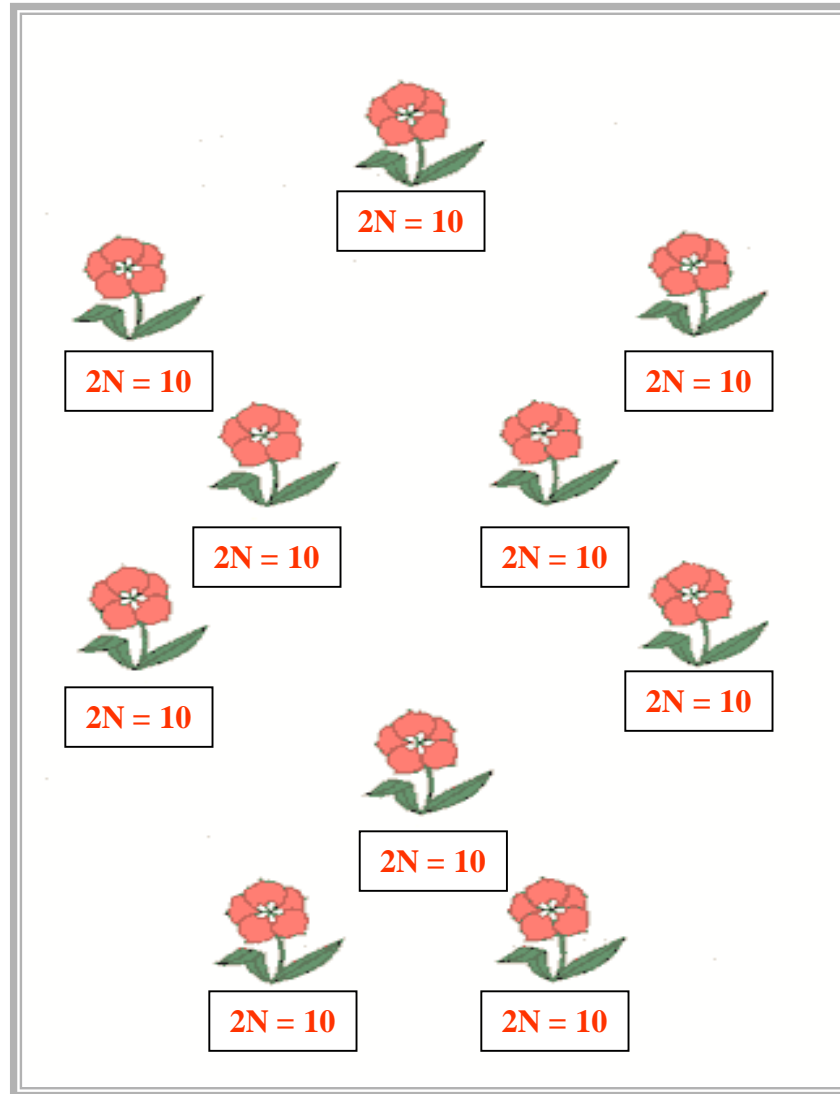
**SYMPATRIC
ALLOPOLYPLOID
SPECIATION
SCENARIO**



ALLOPOLYPLOID
SYMPATRIC
SPECIATION
AUTOPOLYPLOID
COMPONENT

AUTOPOLYPLOID COMPONENT

S



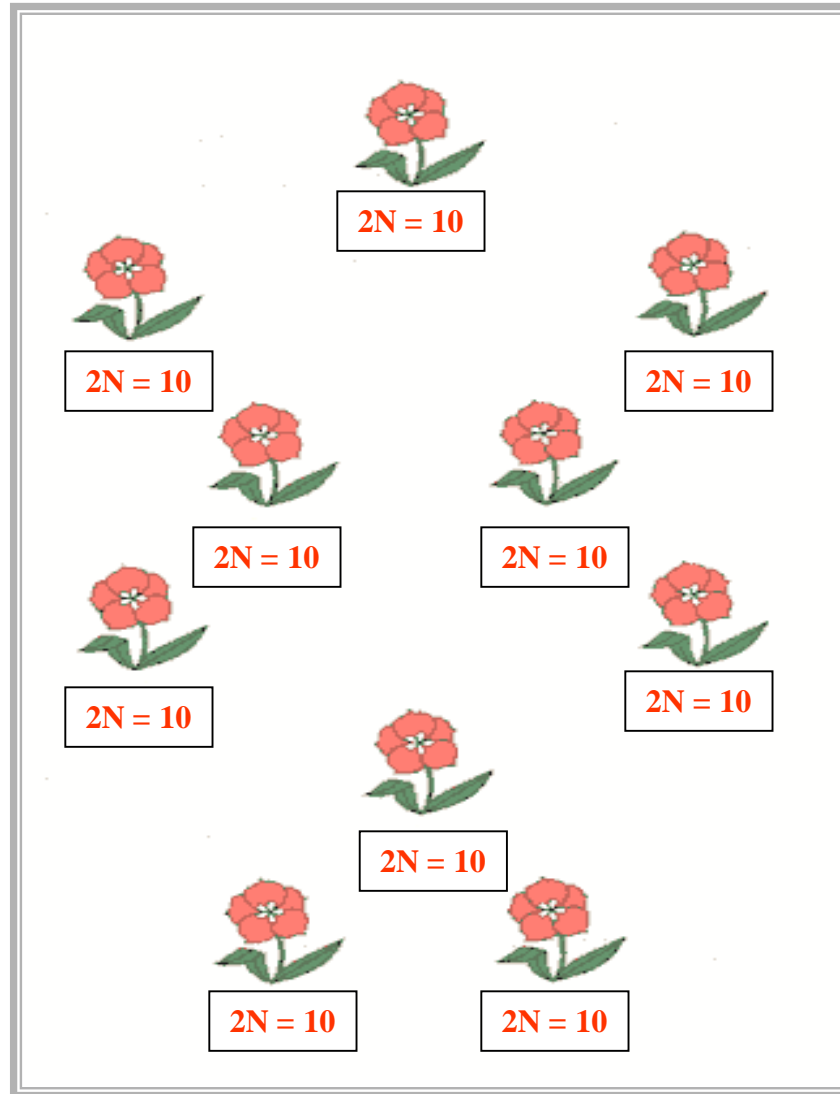
GEOGRAPHIC
AREA

GEOGRAPHIC
AREA

PARENTAL POPULATION

AUTOPOLYPLOID COMPONENT

S

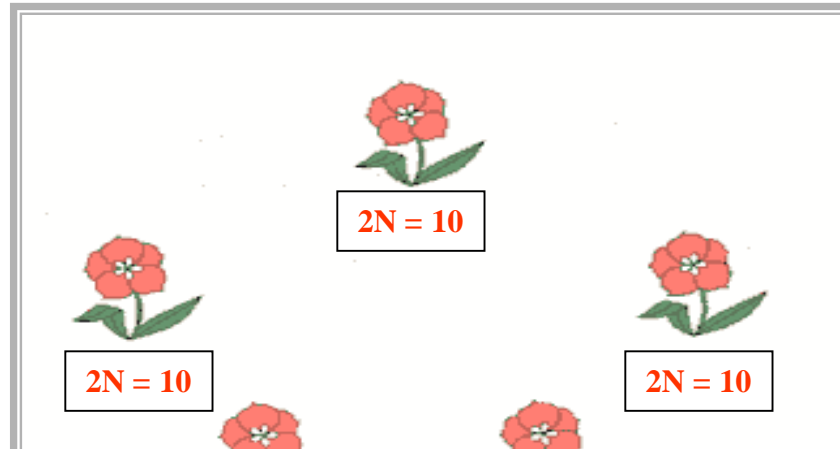


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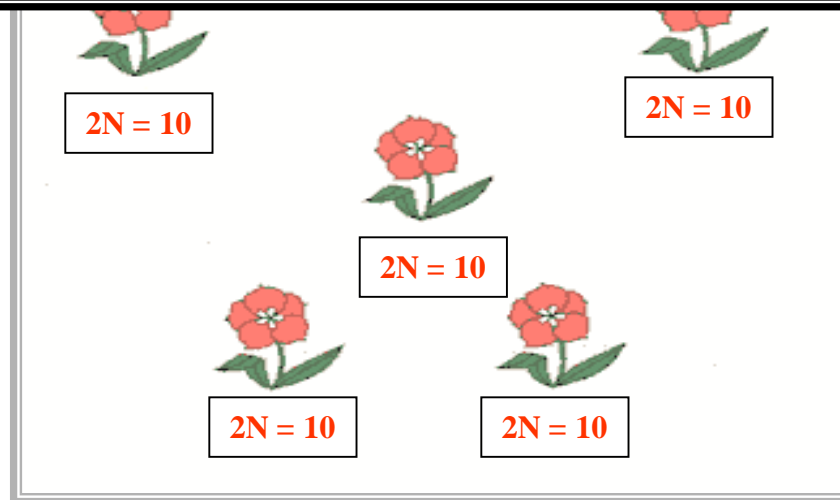
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GEOGRAPHIC
AREA

PARENTAL POPULATION

AUTOPOLYPLOID COMPONENT

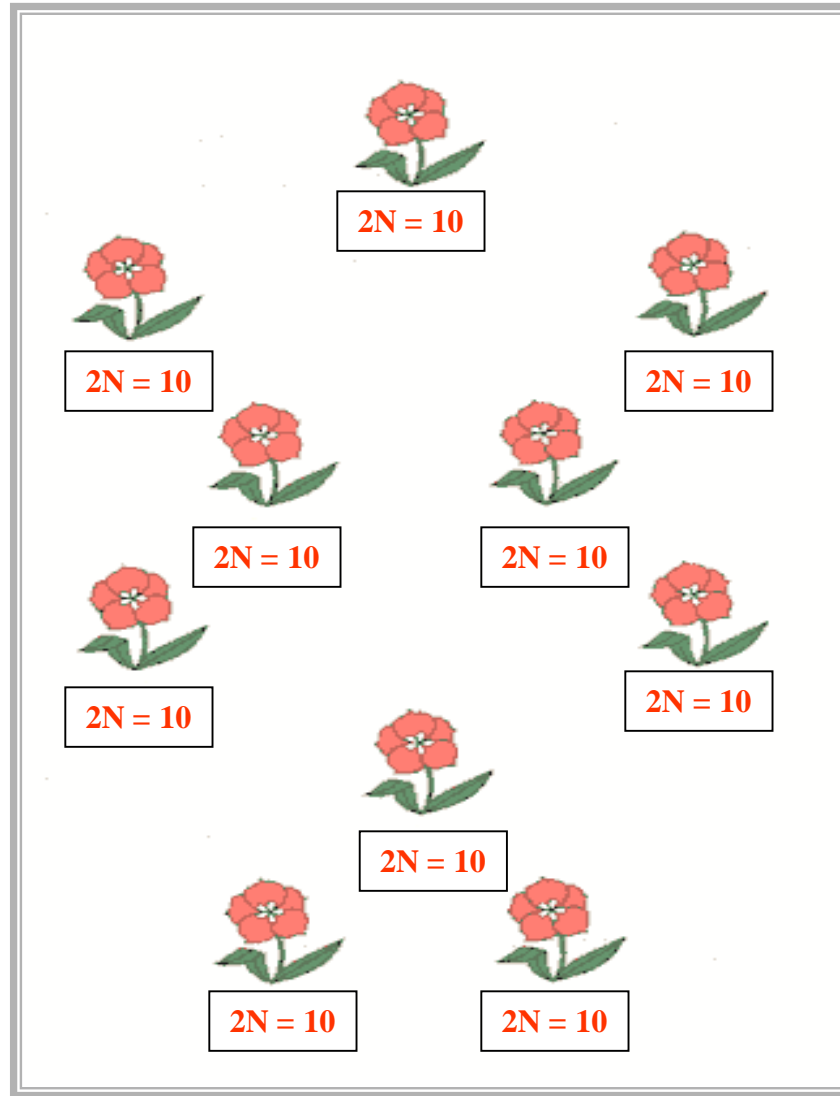


SYMPATRIC POPULATION



PARENTAL POPULATION

AUTOPOLYPLOID COMPONENT R

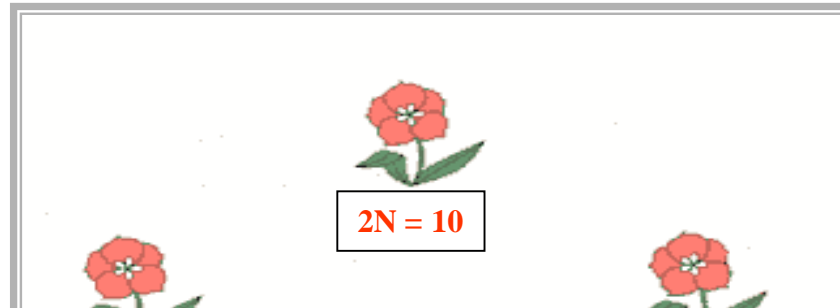


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GEOGRAPHIC
AREA**

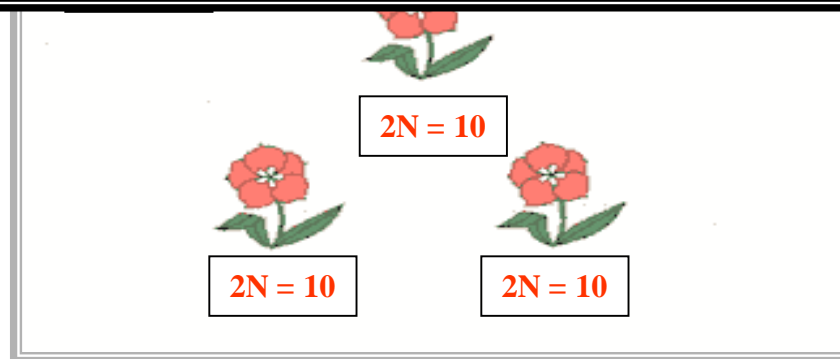
**SAME
GEOGRAPHIC
AREA**

PARENTAL POPULATION

AUTOPOLYPLOID COMPONENT T



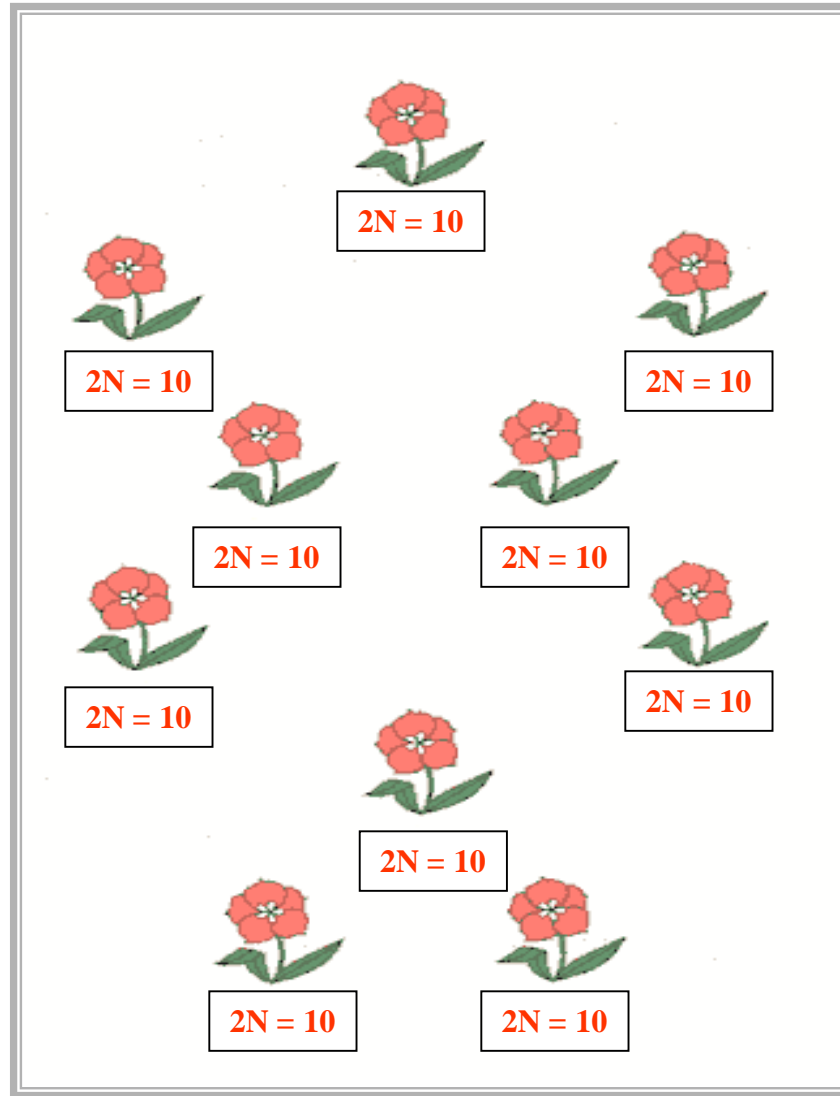
**PARENTAL POPULATION
REMAINS
SYMPATRIC THROUGHOUT**



PARENTAL POPULATION

AUTOPOLYPLOID COMPONENT U

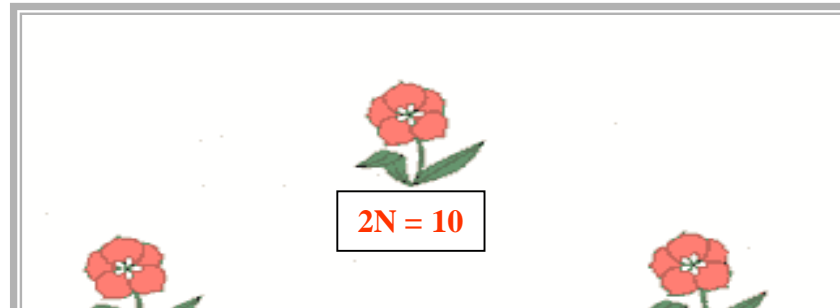
TIME



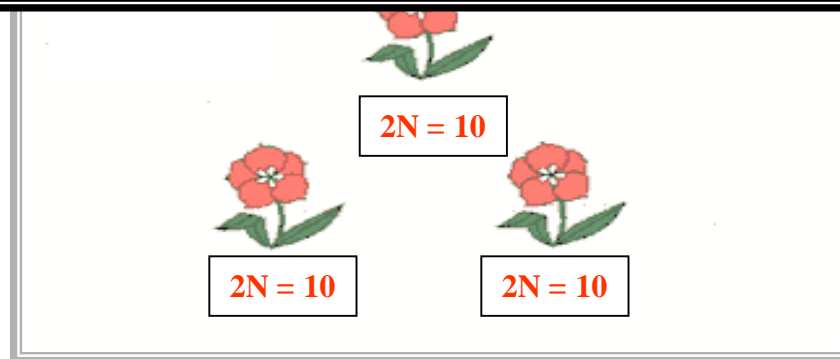
TIME

PARENTAL POPULATION

AUTOPOLYPLOID COMPONENT +

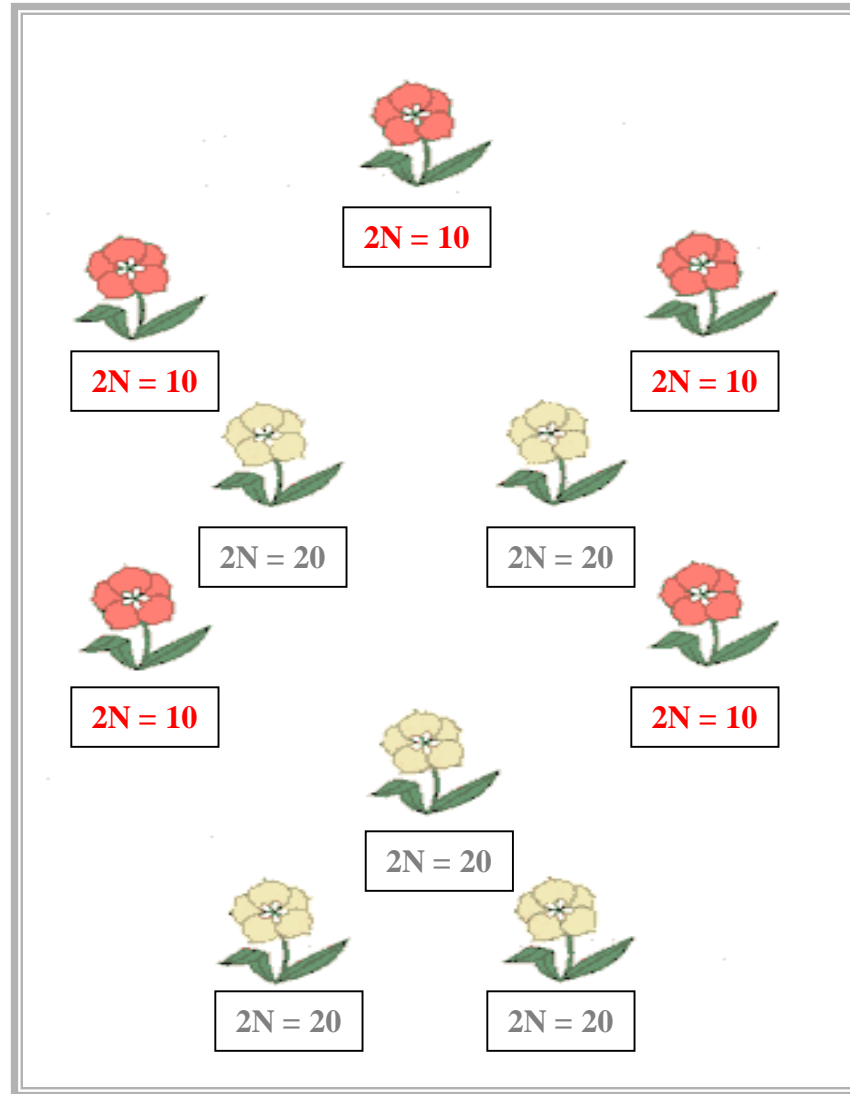


**UNDERGOES
AUTOPOLYPLOID
SPECIATION**



PARENTAL POPULATION

AUTOPOLYPLOID COMPONENT



**SAME
GEOGRAPHIC
AREA**

**SAME
GEOGRAPHIC
AREA**

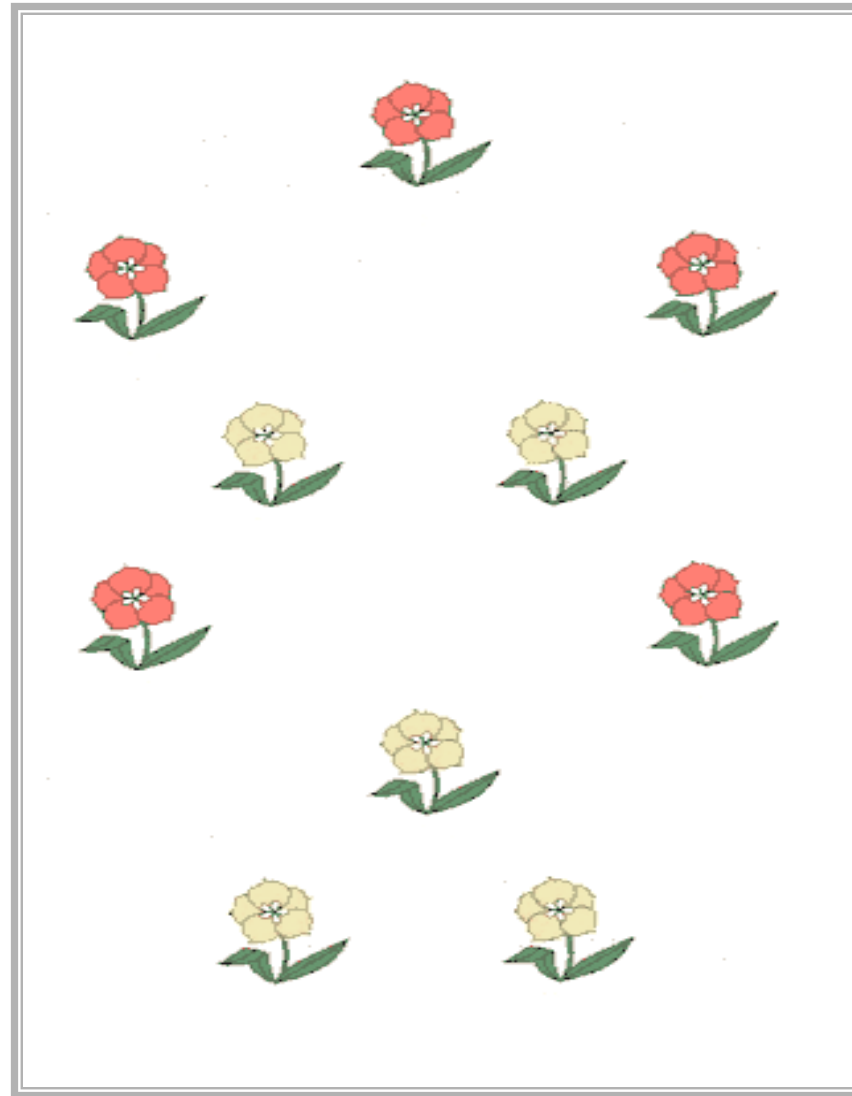
1 PARENTAL SPECIES & 1 DAUGHTER SPECIES

**ALLOPOLYPLOID
SYMPATRIC
SPECIATION
ALLOPOLYPLOID
COMPONENT**

PARENTAL SPECIES

ALLOPOLYPLOID COMPONENT

SP#1



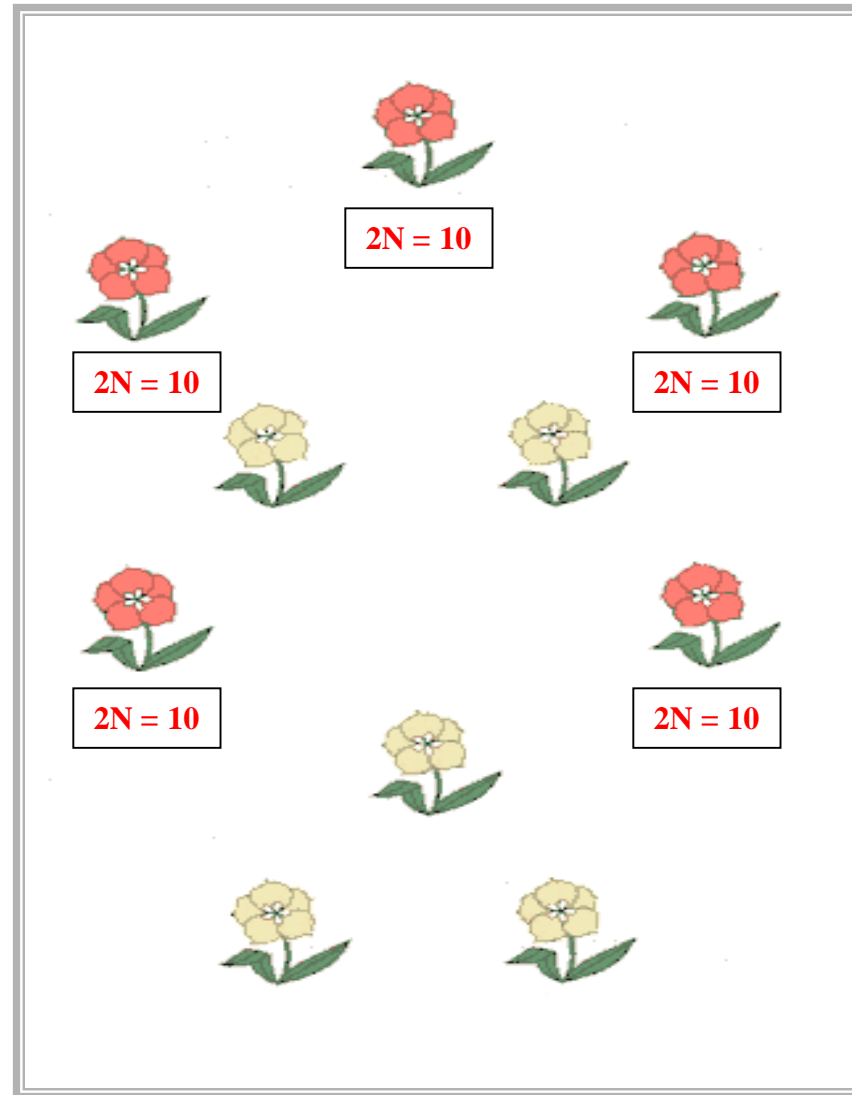
**SAME
GEOGRAPHIC
AREA**

**SAME
GEOGRAPHIC
AREA**

2 PARENTAL SPECIES

ALLOPOLYPLOID COMPONENT

SP#2

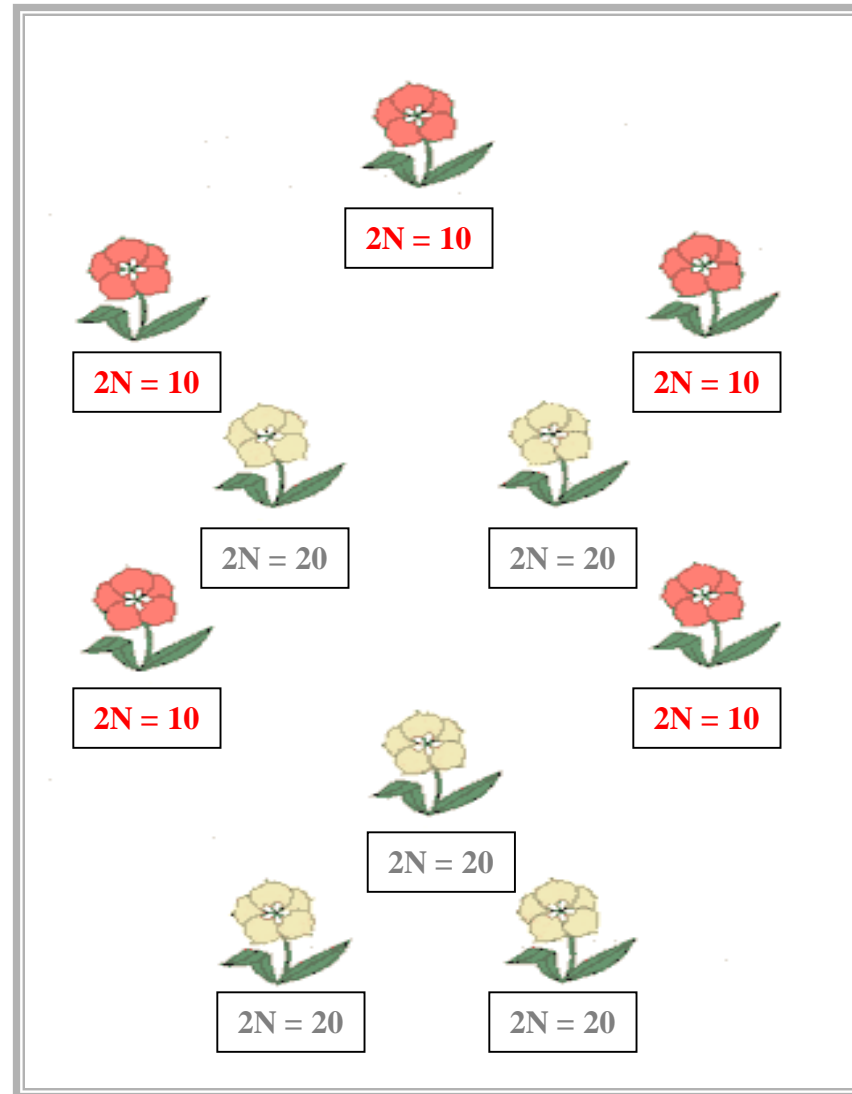


SAME
GEOGRAPHIC
AREA

SAME
GEOGRAPHIC
AREA

2 PARENTAL SPECIES

ALLOPOLYPLOID COMPONENT HY

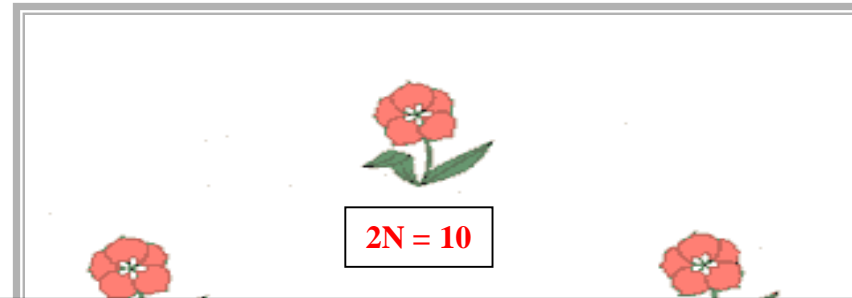


**SAME
GEOGRAPHIC
AREA**

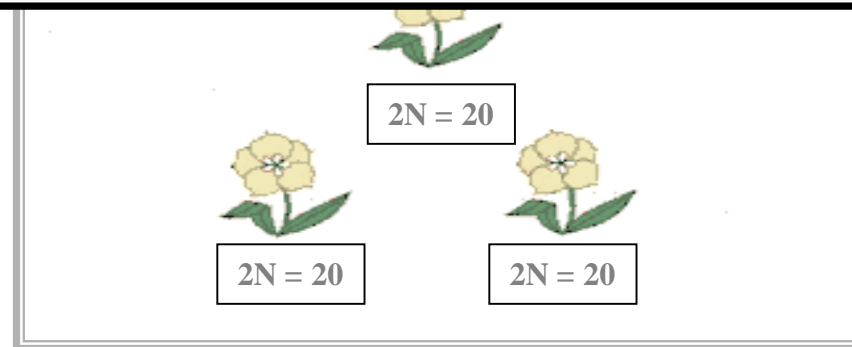
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GEOGRAPHIC
AREA**

2 PARENTAL SPECIES

ALLOPOLYPLOID COMPONENT

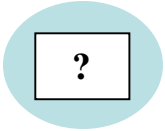
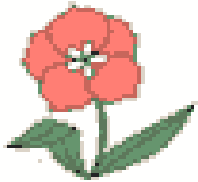


**PARENTAL SPECIES
UNDERGO
HYBRIDIZATION**

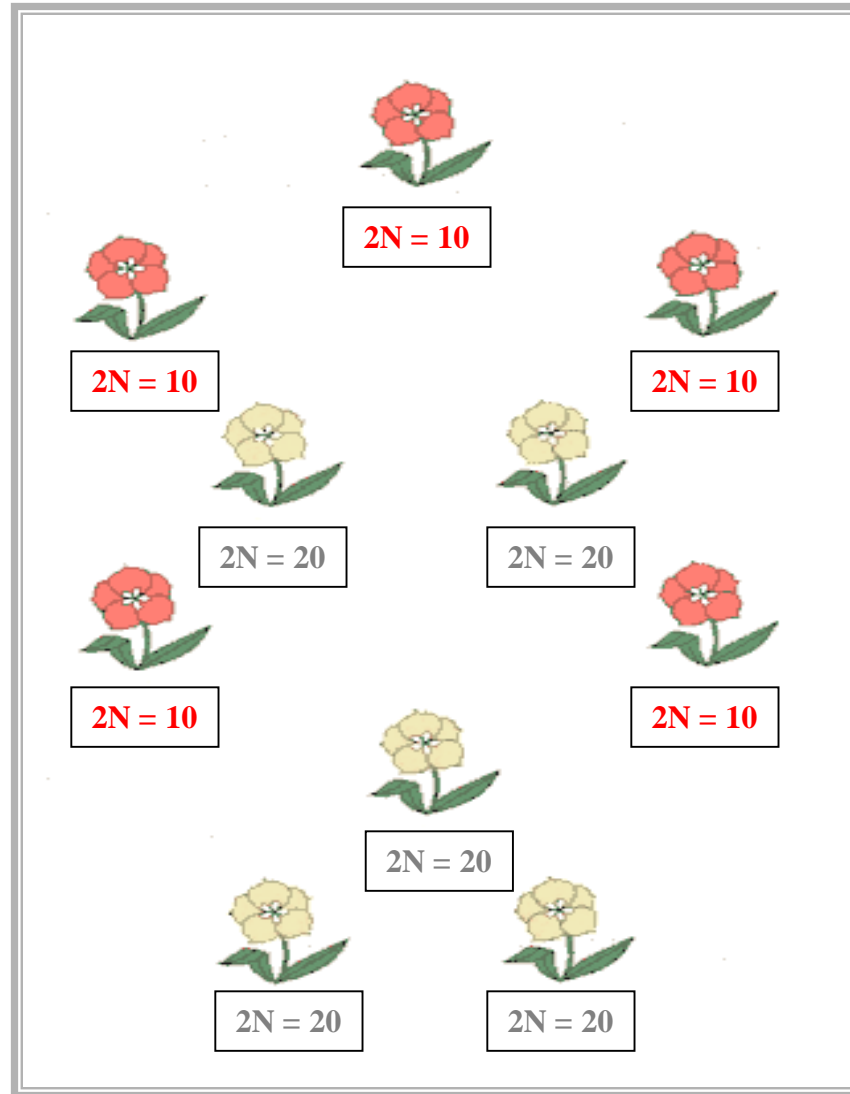


2 PARENTAL SPECIES

ALLOPOLYPLOID COMPONENT 5

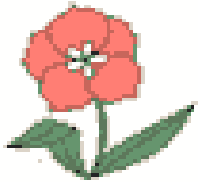


GAMETE
2N = 10 PLT
MEIOSIS
DISJUNCTION



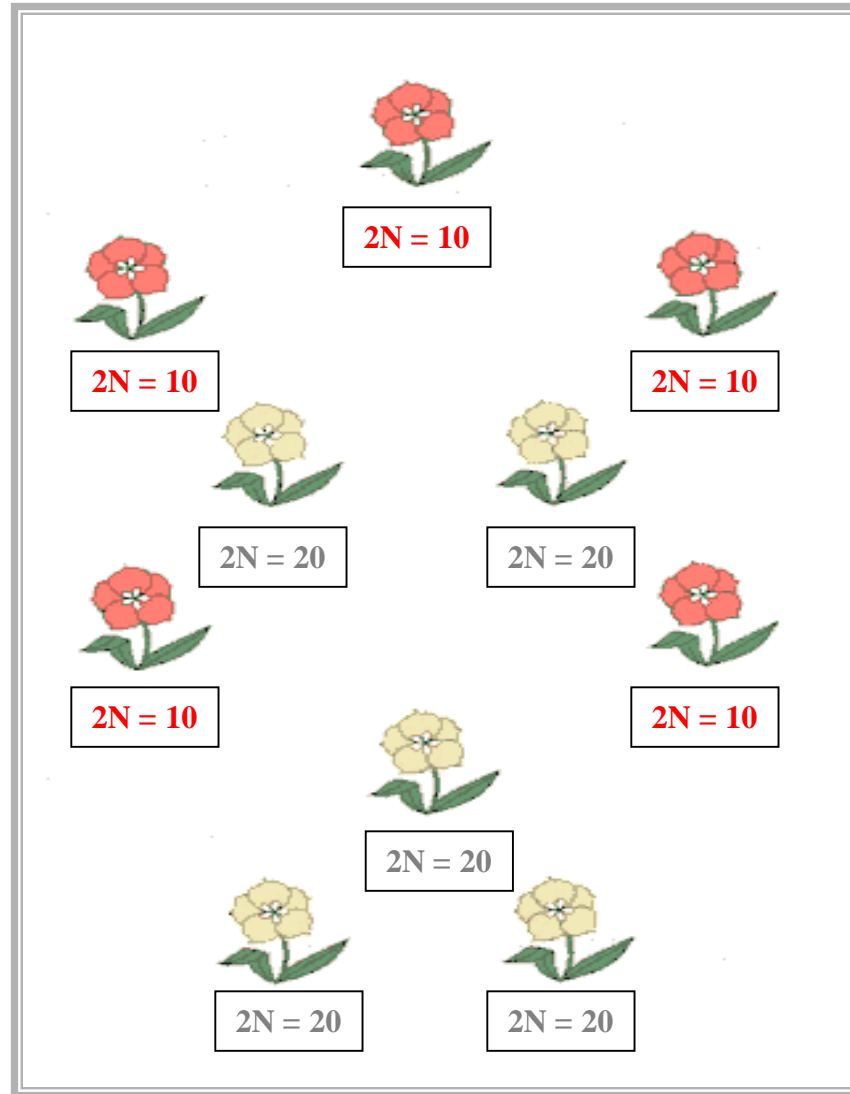
2 PARENTAL SPECIES

ALLOPOLYPLOID COMPONENT



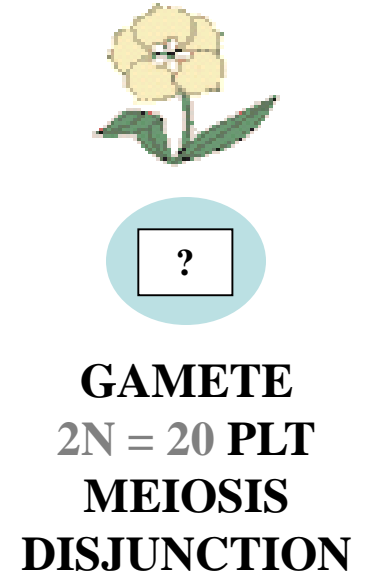
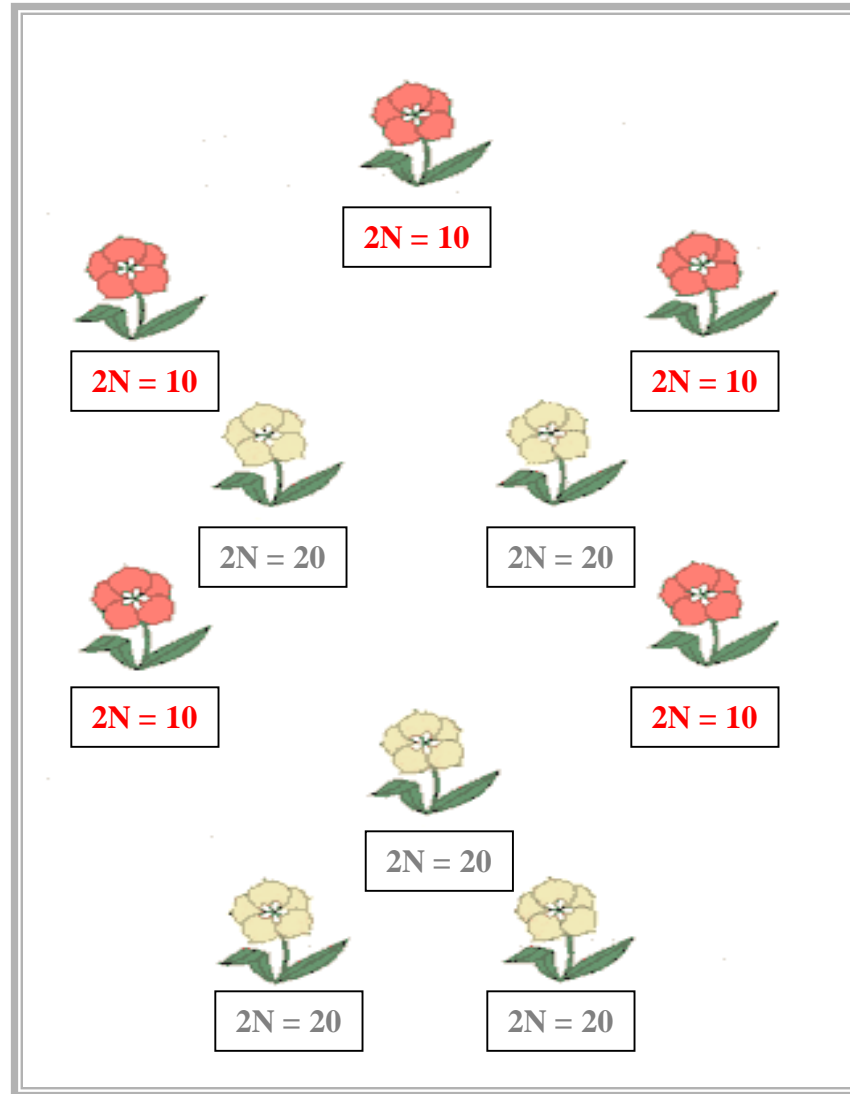
5

GAMETE
2N = 10 PLT
MEIOSIS
DISJUNCTION



2 PARENTAL SPECIES

ALLOPOLYPLOID COMPONENT 10



2 PARENTAL SPECIES