1. The two long sides of the DNA ladder are made of a repeating…

   ☐ chain of amino acids

   ☐ string of metals

   ☐ sugar-phosphate backbone

   ☐ row of fatty acids

2. Why must a cell copy its DNA before dividing?

   ☐ to send a hormone to other cells

   ☐ so each daughter cell gets a full set of DNA

   ☐ to make ATP for the division

   ☐ to break down glucose for energy

3. **Transcription** copies a gene from DNA into…

   ☐ messenger RNA (mRNA)

   ☐ ATP

   ☐ a lipid

   ☐ a protein

4. **Translation** builds a protein by reading…

   ☐ glucose into ATP for energy

   ☐ the mRNA into a chain of amino acids

   ☐ DNA into more copies of DNA

   ☐ a protein back into its DNA code

5. **Gene expression** means…

   ☐ a gene being switched on to make its product

   ☐ copying all the DNA before division

   ☐ a cell dividing into two new cells

   ☐ a gene being deleted from the DNA

6. An unspecialized cell that can develop into many cell types is a _____ cell.

   _____

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   _____

8. Moving a gene from one organism into another is called genetic _____.

   _____

9. The repeating unit of a nucleic acid – a sugar, phosphate, and base – is a _____.

   _____

10. Because each new DNA keeps one old strand, replication is called _____-conservative.

    _____

1. **sugar-phosphate backbone**

   Each strand's backbone is an alternating **sugar-phosphate** chain; the bases stick out from it.

2. **so each daughter cell gets a full set of DNA**

   Replication ensures both daughter cells receive a complete, identical copy of the DNA.

3. **messenger RNA (mRNA)**

   Transcription makes an **mRNA** copy of one gene, which can leave the nucleus.

4. **the mRNA into a chain of amino acids**

   Translation reads the mRNA message and builds the matching chain of amino acids – a protein.

5. **a gene being switched on to make its product**

   Gene expression is a gene being used – transcribed and translated to make its protein.

6. **stem**

   A **stem cell** has not yet specialized, so it can still become many different cell types.

7. **mutagen**

   A **mutagen** – UV light, radiation, or certain chemicals – makes mutations more likely.

8. **engineering**

   Genetic engineering transfers a gene between organisms – for example, putting a human gene into bacteria.

9. **nucleotide**

   Each **nucleotide** is one sugar + one phosphate + one base; many joined make a strand.

10. **semi**

    Replication is **semi-conservative**: each copy has one original strand and one new strand.

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