D1.2 Protein synthesis (HL): data-based questions

What the Cell · DP Biology · data-based questions

Name _____ **Date** _____ **Total** _____ / 10

Read the data carefully before you answer. The number of marks shows how many separate points to make. Show your working in calculations.

1 Introns, exons and globin genes

10 marks

Eukaryotic genes contain exons, which are kept in mature mRNA, and introns, which are removed. The table shows data for five human genes.

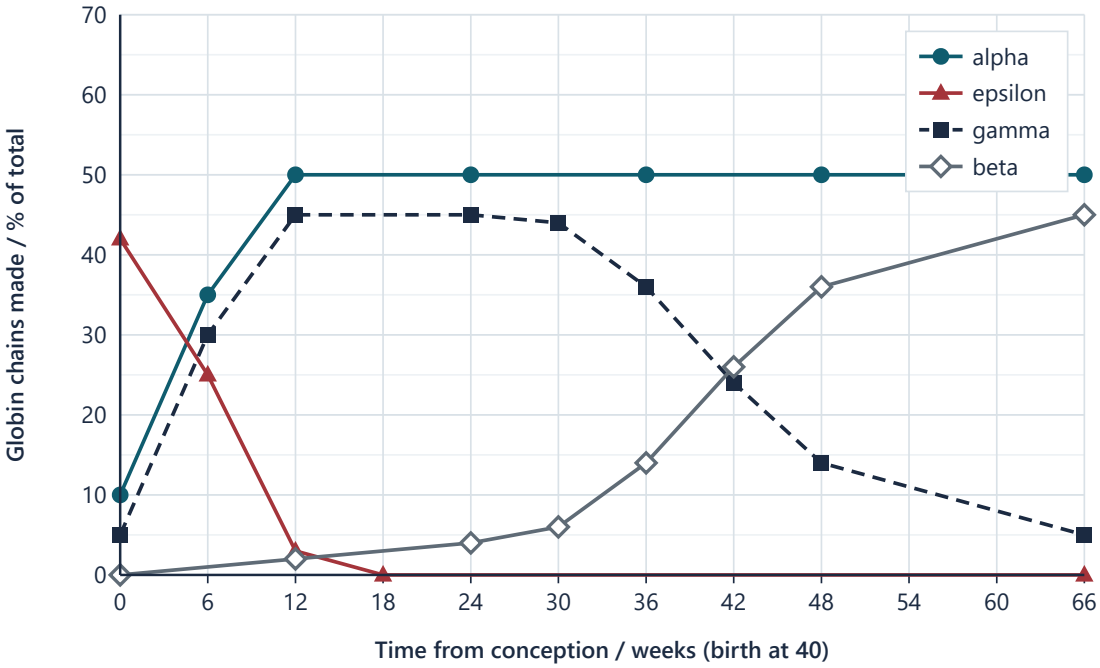
Gene (protein)	Gene length / kb	Number of exons	Mature mRNA / kb
INS (insulin)	1.4	3	0.47
HBB (beta-globin)	1.6	3	0.63
PAH (phenylalanine hydroxylase)	79	13	2.4
COL1A1 (collagen)	18	51	4.8
DMD (dystrophin)	2200	79	14

a **Calculate** the percentage of the HBB gene that ends up in its mature mRNA. **[1]**

b **Analyse** the relationship between gene length and the number of exons. **[2]**

c The coding sequence of PAH mRNA, from start codon to stop codon, is 1359 nucleotides. **Determine** the number of amino acids in phenylalanine hydroxylase. **[1]**

Haemoglobin is made of four globin chains, two of one type and two of another. The graph shows which globin chains are made before and after birth.



d **State** which globin chains are made first after conception. **[1]**

e **Compare** the expression of the gamma and beta genes. **[3]**

f **Deduce** the chain composition of haemoglobin at 20 weeks after conception and at six months after birth. **[2]**