Linkage maps and Recombination frequency

Slide show by Kelly Riedell/Brookings Biology

2020 CED ESSENTIAL KNOWLEDGE
IST-1.J.1 Patterns of inheritance of many traits do not follow ratios predicted by Mendel's laws and can be identified by quantitative analysis, where observed phenotypic ratios statistically differ from the predicted ratios—
a. Genes that are adjacent and close to one another on the same chromosome may appear to be genetically linked; the probability that genetically linked genes will segregate as a unit can be used to calculate the map distance between them.

Determine the sequence of genes along a chromosome based on the following recombination frequencies

A-C 20%

A-D 10%

B-C 15%

B-D 5%

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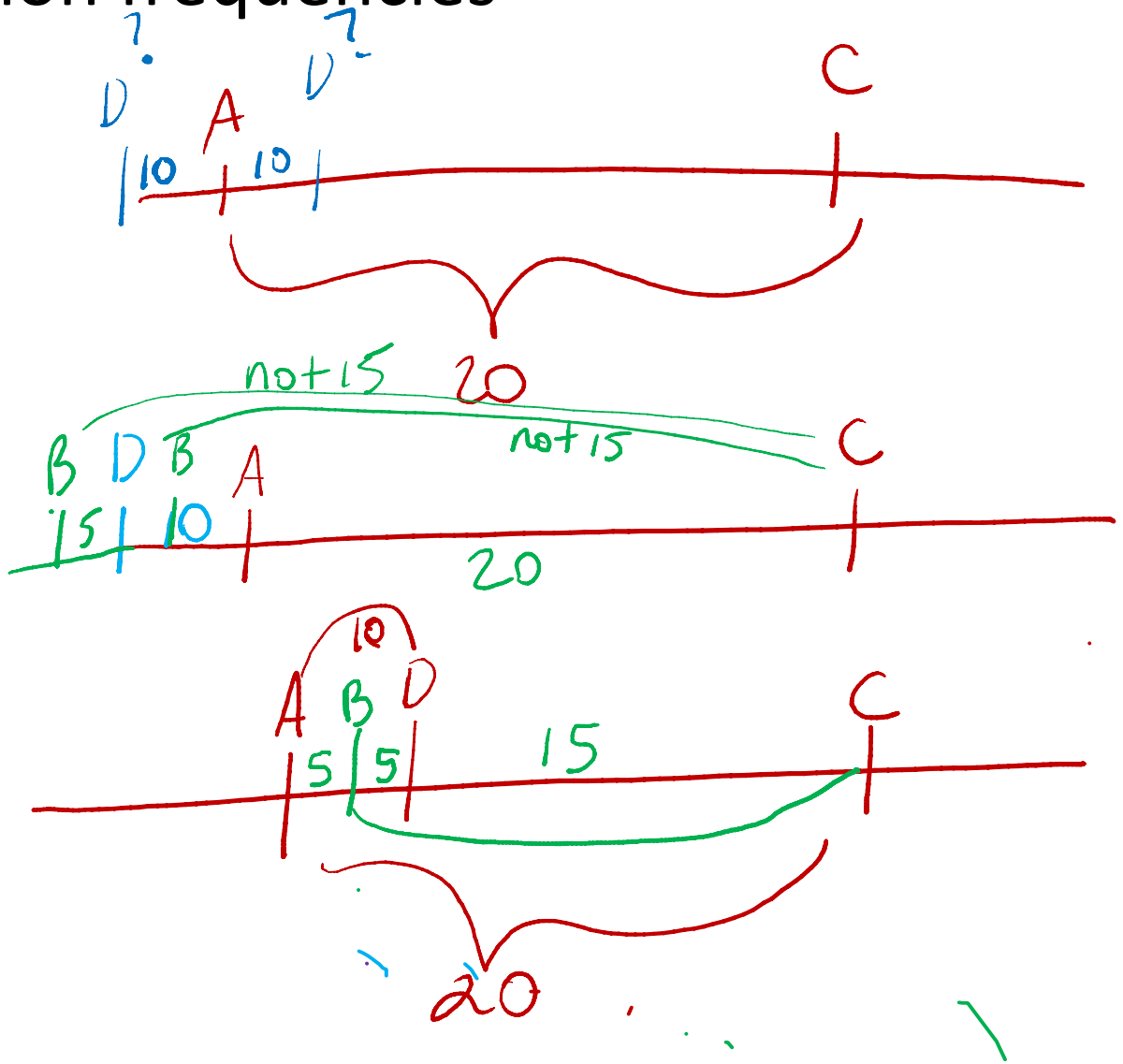

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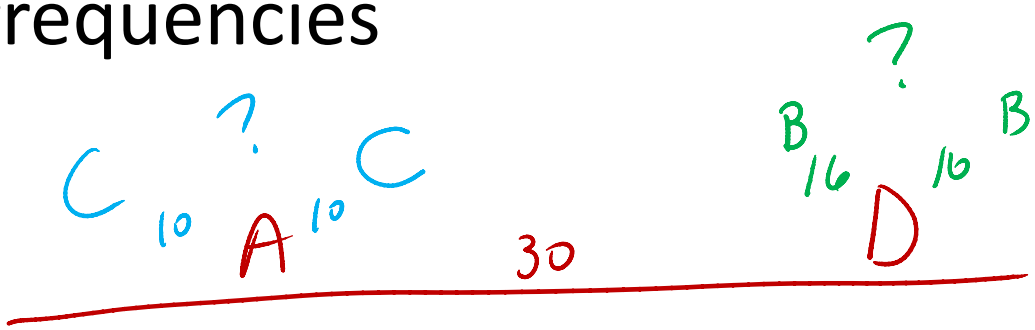

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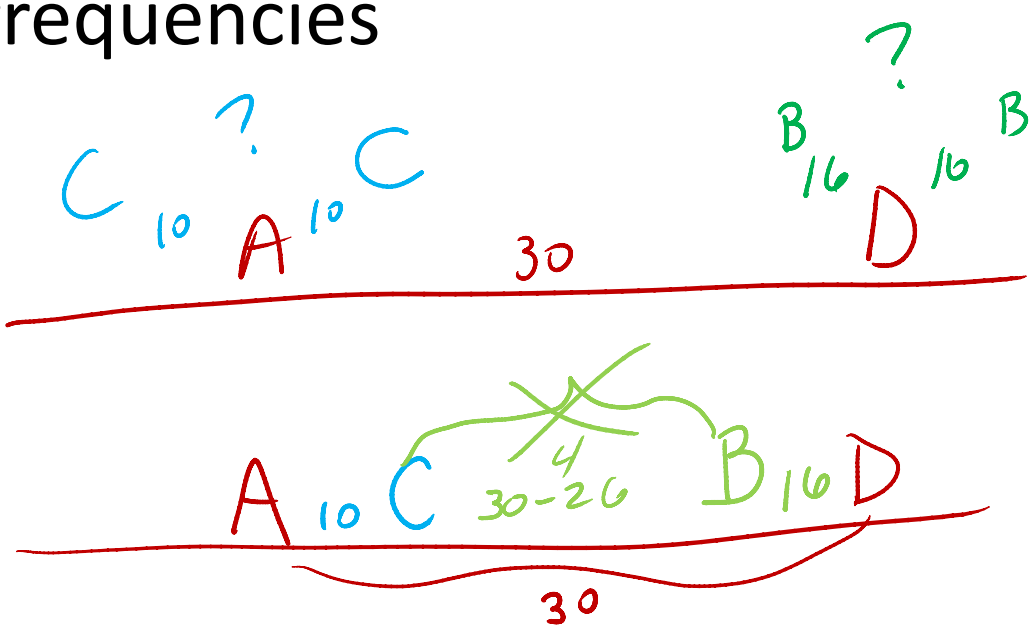

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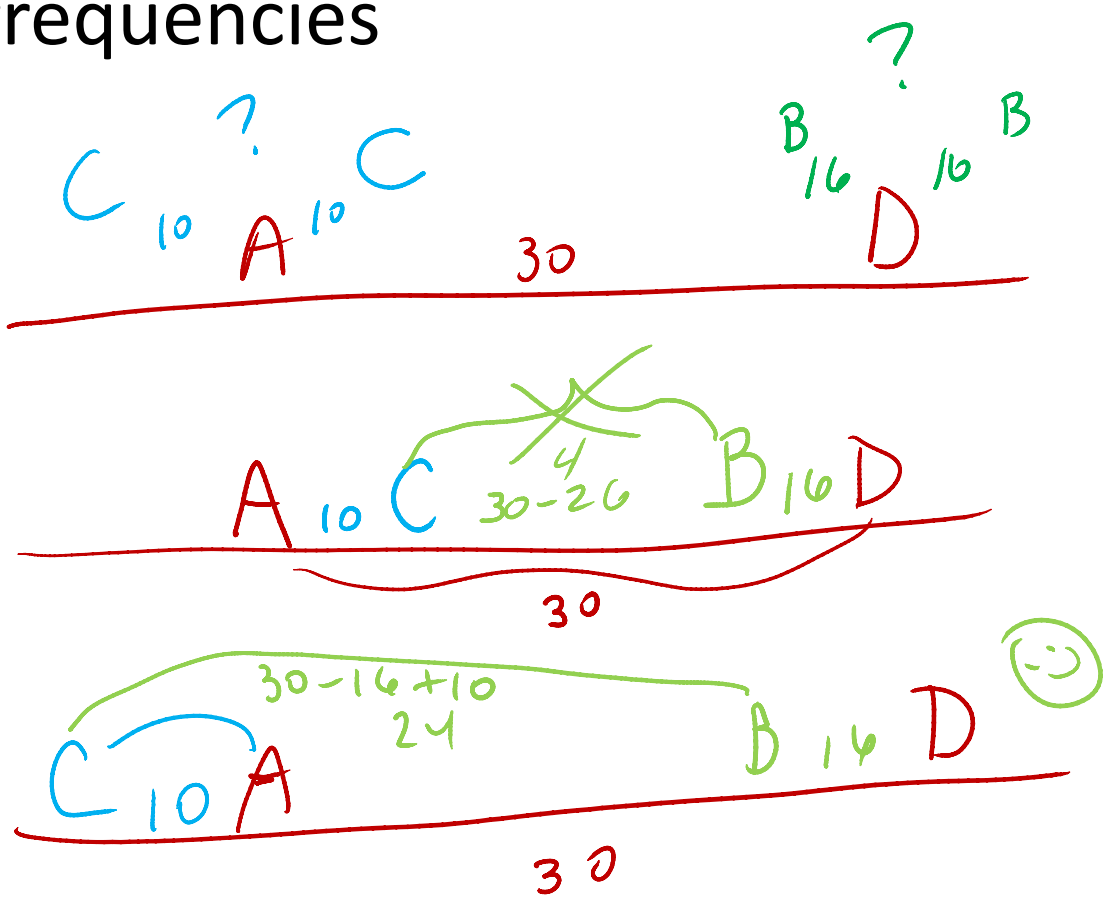

CABD

Determine the sequence of genes along a chromosome based on the following recombination frequencies

A-B 8%

A-C 28%

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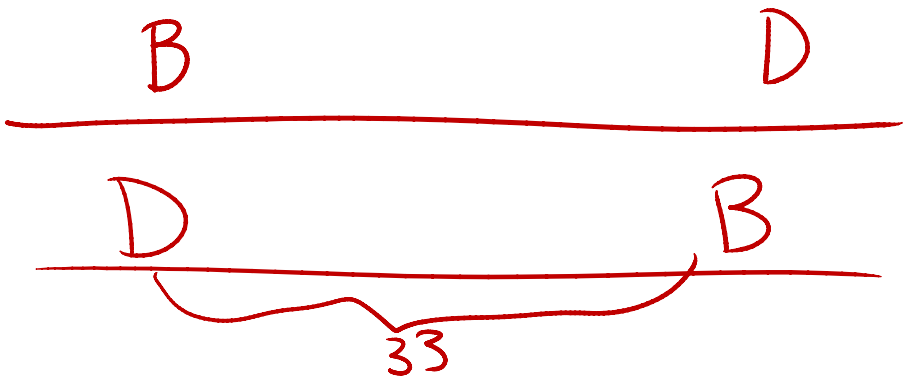

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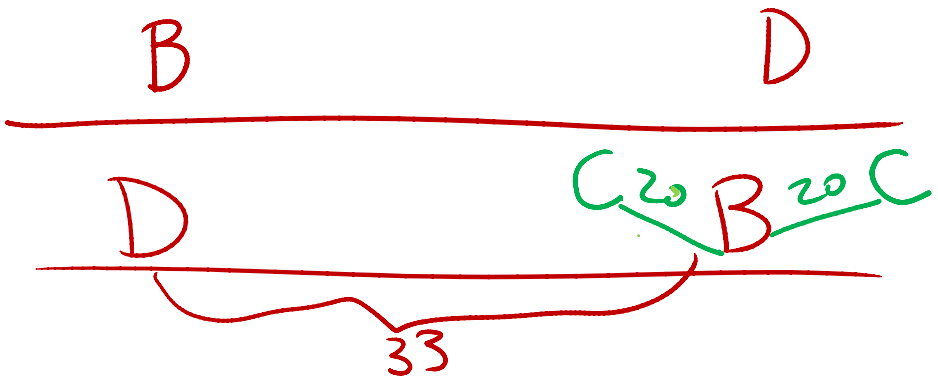

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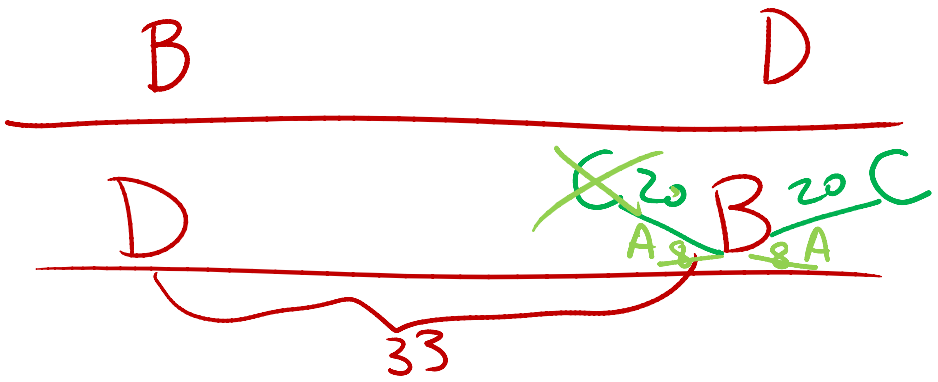

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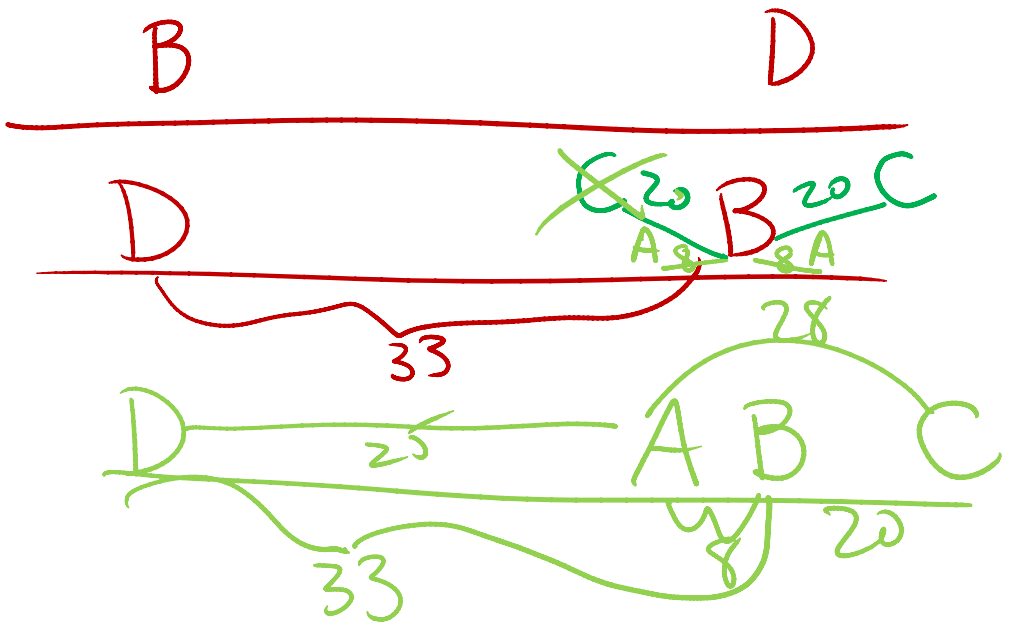

A Wild type fruit fly (heterozygous for gray body and normal wings) is mated with a black fly with vestigial wings.

OFFSPRING:

778- wild type

785- black-vestigial

158- black- normal wings

162- gray body-vestigial wings

What is the recombination frequency between these genes?

A Wild type fruit fly (heterozygous for gray body and normal wings) is mated with a black fly with vestigial wings.

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Parentals

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Parentals

Recombinants

What is the recombination frequency between these genes?

$$\frac{\text{Recombinants}}{\text{Parentals}} \times 100 \qquad \frac{158 + 162}{778 + 785} \times 100 \qquad \frac{320}{1563} \times 100 \qquad 20.5 = 20.5 \text{ map units}$$

A Wild type fruit fly (heterozygous for red eyes and normal wings) is mated with a HOMOZYGOUS RECESSIVE dumpy winged fly with purple eyes .
OFFSPRING:
832- wild type (red eyes, normal wings)
841- dumpy wings-purple eyes
147- purple eyes- normal wings
152- red eyes-dumpy wings

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841- dumpy wings-purple eyes Parentals

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OFFSPRING:

832- wild type (red eyes, normal wings)

841- dumpy wings-purple eyes Parentals

147- purple eyes- normal wings Recombinants

152- red eyes-dumpy wings

What is the recombination frequency between these genes?

$\frac{152 + 147}{832 + 841} \times 100$ $\frac{299}{1673} \times 100$ 17.9 = 17.9 map units

A Wild type fruit fly (heterozygous for gray body and red eyes) is mated with a black fly with purple eyes.

OFFSPRING:

721- gray body/red eyes

751- black body/purple eyes

49- gray body/purple eyes

45- black body/red-eyes

What is the recombination frequency between these genes?

A Wild type fruit fly (heterozygous for gray body and red eyes) is mated with a black fly with purple eyes.

OFFSPRING:

721- gray body/red eyes Parentals

751- black body/purple eyes

49- gray body/purple eyes

45- black body/red-eyes

What is the recombination frequency between these genes?

A Wild type fruit fly (heterozygous for gray body and red eyes) is mated with a black fly with purple eyes.

OFFSPRING:

721- gray body/red eyes — Parentals

751- black body/purple eyes — Parentals

49- gray body/purple eyes — Recombinants

45- black body/red-eyes — Recombinants

What is the recombination frequency between these genes?

$$\frac{49 + 45}{721 + 751} \times 100 \qquad \frac{94}{1472} \times 100 \qquad 6.4 \quad = 6.4 \text{ map units}$$