Problem Set on Inheritance - key

1) $2/10^4$ (or 1/5000)

2) 1/2

3) a) 8 (in equal proportion)

b) 12 genotypes

4) The eggs would be diploid (two chromosomes of each type); upon fertilization a triploid embryo would be produced (this would be lethal and the embryo would die).

5) $I^A I^O$ MM x $I^A I^B$ MN

a) 1/8 will have genotype $I^A I^A$ MM
b) ¼ will have phenotype A M ?
c) There is a ½ chance that a child with blood type A M is homozygous for both genes
d) There is a ½ chance that a child who has AB blood will also have MN blood (the two phenotypes are determined by independent genes).

6) and 7) will be added here shortly

8) a) This pedigree has an unusually large number of consanguineous matings.
b) They were aiming to "preserve the royal blood" by mating within the family (the effect is to dramatically increase the probability of yielding individuals who are homozygous for mutations that are present in single dose (in carriers).

9) a) ¼ b) 0 c) ½ d) 0 for both sons and daughters

10) a) 1/256 **b)** 1/512 **c)** 9/64 **d)** 0

11) The important concept to think about here is the difference between the AB blood antigens, which are present on the surface of RBCs, and the antibodies *against* the AB antigens, which are present in plasma. If the plasma portion of a blood donation is separated from the blood cells, realize that there will be NO AB blood antigens. If the blood donor was type O, then the plasma will contain antibodies to the A antigen and antibodies to the B antigen; in contrast, an AB donor has plasma that does not contain antibodies to either A or B antigens, and therefore can be considered "neutral".