EnterMedSchool.org

Genetics: Pedigrees, Mendel & Inheritance Traps

Printable Flashcards — Pre-Med Biology

Mendelian laws, monohybrid and dihybrid crosses, Punnett squares, probability, incomplete dominance, codominance, ABO blood types, X-linked/Y-linked/mitochondrial inheritance, pedigree analysis, and common exam traps.

188 cards — Print double-sided, flip on long edge, then cut along dashed lines.

188 cards — Printable Flashcards

Free & Open-Source

Generated February 20, 2026

Scan to visit online

1

Gene vs allele: what's the clean difference?

2

Locus means...

3

Genotype vs phenotype:

4

Homozygous means...

5

Heterozygous means...

6

Dominant allele means...

7

Recessive allele means...

8

Trap: dominant = common and recessive = rare. True or false?

2

The physical location of a gene on a chromosome.

1

Gene = the 'instruction' for a trait. Allele = a version of that gene (like A vs a).

4

Two same alleles (AA or aa).

3

Genotype = your alleles (AA, Aa, aa).
Phenotype = what shows up (trait you observe).

6

One copy is enough to show the phenotype (in complete dominance).

5

Two different alleles (Aa).

8

False.

7

You need two copies to show the phenotype (in complete dominance).

9

Carrier means...

10

Trap: carriers are always sick. True or false?

11

Haploid vs diploid (human):

12

Gametes carry how many alleles for each gene (usually)?

13

Genotype = {{c1::alleles}} you have; phenotype = {{c2::trait}} you observe.

14

Term for having two different alleles (like Aa):

15

Mendel used pea plants because...

16

Pure-breeding (true-breeding) means...

10

False.

9

Has a recessive allele but doesn't show the recessive phenotype (usually heterozygous).

12

One.

11

Diploid (2n) = body cells, 2 copies of each chromosome. Haploid (n) = gametes (sperm/egg).

14

Heterozygous

13

Genotype = alleles you have; phenotype = trait you observe.

16

If it self-fertilizes, the offspring always show the same trait.

15

They have clear traits, short generation times, and you can control crosses.

17

In Mendel's classic cross: pure dominant x pure recessive. What does F1 look like (complete dominance)?

18

F1 x F1 (Tt x Tt) gives what classic phenotype ratio in F2 (complete dominance)?

19

Same cross (Tt x Tt): what's the genotype ratio in F2?

20

Mendel's Law of Segregation (no fluff):

21

Mendel's Law of Independent Assortment (no fluff):

22

Trap: independent assortment ALWAYS applies. True or false?

23

Why did Mendel get clean ratios (3:1, 9:3:3:1)?

24

Mendel's key trick: he looked at huge sample sizes, so ratios became...

18

3:1 (dominant:recessive).

17

All show the dominant phenotype.

20

Allele pairs separate during gamete formation, so each gamete gets one allele.

19

1 TT : 2 Tt : 1 tt.

22

False.

21

Different gene pairs separate independently into gametes (if genes are unlinked).

24

Obvious.

23

He chose traits controlled by single genes with clear dominance and unlinked inheritance (mostly).

25

Trap: if you don't get exactly 3:1, Mendel is wrong. True or false?

26

Monohybrid F2 (Aa x Aa) phenotype ratio (complete dominance) = {{c1::3:1}} and genotype ratio = {{c2::1:2:1}}.

27

Mendel's law where alleles separate so gametes get one allele each:

28

Punnett square is basically a tool to...

29

Shortcut rule: probability of independent events together =

30

Shortcut rule: probability of either/or =

31

Aa x Aa: chance an offspring is recessive phenotype (aa)?

32

Aa x Aa: chance an offspring is a carrier (Aa)?

26

Monohybrid F2 (Aa x Aa) phenotype ratio (complete dominance) = 3:1 and genotype ratio = 1:2:1.

25

False.

28

List possible offspring genotypes from parental gametes.

27

Law of segregation

30

Add (sum rule) if events are mutually exclusive.

29

Multiply (product rule).

32

1/2.

31

1/4.

33

Aa x aa: chance of recessive phenotype?

34

AA x aa: all offspring are...

35

Trap: if you show dominant phenotype, you must be AA. True or false?

36

Test cross (what it is):

37

Test cross result: unknown dominant phenotype x aa gives 50% dominant, 50% recessive. Unknown genotype is...

38

Test cross result: unknown dominant phenotype x aa gives 100% dominant offspring (big sample). Unknown genotype is...

39

Dihybrid AaBb makes how many gamete types (if independent)?

40

AaBb x AaBb: classic phenotype ratio (complete dominance, unlinked genes) is...

34

Aa (all heterozygous).

33

1/2.

36

Cross an individual with dominant phenotype with a homozygous recessive (aa) to find the genotype.

35

False.

38

Probably AA.

37

Aa.

40

9:3:3:1.

39

4: AB, Ab, aB, ab (each 1/4).

41

AaBb x AaBb: chance of both recessive phenotypes (aabb)?

42

AaBb x AaBb: chance of showing BOTH dominant phenotypes ($A_B\_$)?

43

Trap: 9:3:3:1 ratio means genes are on different chromosomes for sure. True or false?

44

Probability shortcut: for independent genes, P(aa and bb) = P(aa) {{c1::*}} P(bb).

45

Classic F2 phenotype ratio for a dihybrid cross (AaBb x AaBb) with complete dominance and independent assortment:

46

Incomplete dominance means...

47

In incomplete dominance, Aa x Aa gives phenotype ratio...

48

Codominance means...

42

9/16.

41

1/16.

44

Probability shortcut: for independent genes, P(aa and bb) = P(aa) * P(bb).

43

False.

46

Heterozygote is intermediate (a 'blend') between the two homozygotes.

45

9:3:3:1

48

Heterozygote shows BOTH alleles clearly (not a blend).

47

1:2:1 (same as genotype).

49

Codominance vs incomplete dominance (fast rule):

50

ABO blood types: which alleles are codominant?

51

ABO quick: genotype of blood type O is...

52

Trap: type O can be IAi. True or false?

53

Multiple alleles means...

54

Lethal allele clue in ratios:

55

Trap: a 2:1 ratio proves the trait is sex-linked. True or false?

56

If heterozygote is distinct AND the ratio is 1:2:1, what two patterns could it be?

50

IA and IB.

49

Codominance = both show.
Incomplete dominance = blend.

52

False.

51

ii.

54

You might see 2:1 instead of
3:1 in offspring phenotypes.

53

A gene has more than 2 allele options in
the population (but you still have only 2).

56

Incomplete dominance or codominance.

55

False.

57

Incomplete dominance: Aa phenotype is {{c1::intermediate}}; codominance: Aa phenotype shows {{c2::both}}.

58

Blood type AB genotype:

59

Autosomal vs sex-linked: autosomal genes are on...

60

Why do X-linked recessive traits show up more in males?

61

X-linked recessive clue: father-to-son transmission happens?

62

X-linked recessive: affected father + normal (non-carrier) mother -> sons are...

63

X-linked recessive: affected father + normal mother -> daughters are...

64

X-linked dominant clue: affected father -> which children affected?

58

IAIB

57

Incomplete dominance: Aa phenotype is intermediate; codominance: Aa phenotype shows both.

60

Males have only one X, so one recessive allele is enough.

59

Chromosomes 1-22; sex-linked genes are on X or Y.

62

All normal (for that trait).

61

No.

64

All daughters affected, no sons affected (if mom unaffected).

63

All carriers (usually) but not affected.

65

Y-linked trait clue:

66

Mitochondrial inheritance clue:

67

Trap: mitochondrial traits pass father-to-son strongly. True or false?

68

Autosomal dominant traits usually affect males vs females how?

69

Autosomal recessive traits usually affect males vs females how?

70

Trap: 'more males affected' automatically means X-linked recessive. True or false?

71

X-linked recessive: no {{c1::father-to-son}} transmission because fathers give {{c2::Y}} to sons.

72

Mitochondrial inheritance: affected {{c1::mother}} -> all children affected; affected {{c2::father}} -> none affected.

66

Only mothers pass it on (affected mother -> all kids; affected father -> none).

65

Only males affected, and it goes father -> all sons.

68

Roughly equally.

67

False.

70

False.

69

Roughly equally.

72

Mitochondrial inheritance: affected mother -> all children affected; affected father -> none affected.

71

X-linked recessive: no father-to-son transmission because fathers give Y to sons.

73

Inheritance pattern where only males are affected and every affected father passes it to all sons:

74

Pedigree symbols: square = ?, circle = ?

75

In pedigrees, a filled symbol usually means...

76

Step 0 in any pedigree question:

77

Quick clue: if two unaffected parents have an affected child, the trait is most likely...

78

Quick clue: if the trait appears in every generation (no skipping), think...

79

Trap: 'skips a generation' proves recessive. True or false?

80

Pedigree shortcut: if you see father-to-son transmission, the trait is NOT...

74

Square = male, circle = female.

73

Y-linked inheritance

76

Write down what 'affected' means and whether it's dominant/recessive possibility.

75

Affected (shows the trait).

78

Autosomal dominant (or X-linked dominant).

77

Autosomal recessive (or X-linked recessive, depending on sex).

80

X-linked.

79

Usually true, but not 100%.

81

If an affected father has an affected son, what does that immediately suggest?

82

If ALL daughters of an affected father are affected, but no sons are, that's screaming...

83

If an affected mother passes the trait to ALL her children (sons + daughters), think...

84

Trap: in mitochondrial inheritance, affected mothers pass it to half their kids. True or false?

85

Pedigree rule: father-to-son transmission rules out {{c1::X-linked}} inheritance.

86

Pedigree symbol for a male is a:

87

Autosomal dominant pedigree usually looks like:

88

Autosomal recessive pedigree usually looks like:

82

X-linked dominant (if mom unaffected).

81

Autosomal (dominant or recessive) or Y-linked; not X-linked.

84

False (in the simplified pre-med model).

83

Mitochondrial inheritance.

86

Square

85

Pedigree rule: father-to-son transmission rules out X-linked inheritance.

88

Trait can skip generations; affected kids can have unaffected parents (carriers).

87

Trait in every generation, affected person usually has an affected parent.

89

Autosomal dominant: two affected parents can have an unaffected child if...

90

Autosomal recessive: two affected parents (aa x aa) have children that are...

91

If an autosomal recessive trait appears, carriers are usually...

92

Consanguinity (parents related) makes which inheritance pattern more likely to show up?

93

Trap: consanguinity makes autosomal dominant traits more common. True or false?

94

Autosomal dominant: what's the usual chance an affected heterozygote (Aa) passes it to a child (with aa partner)?

95

Autosomal recessive: two carriers (Aa x Aa) chance of an affected child is...

96

Carrier x affected (Aa x aa) for autosomal recessive: chance of affected child is...

90

All affected (aa).

89

Both are heterozygous (Aa x Aa) and child gets aa.

92

Autosomal recessive.

91

Unaffected.

94

50%.

93

False.

96

50%.

95

25% (1/4).

97

Trap: if a trait is autosomal recessive, an affected person must have an affected parent. True or false?

98

Autosomal recessive carrier cross: Aa x Aa -> {{c1::1/4}} affected (aa), {{c2::1/2}} carriers (Aa), {{c3::1/4}} unaffected (AA).

99

Autosomal recessive: probability of an affected child from two carriers (Aa x Aa):

100

X-linked recessive pedigree tends to show:

101

X-linked recessive: an affected male's daughters are (if mom unaffected)...

102

X-linked recessive: a carrier mother has what chance of an affected son?

103

X-linked recessive: a carrier mother has what chance of a carrier daughter (with normal father)?

104

X-linked dominant pedigree tends to show:

98

Autosomal recessive carrier cross: Aa x Aa -> 1/4 affected (aa), 1/2 carriers (Aa), 1/4 unaffected (AA).

97

False.

100

More males affected, trait can skip generations, no father-to-son transmission.

99

25% (1/4)

102

50% (each son).

101

All carriers.

104

Trait in every generation; affected fathers affect all daughters, no sons.

103

50% (each daughter).

105

X-linked dominant: affected mother (heterozygous) -> chance child affected (any sex)?

106

Trap: X-linked dominant can be father-to-son. True or false?

107

Quick compare: X-linked recessive vs autosomal recessive - what's a big sex clue?

108

If a pedigree shows ONLY males affected and it goes father -> son -> grandson, think...

109

X-linked recessive: carrier mother -> {{c1::50%}} affected sons. X-linked dominant: affected father -> {{c2::100%}} affected daughters.

110

In X-linked recessive inheritance, can an affected father pass the trait to his sons?

111

Pedigree fast ID: trait passes from mother to ALL children, but never from father. That's...

112

Pedigree fast ID: trait passes only father -> son, every generation, no females. That's...

106

False.

105

50%.

108

Y-linked (or a male-limited autosomal trait, but pre-med usually means Y-linked).

107

X-linked recessive often has more affected males; autosomal recessive affects sexes equally.

110

No

109

X-linked recessive: carrier mother -> 50% affected sons. X-linked dominant: affected father -> 100% affected daughters.

112

Y-linked.

111

Mitochondrial inheritance.

113

Pedigree fast ID: both sexes affected equally AND it can skip generations. That's likely...

114

Pedigree fast ID: both sexes affected equally AND it appears every generation. That's likely...

115

Trap: mitochondrial inheritance always affects only muscles. True or false?

116

Fast ID: maternal-only transmission (mom -> all kids) = {{c1::mitochondrial}}; father -> all sons = {{c2::Y-linked}}.

117

Pedigree scenario: affected child born to two unaffected parents, and both sexes can be affected. Most likely?

118

Pedigree scenario: trait appears every generation, males and females equally affected, and father-to-son transmission exists. Most likely?

119

Pedigree scenario: mostly males affected, no father-to-son transmission, affected males often have carrier mothers. Most likely?

120

Pedigree scenario: affected father, unaffected mother, ALL daughters affected, no sons affected. Most likely?

114

Autosomal dominant.

113

Autosomal recessive.

116

Fast ID: maternal-only transmission (mom -> all kids) = mitochondrial; father -> all sons = Y-linked.

115

False.

118

Autosomal dominant.

117

Autosomal recessive.

120

X-linked dominant.

119

X-linked recessive.

121

Pedigree scenario: only males affected and every affected father has affected sons. Most likely?

122

Pedigree scenario: affected mother has affected sons and daughters. Affected father has no affected children. Most likely?

123

Trap scenario: a trait seems to skip a generation but otherwise looks dominant. Two words to explain that (conceptually):

124

Pedigree trap: you see equal numbers of affected males and females. That alone tells you...

125

Pedigree trap: a single affected child in a small family doesn't prove anything. Why?

126

If you see father-to-son transmission, the trait is {{c1::not X-linked}}.

127

Pedigree clue: trait can skip generations and affected children can have unaffected parents. Likely pattern:

128

Trap: 'dominant trait' means it's always the most common trait. True or false?

122

Mitochondrial inheritance.

121

Y-linked.

124

It's probably autosomal (but not guaranteed).

123

Incomplete penetrance.

126

If you see father-to-son transmission,
the trait is not X-linked.

125

Small sample size can hide the real pattern.

128

False.

127

Autosomal recessive

129

Trap: recessive traits 'disappear' over time. True or false?

130

If a dominant phenotype individual has a recessive child, that parent must be...

131

In a monohybrid cross, why does genotype ratio 1:2:1 become phenotype ratio 3:1?

132

If you see 1:2:1 phenotype ratio, what does that suggest?

133

Trap: 'carrier' only exists for autosomal recessive traits. True or false?

134

If an allele is recessive, can it still be deadly in homozygotes?

135

Trap: heterozygous always means the organism is a carrier. True or false?

136

A_ means...

130

Heterozygous (Aa).

129

False.

132

Incomplete dominance or codominance (heterozygote has its own phenotype).

131

Because Aa and AA look the same under complete dominance.

134

Yes.

133

False.

136

At least one dominant allele (AA or Aa).

135

Depends.

137

Trap: A_ means heterozygous. True or false?

138

If a dominant phenotype parent has a recessive child, the parent must be {{c1::heterozygous}} (Aa).

139

Meaning of A_ in genetics notation:

140

Independent assortment applies when genes are...

141

Trap: genes on the same chromosome can never assort independently. True or false?

142

If a dihybrid cross does NOT give 9:3:3:1, what's your first suspicion (pre-med level)?

143

AaBb gamete types (again, because it's so testable):

144

AaBb x aabb (testcross dihybrid): if genes assort independently, offspring phenotype ratio should be...

138

If a dominant phenotype parent has a recessive child, the parent must be heterozygous (Aa).

137

False.

140

On different chromosomes (or far apart on the same one).

139

AA or Aa (at least one A)

142

Genes might be linked (or there could be epistasis).

141

False.

144

1:1:1:1.

143

AB, Ab, aB, ab.

145

If a dihybrid testcross does NOT give 1:1:1:1, your suspicion is...

146

Parental vs recombinant offspring in a linkage question: which are usually more common?

147

Trap: recombinant types are always more common than parental types. True or false?

148

Dihybrid testcross (AaBb x aabb) gives {{c1::1:1:1:1}} if genes assort independently.

149

Number of different gamete types produced by AaBb (if independent assortment):

150

Chi-square test in genetics is used to check...

151

Trap: if observed ratio isn't perfect, you automatically reject Mendel. True or false?

152

Autosomal recessive: two carriers have one affected child already. Chance the NEXT child is affected?

146

Parental types.

145

Linkage (genes not assorting independently).

148

Dihybrid testcross (AaBb x aabb) gives 1:1:1:1 if genes assort independently.

147

False.

150

If your observed offspring ratios fit an expected Mendelian ratio (or if deviation is too big to be chance).

149

4

152

Still 25%.

151

False.

153

Trap: if a couple already has one affected child, the next one is 'more likely' to be affected. True or false?

154

Autosomal recessive: Aa x Aa. If a child is unaffected, what's the chance they're a carrier?

155

Trap: in Aa x Aa, an unaffected child has 1/2 chance of being a carrier. True or false?

156

X-linked recessive: carrier mother (XNXn) + normal father (XNY). Chance a SON is affected?

157

X-linked recessive: carrier mother + normal father. Chance a DAUGHTER is affected?

158

X-linked recessive: affected father (XnY) + carrier mother (XNXn). Chance a daughter is affected?

159

Autosomal dominant: affected heterozygous parent (Aa) + unaffected (aa). Chance child affected?

160

Conditional trap: Aa x Aa. Given a child is unaffected, P(carrier) = {{c1::2/3}}.

154

2/3.

153

False (for simple Mendelian inheritance).

156

50%.

155

False.

158

50%.

157

0% (in simple model).

160

Conditional trap: Aa x Aa. Given a child is unaffected, P(carrier) = 2/3.

159

50%.

161

Aa x Aa (autosomal recessive). Given a child is unaffected, chance they're a carrier:

162

Mendel crossed pure-breeding tall (TT) with pure-breeding short (tt). F1 were all tall. What did that suggest?

163

Mendel got 3:1 in F2. What did that suggest about alleles?

164

If a trait 'disappears' in F1 but returns in F2, the clean interpretation is...

165

Mendel's big conceptual win: traits are controlled by...

166

If someone says 'dominant allele destroys recessive allele', what's the correct correction?

167

Mendel's key result: recessive traits can {{c1::reappear}} in F2, showing alleles are not {{c2::blended}} away.

168

Gotcha: 'dominant' does NOT mean...

162

Tall allele is dominant over short (in this trait).

161

2/3

164

The trait is recessive and was masked in heterozygotes.

163

They don't blend; they segregate and can reappear.

166

No. Recessive allele is still there; it just doesn't show in phenotype.

165

Discrete units (genes), not blended fluids.

168

Stronger, healthier, more common, or better.

167

Mendel's key result: recessive traits can reappear in F2, showing alleles are not blended away.

169

Gotcha: recessive traits can be common if...

170

Gotcha: if a trait appears only in males in ONE family, that doesn't automatically mean Y-linked because...

171

Gotcha: an affected female in an X-linked recessive pedigree is rare because...

172

Gotcha: in X-linked recessive, an affected male's mother must be...

173

Gotcha: if a dominant trait looks like it skipped, two common explanations are...

174

Gotcha: test cross is used because it gives a clear readout of genotype based on...

175

Gotcha: if genes are linked, the most common offspring types are usually...

176

In X-linked recessive inheritance, sons inherit their {{c1::X}} from mom and {{c2::Y}} from dad.

170

It could be X-linked recessive or just chance/small sample.

169

The recessive allele is common in the population (and carriers are common).

172

At least a carrier (in the simple model).

171

She needs two affected X alleles (or one affected X plus special cases).

174

Offspring phenotypes.

173

Incomplete penetrance or a new mutation in the affected person.

176

In X-linked recessive inheritance, sons inherit their X from mom and Y from dad.

175

Parental combinations, not recombinants.

177

Most likely inheritance if trait passes from affected mothers to ALL children but from affected fathers to NONE:

178

Clue: trait appears in every generation, males and females equally affected.

179

Clue: trait can skip generations, affected kids can have unaffected parents, sexes equally affected.

180

Clue: more males affected, no father-to-son transmission.

181

Clue: affected father -> all daughters affected, no sons affected (mom unaffected).

182

Clue: only males affected, affected father -> all sons affected.

183

Aa x AA: chance child is recessive phenotype?

184

Aa x AA: chance child is heterozygous (Aa)?

178

Autosomal dominant

177

Mitochondrial inheritance

180

X-linked recessive

179

Autosomal recessive

182

Y-linked

181

X-linked dominant

184

50%.

183

0%.

185

Aa x aa: chance child is a carrier (Aa)?

186

Dihybrid quick: AaBb x aabb.
Chance offspring is Aabb?

187

Dihybrid quick: AaBb x aabb. Chance offspring shows BOTH recessive phenotypes (aabb)?

188

Monohybrid: Aa x aa -> {{c1::1/2}}
Aa and {{c2::1/2}} aa (phenotype 1:1).

186

1/4.

185

50%.

188

Monohybrid: Aa x aa -> 1/2 Aa and 1/2 aa (phenotype 1:1).

187

1/4.