What do the initials DNA stand for?

**DNA History:**

1940's:

1947: Chargaff
   Chargaff's Rule

1950's:

Early 1950's: Rosalind Franklin:
   X-ray crystallography of DNA

1952: Hershey & Chase: (p. 185; Fig. 10.1)
   Discovered DNA is the genetic material of bacteriophages (p. 183; Fig. 10.0)
   Bacteriophages are viruses that infect bacteria (bacteria eaters)
   Conclusions: viral DNA injected into bacteria, which made more viruses

1953: Watson & Crick:
   Used information from Franklin's X-ray photos to make a wire scale model
   Conclusions:

Late 1950's: Messelson & Stahl
   Working with bacteria (E. coli)
   Confirmed Watson & Crick's model for DNA replication

**Brief review of DNA structure:**
DNA is a polymer of?

**Components of a nucleotide:** (p. 186; Fig. 10.2A)
  a)
  b)
  c)
Two classes of nitrogenous bases: (p. 187; Fig. 10.2 B & C)

a) **Purines**
   1) 
   2) 

b) **Pyrimidines**
   1) 
   2) 
   3) 

Which nitrogenous base is only found in RNA?

Which nitrogenous base is only found in DNA?

Which nitrogenous bases are found in both DNA and RNA?

**Base pairing of nitrogenous bases (Chargaff's Rule):**

<table>
<thead>
<tr>
<th>Purines</th>
<th>Pyrimidines</th>
<th>Base pairs</th>
<th># of H-bonds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenine (A)</td>
<td>Thymine (T)</td>
<td>A = T</td>
<td></td>
</tr>
<tr>
<td>Guanine (G)</td>
<td>Cytosine (C)</td>
<td>G = C</td>
<td></td>
</tr>
</tbody>
</table>

Adenine comprises 20% of the nitrogenous bases in the DNA of a particular organism. What percentage does cytosine comprise?

**DNA structure:**
Double helix - shaped like a ladder (p. 189; Fig. 10.3C)

   a) Backbone (legs) of the ladder composed of:
   
   b) Rungs of the ladder composed of:

Double helix: 2 nm, suggested 2 strands
10 nucleotide pairs in each helix turn

DNA strands are **antiparallel** (p. 191; Fig. 10.5B)

Why would a cell undergo DNA replication?

What phase of the cell cycle does DNA replication take place? (p. 131; Fig. 8.5)
DNA Replication (synthesis):

Enzymes involved in DNA replication:

- helicase, single strand binding protein, primase:
  - DNA polymerase:  
    a)  
    b)  
    c)  
- DNA ligase:

Origins of replication: (p. 191; Fig. 10.5A)

Replication bubble:

Eukaryotes: thousands of replication bubbles
  Why?

Replication Fork: (p. 191; Fig. 10.5C)
Replication bubble creates a Y-shaped region

Replication will spread in both directions:

Priming for DNA Replication:
Before DNA polymerase can begin work on the daughter strands, a primer must be laid first.

Which enzyme produces the primer?

What type of molecule is the primer?

Synthesis of the new DNA strands:
Once the RNA primers are in place, DNA polymerase can go to work.

DNA polymerase catalyses the synthesis of the new strands:
  Direction of synthesis: _______________________

Why?
  Leading strand:

  A different DNA polymerase will come and convert the RNA primer to DNA nucleotides

  Lagging strand:

  Okazaki’s fragments:
Role of DNA ligase:

**Semi-conservative model for DNA Replication:**
Watson & Crick suggested & Meselson & Stahl confirmed:

```
DNA template
           ↓
           ↓
New DNA strand
New DNA strand
           ↓
           ↓
DNA template
```

**Proofreading:**

**DNA Repair:**
Damage to DNA through:

Excision repair:

**DNA Technology:**

- **Recombinant DNA technology:**

- **Polymerase Chain Reactions (PCR):** p. 242; Fig. 12.12

- **Restriction Fragment Length Polymorphism (RFLP):**

  Restriction enzymes:

  Use of RFLP’s: