1. In Griffith's bacterial transformation experiment, why did mice die when injected with a mixture of heat-killed S-strain bacteria and live R-strain bacteria?

   (a) The heat-killed S-strain bacteria activated the immune system, leading to an exaggerated response against the live R-strain bacteria.

   (b) The heat-killed S-strain bacteria activated the immune system, leading to an exaggerated response against the live R-strain bacteria.

   (c) The heat-killed S-strain bacteria released harmful enzymes that affected the mice.

   (d) The combination of heat-killed S-strain bacteria and live R-strain bacteria triggered an unforeseen chemical reaction toxic to mice.

   (e) The live R strain bacteria acquired genetic material from the heat-killed S strain bacteria, making them virulent

   Answer: (e)

2. In the Hershey-Chase experiment, which component of the T2 bacteriophage was radioactively labeled to distinguish between DNA and protein?

   (a) Nitrogen bases in DNA.

   (b) Phosphorus in DNA.

   (c) Sulfur in protein.

   (d) Phosphorus in protein.

   Answer: (b), (c)

3. E. coli cells were grown in N15 medium for several generations and then shifted to a normal medium for one generation. If the DNA isolated from the culture is centrifuged on a CsCl equilibrium density gradient, the result will be

   (a) Two bands containing single-stranded DNA, one with N14 and the other with N15 label.

   (b) A single band of double helix DNA consisting of one strand with N14 and another with N15 label.

(c) A single band of double helix DNA consisting of N14 and N15 in both strands.

(d) Two bands containing double helix DNA, each containing both N14 and N15 labels.

Answer: (b)

4. While performing a PCR, the student forgot to add one of the two primers. The number of molecules of single-stranded DNA produced after 25 PCR cycles is

   (a) $6.7 * 10^7$

   (b) 1

   (c) 25

   (d) 50

   Answer: (c)

5. Genetic code is non-overlapping. In a hypothetical condition if genetic code is overlapping, then how many amino acids will be synthesized from a 100 nucleotide stretch? (Don't consider Stop codons)

   (a) 98

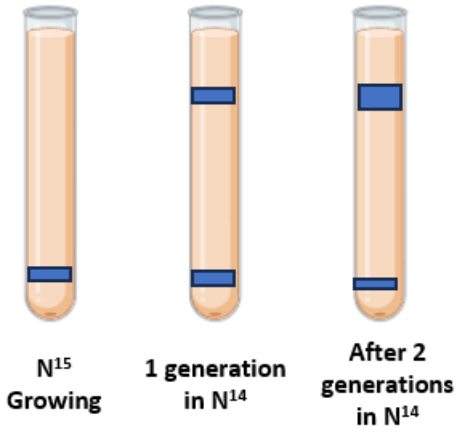
   (b) 99

   (c) 33

   (d) 66

   Answer: (a)

6. A new species of bacteria was isolated from Powai Lake, which, when tested in the lab, showed the following result in the Meselson-Stahl experiment after density gradient centrifugation (The blue bands depict DNA bands of different densities):



DNA replication of this bacteria follows:

(a) Conservative model

(b) Dispersive model

(c) Semi-conservative model

(d) Not enough information was given to answer.

Answer: (a)

7. For the primer sequence 5'- GGG GCA GTG CCT CGT AAA -3', what is the expected melting temperature (Tm)?

(a) 68.3°C

(b) 58°C

(c) 36°C

(d) 42.8°C

Answer: (b)

8. Which of the following is favored for primer design?

(a) Primers should contain long stretches of a particular nucleotide, preferably A or T.

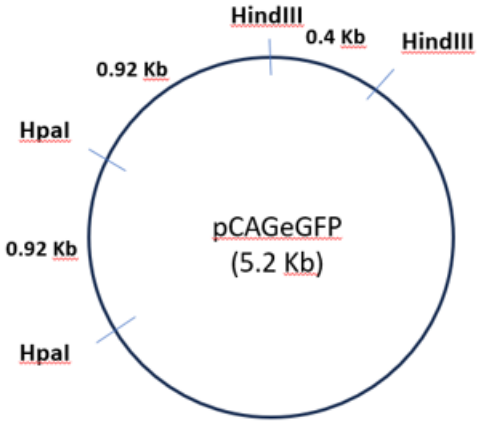
(b) Primers should be very long in length.

(c) Primers should not be complementary to each other.

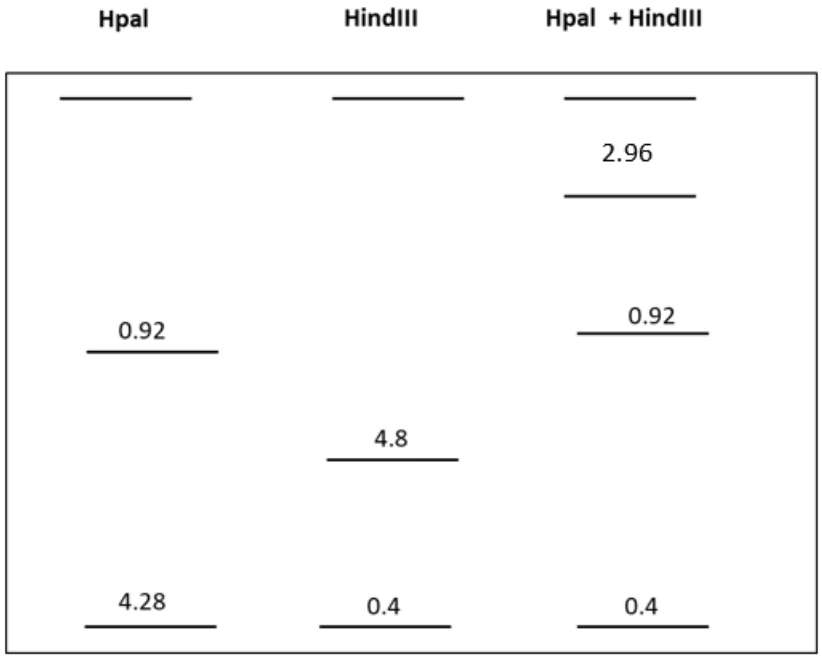
(d) The melting temperature should be different for both the primers.

Answer: (c)

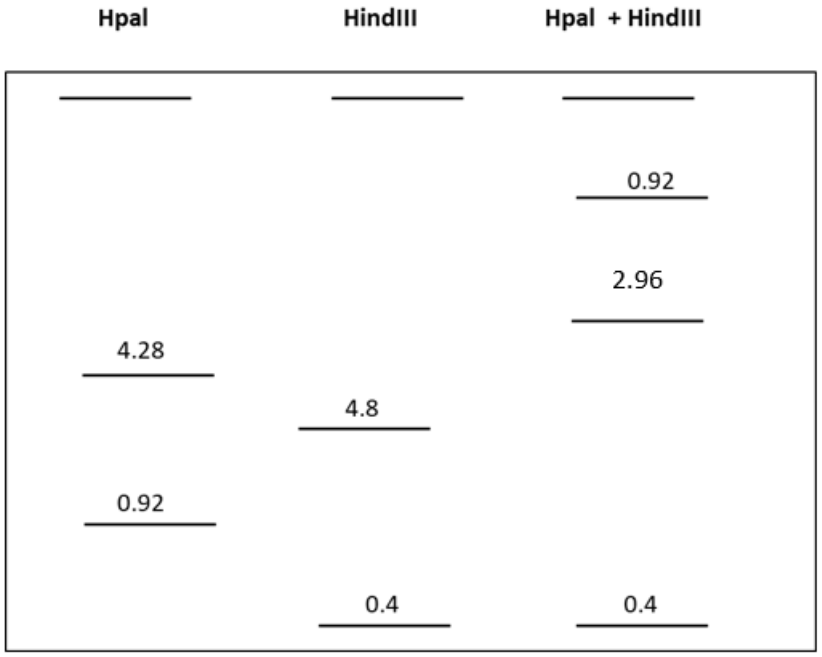
9. Given below is the plasmid map of the plasmid pCAGeGFP. This plasmid has been digested with the restriction enzymes HpaI, HindIII separately, and in another reaction, it is digested with both enzymes. Following this, they were run on 3 different lanes on an agarose gel. What would the agarose gel look like:



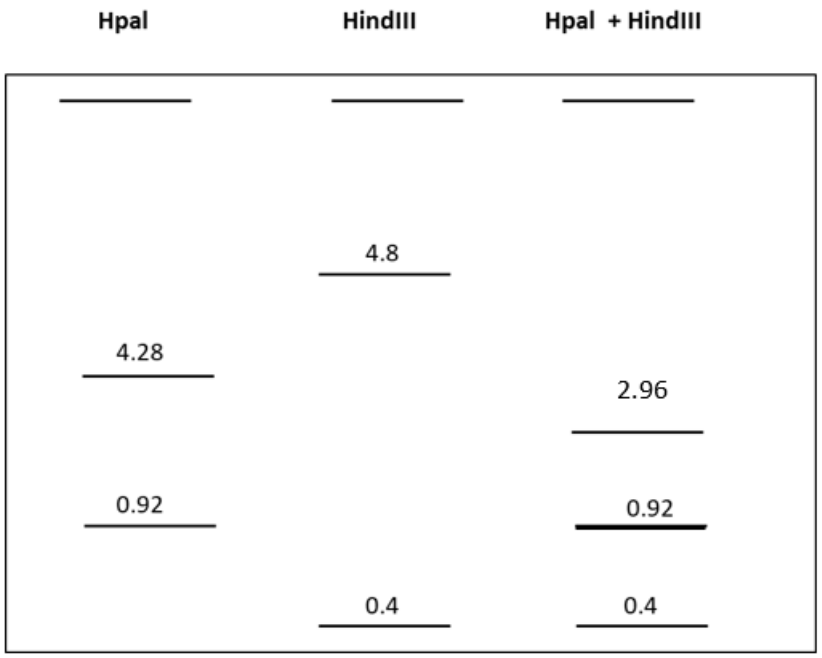
(a)



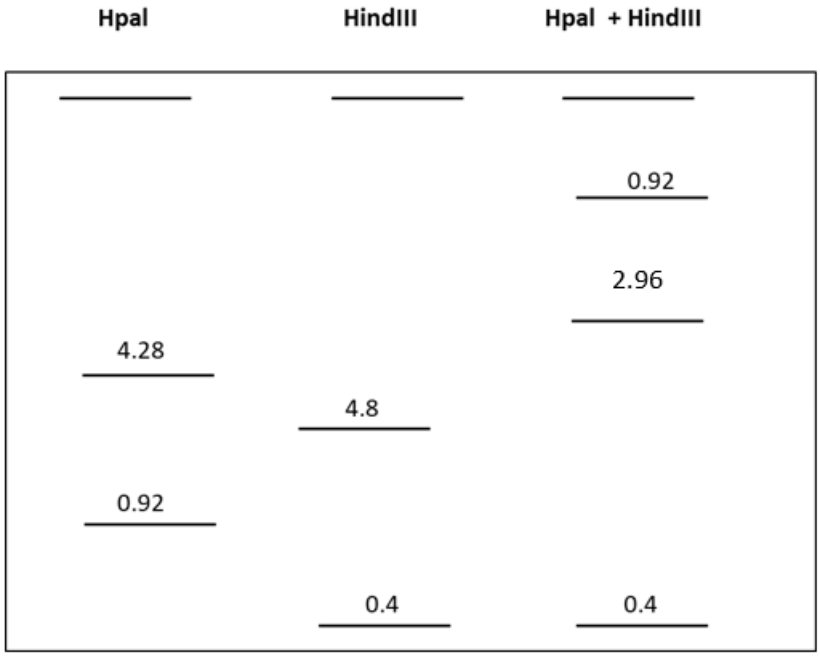
(b)


HpaI
HindIII
HpaI + HindIII
0.92
2.96
4.28
4.8
0.92
0.4
0.4

(c)


HpaI
HindIII
HpaI + HindIII
4.8
4.28
2.96
0.92
0.92
0.4
0.4

(d)

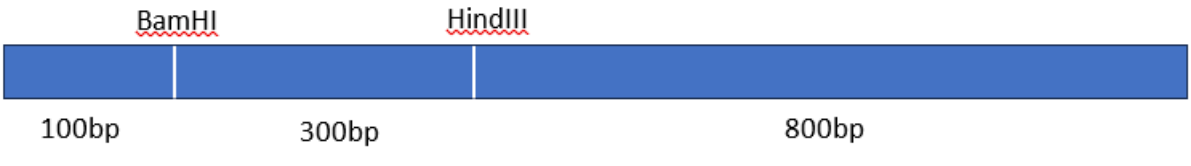


Answer: (c)

10. If you digest a double stranded linear DNA with HindIII, you are getting two fragments of 400 bp and 800 bp. If you digest the same DNA with BamHI, you are getting two fragments of 300bp and 900 bp. When you are digesting the DNA with both HindIII and BamI, you are getting three fragments of 300 bp, 100 bp and 800 bp. Which one would look like the restriction map of the DNA?

(a)

(b)



(c)

(d) 

Answer: (d)