① round : R
wrinkled : r

a) RR × rr

	R
r	Rr

F_1 genotype : 100% Rr
phenotype : 100% round

b) Since wrinkled is recessive to round, a wrinkled seed is <u>homozygous</u>.

c) F_2 genotype : 1 : 2 : 1
RR Rr rr
phenotype : 3 : 1
round wrinkled

	R	r
R	RR	Rr
r	Rr	rr

② large : L
small : l

parents : Ll × ll

F_1

	L	l
l	Ll	ll
l	Ll	ll

genotype : 1 : 1
Ll ll
phenotype : 1 : 1 ⇒ 50% large <u>heterozygous</u>
50% small <u>homozygous</u>

③ dimples : D
no dimples : d

★ see question ②

	D	d
d	Dd	dd
d	Dd	dd

genotype of parents : Dd (heterozygous) × dd (homozygous)

④ long : E
short : e

★ see question ①

F_1 generation : Ee
genotype : Ee
phenotype : long eyelashes

⑤ The allele that codes for 5 digits is more prevalent / common despite being recessive. Sometimes, recessive alleles are maintained in populations because they provide adaptive advantages for the organism.

Yes, it's possible : homozygous × heterozygous : NO
heterozygous × heterozygous : 25%

(6) normal : C
albino : c

	C	c
c	Cc	cc
c	Cc	cc

P generation : cc × Cc

f_1 generation : genotype : 1 : 1
Cc cc

phenotype : 1 : 1
normal albino

(7) brown : B
blue : b

P gen. bb × Bb (heterozygous because of blue-eyed mother)
♀ ♂

F_1 gen : ✗ see question (6) for Punnett

genotype : 1 : 1
Bb bb

phenotype : 50% brown
50% blue

(8) normal : A
sickle cell : a

P gen : aa × Aa

↪

(8)

P gen: aa × Aa
♂ ♀

a) NO. The children will either be heterozygous for the trait or will have sickle cell anemia

b) 50% genotype aa

c) 50% genotype Aa

(9) black : B
white : b

b) 5 would be black (half of 10)
see a) for explanation

a) use a test cross by mating the unknown with a pure-breeding homozygous recessive. Follow-up by looking at ratios 50% : 50% means unknown is heterozygous and 100% same as unknown would mean homozygous.

ex.

	B	b
b	Bb	bb
b	Bb	bb

← unknown →

vs

	B	B
b	Bb	Bb
b	Bb	Bb