

(DBT-2016)

20. Protein 'A' from *Pseudomonas putida* contains 135 amino acids. The number of nucleotides present in the gene encoding the protein will be -----.

(1) 405

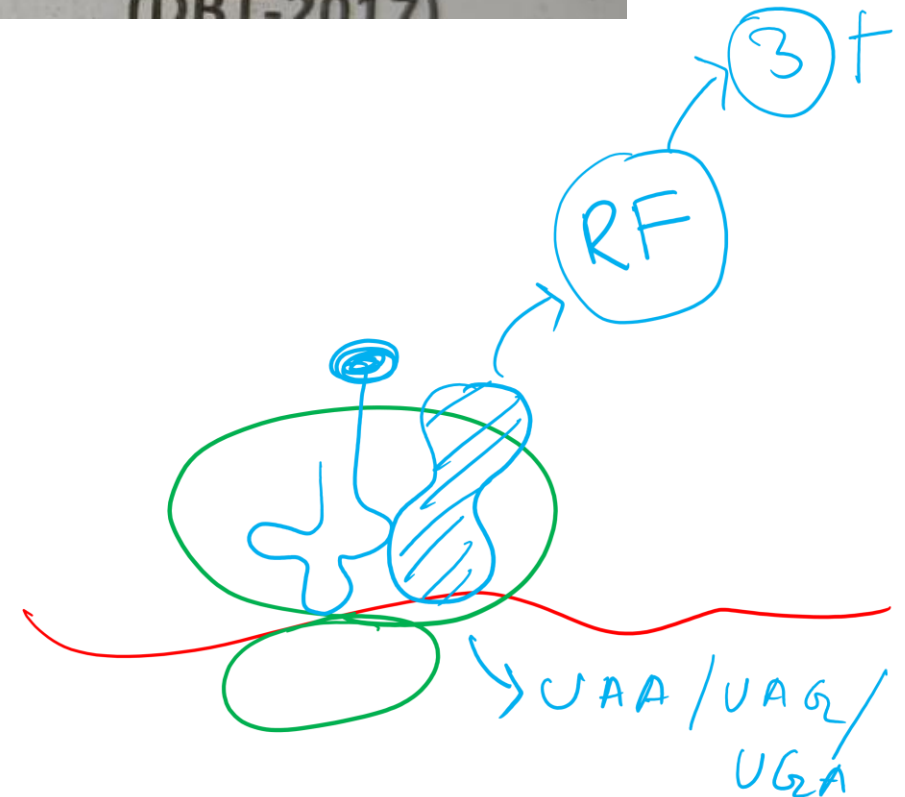
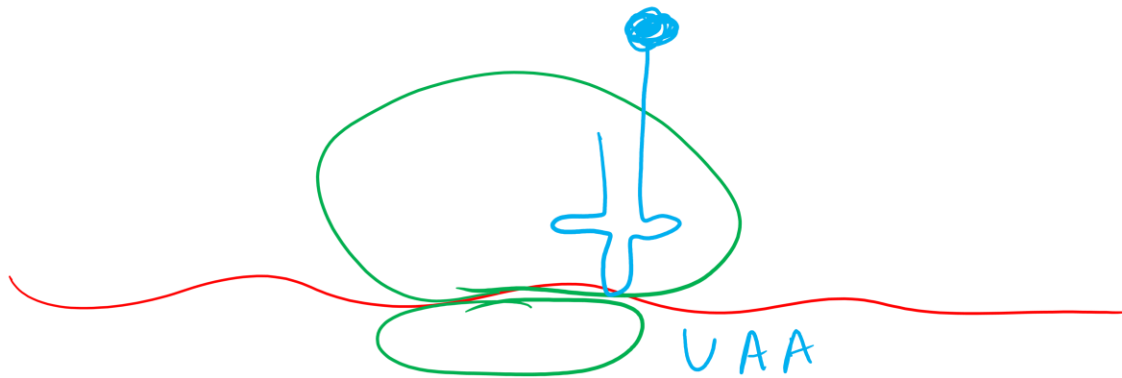
~~(2) 408~~

(3) 411

✓ (4) 421

(DBT-2017)

$$135 \times 3 = 405 + 3 = 408$$



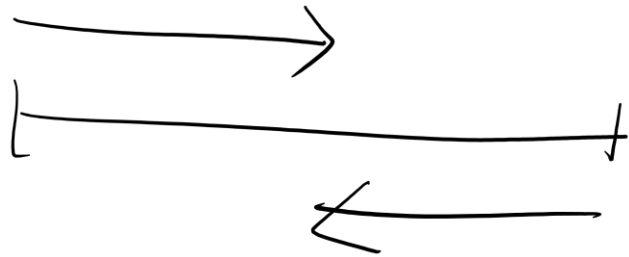
17. Which one of the following sequences is a palindrome?

(1) 5' ACGGATTTCGC 3'

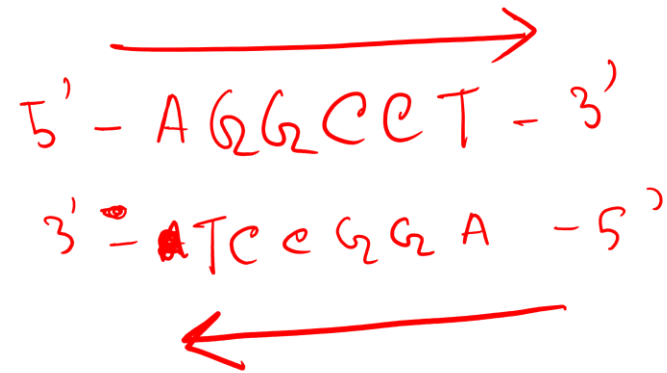
(2) 5' ATGCCCG 3'

(3) 5' CCATT 3'

(4) 5' AGGCCT 3'



Palindrome



18. The molecular weight of a protein is 30 kDa. The minimal length of mRNA encoding this polypeptide will be close to

(1) 800

(2) 900

(3) 1000

(4) 300

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(DBT-2016)

Avg. wt of any Amino acid \rightarrow 110 Da [1 a.a. = 110 Da]

$$30 \text{ kDa} = \underline{\underline{30,000 \text{ Da}}}$$

$$\frac{30,000}{110} \text{ Da} = 272 \dots$$

\rightarrow how many a.a?

$$nt = 272 \times 3$$
$$\approx 800$$

25. Of the dsDNA sequences given below, the sequence that is expected to have a higher melting temperature is:

(1) ATGACATTATTACATTAGTG X

✓ (2) GCGCGTGCATGCCCGATGCC ✓

(3) ATTATTATACCGTATTTATAT X

(4) CGCGATCGGGGATTACGAGC X

(DBT-2019)

$G_2 \equiv C \leftarrow \textcircled{e}$

$A = T$

Seq \Rightarrow GC \uparrow

\downarrow
melting temp.

$(T_m) \uparrow$

7. Which of the following does not represent a valid amino acid sequence?

(1) E[~]INSTEIN

(2) CRICK ✓

(3) FARADAY

(4) ~~WATSON~~

(DBT-2009)

↓
doesn't exist (X)

✓
Alanine → A[~]
→ Ala

S → Serine

E → Glu / Glutamic acid

I → Isoleucine

F → Phenyl
Ala

C → Cysteine

N → Asparagine (Asn)

T → Threonine

Y → Tyrosine

D → Aspartic acid (Asp)

R → Arginine

K → Lysine

37. The melting temperature (T_m) of DNA is higher when the content of:

(1) A:T base pairs is higher.

(2) G:C base pairs is higher.

(3) A:T base pairs is same as G:C base pairs.

(4) G:C base pairs is lower.

(DBT-2022)

7. Analysis of a nucleotide sequence reveals the proportion of A : T : C : G :: 0.40 : 0.85 : 1.56 : 1. Type of DNA concluded from this study is a

- ~~(1) purine rich DNA~~ ~~(2) cruciform DNA~~
~~(3) double stranded DNA ?~~ ~~(4) single stranded DNA~~

(DBT-2010)

$$A : T : C : G :: 0.8 : 0.8 : 0.8 : 0.8$$

dsDNA

Chargaff's rule $\Rightarrow A + G = T + C \Rightarrow \frac{A + G}{T + C} = 1$

$$\begin{array}{l|l} A = x & G = y \\ T = x & C = y \end{array}$$

$$\Rightarrow \frac{0.40 + 1}{0.85 + 1.56}$$

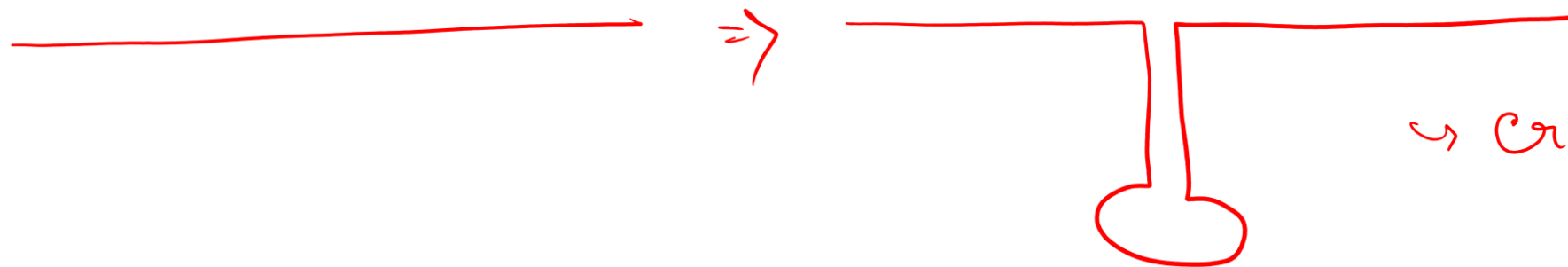
$$\Rightarrow \frac{1.4}{2.41} \neq 1$$

Purine $\frac{A + G}{T + C} = 1$
Pyrimidine $\frac{T + C}{A + G} = 1$

✓	✓		✓	✓		✓	✓		✓	✓
A	T	G	C	A	T	G	C	A	T	
T	A	C	G	T	A	C	G	T	A	
1	2	3	4	5	6	7	8	9	10	

$$6 \rightarrow AT$$

$$4 \rightarrow GC$$



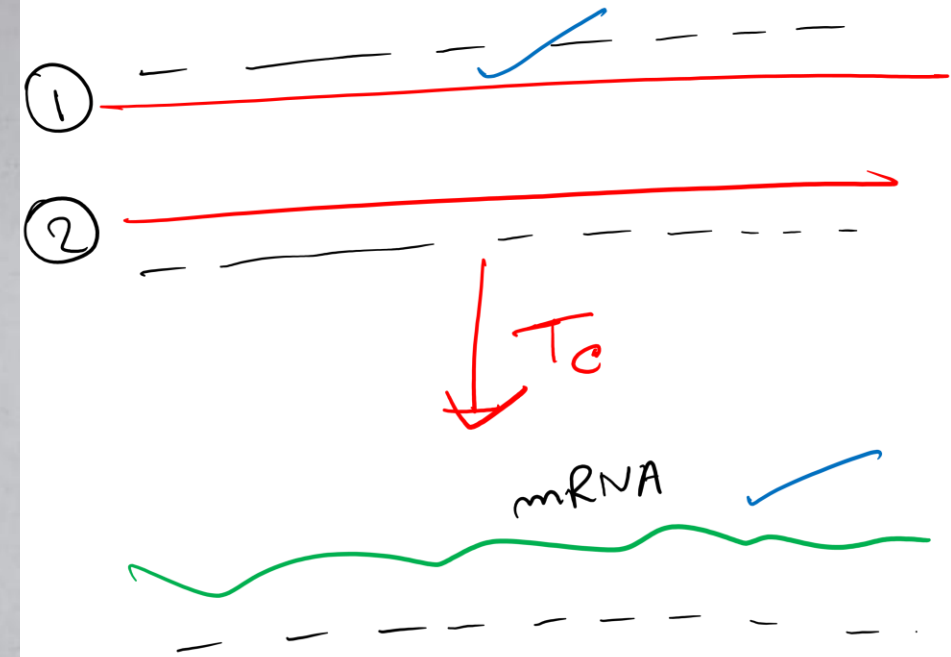
\rightarrow Cruciform DNA

18. You have obtained a sample of DNA, and you transcribe mRNA from this DNA and purify it. You then separate the two strands of the DNA and analyze the base composition (%) of each strand and of the mRNA. You obtain the data shown in table below. Which strand of the DNA is the coding strand, serving as a template for mRNA synthesis?

	A	G	C	T	U
DNA strand 1	39.1	26.0	31.0	14.9	0
DNA strand 2	14.2	30.8	25.7	38.3	0
mRNA	39.0	25.9	30.8	0	14.6

- (1) Strand 1 (2) Strand 2
 (3) Both strands 1 and 2 (4) Neither strand 1 nor 2

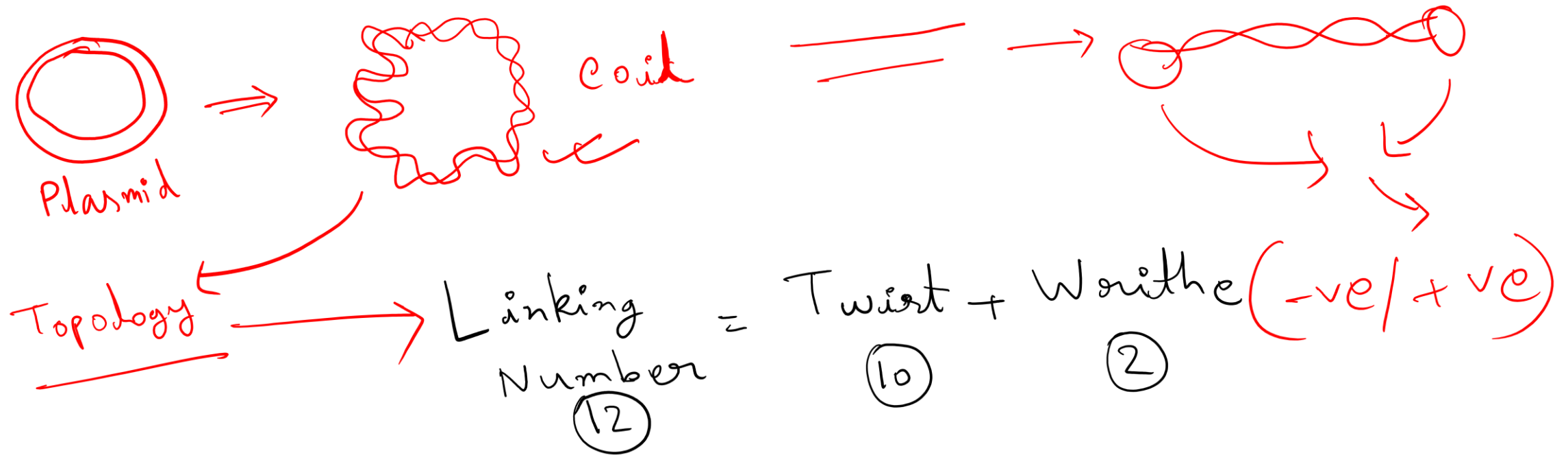
(DBT-2013)

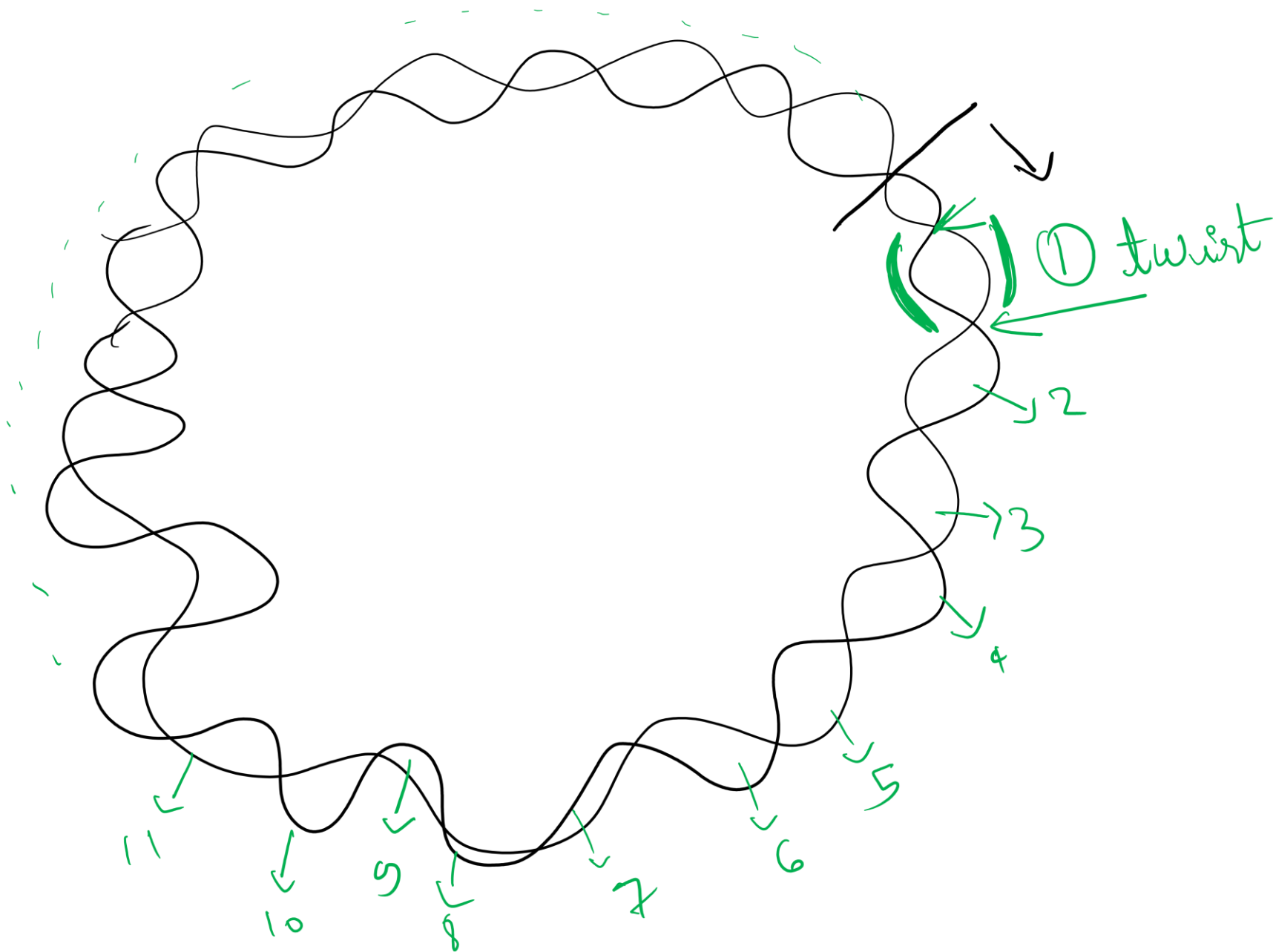


14. A 300 bp long B- form of plasmid DNA has 20 complete turns. This DNA molecule is:

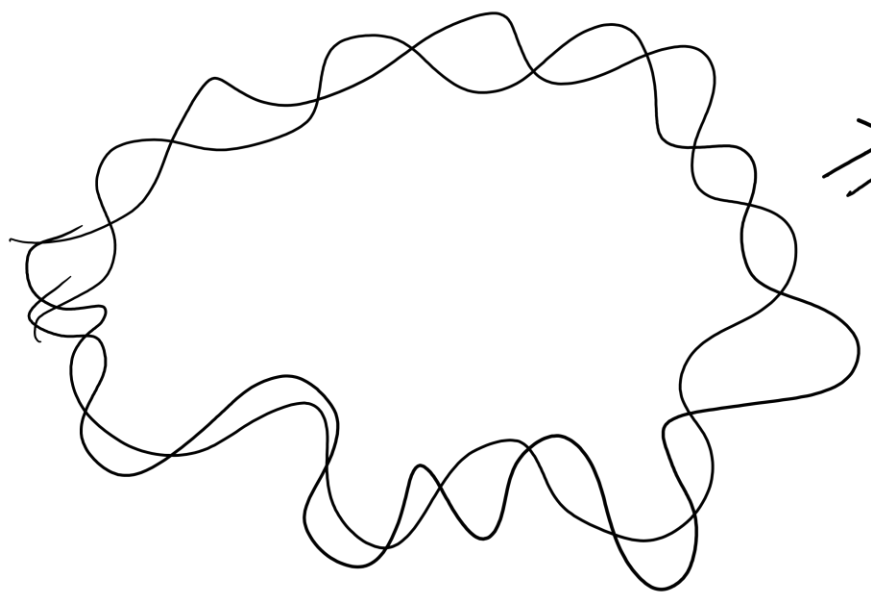
- (1) Positively supercoiled
- (2) Negatively supercoiled
- (3) Relaxed
- (4) Cannot be predicted

(DBT-2014)



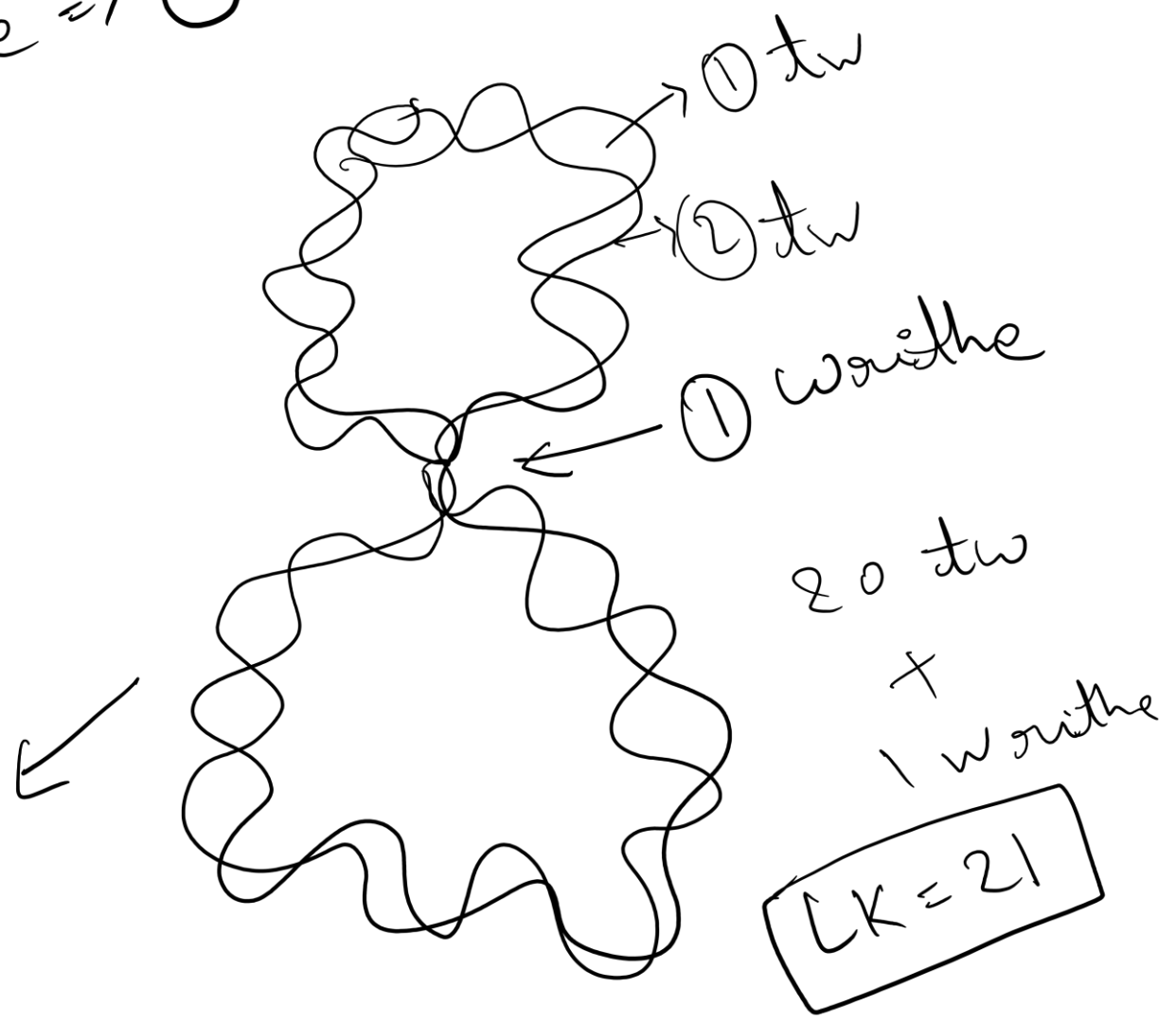
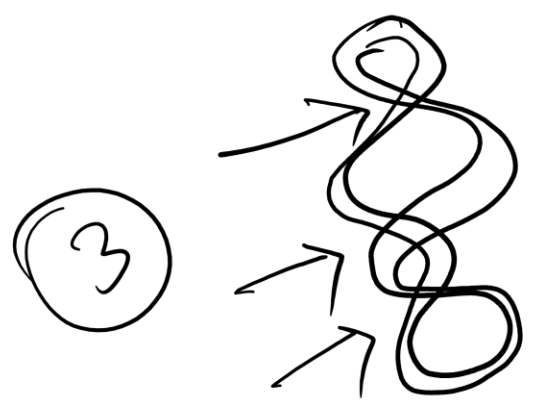


\Rightarrow 20 Twist



Circular

\Rightarrow Wirthe \Rightarrow 0



9. A hypothetical relaxed circular plasmid has 4500 bp. If for supercoiled form of this plasmid the twist is 440 and the writhe is -20, then the plasmid can be considered as a

- (1) nicked circular plasmid
- (2) positively supercoiled plasmid
- ☒ (3) negatively supercoiled plasmid
- (4) relaxed circular plasmid

(DBT-2011)

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$$\text{Twist} = \frac{\text{Total no. of Base pair}}{10.5}$$

[expected]
relaxed DNA

$$\begin{aligned} Tw &= 440 \\ Wr &= -20 \\ LK &= 440 + (-20) \\ &= 420 \text{ (actual)} \end{aligned}$$

$$\begin{aligned} \text{Plasmid} &\Rightarrow \frac{4500 \text{ bp}}{10.5} \\ &\approx 429 \text{ bp (Tw)} \\ &\text{(expected)} \end{aligned}$$