READ THE PASSAGE AND ANSWER THE QUESTIONS THAT FOLLOW:

In a development that blurs the line between science fiction and reality, researchers at a biotechnology startup have announced the birth of animals genetically engineered to resemble dire wolves—an extinct species that last walked the Earth over 10,000 years ago. Named Romulus, Remus, and Khaleesi, the pups are tributes to ancient mythology and pop culture. Although labeled as "de-extincted," these canines are not pure dire wolves, but rather genetically modified organisms derived from gray wolves.

Dire wolves were formidable predators that roamed North and South America during the Pleistocene epoch, spanning approximately 2.6 million to 11,700 years ago. Fossils of these creatures have been frequently discovered at sites like the La Brea Tar Pits in California. Compared to their closest modern relative, the gray wolf, dire wolves were noticeably larger, with broader skulls and more robust teeth.

The biotechnology company behind this experiment, Colossal Biosciences, has been involved in high-profile efforts to "revive" extinct species such as woolly mammoths and dodos. Although their work with dire wolves was not publicized until now, it represents a continuation of their mission to reconstruct extinct genomes and recreate related animals through gene editing.

To accomplish this, scientists sequenced DNA from two ancient dire wolf fossils—one over 13,000 years old and the other approximately 72,000 years old. However, retrieving usable DNA was challenging due to poor preservation in non-arctic climates. Once extracted, the DNA was compared with the genome of gray wolves. Researchers identified specific gene variations linked to dire wolf traits, such as body size, head shape, tooth structure, and fur color.

These traits were artificially inserted into gray wolf egg cells—after removing the original genetic material. The modified cells were placed into the wombs of large dog breeds. All three surviving pups were born through cesarean section, with one additional pup dying from a non-genetic cause.

While Colossal Biosciences hails this as a breakthrough in "de-extinction," some scientists urge caution. Since the pups do not possess 100% dire wolf DNA, critics argue that these animals are closer to hybrids than true revivals. Regardless, the achievement raises pressing questions about genetics, ethics, and the future of conservation.

https://www.downtoearth.org.in/wildlife-biodiversity/return-of-the-dire-wolf-is-an-impressive-feat-of-genetic-engineering-not-a-reversal-of-extinction

Answer the following questions:

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1. Select the option that best reflects the *central conflict* highlighted in the passage.
[1 mark]
(A) The gap between ancient mythology and scientific research
(B) Ethical concerns surrounding partial genetic reconstruction
(C) The failure of gene editing in commercial animal breeding
(D) Legal battles over ownership of animal genomes

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2. Based on the passage, what does the author imply about the term "de-extinction" as used by Colossal Biosciences? [1 mark]
(A) It refers to creating new animal breeds using wild DNA
(B) It accurately describes the revival of any animal using cloning
(C) It is a debated term since the recreated animals are not genetically identical to the extinct species
(D) It applies only to animals recreated from complete ancient genomes

3. The researchers used DNA from two dire wolf specimens—one over 13,000 years old, the other 72,000 years old. What does this suggest about the challenges of genetic recovery, and what does the team's success imply about the current state of biotechnology? Answer in 40–50 words. [2 marks]

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4. What ethical dilemma arises from reviving extinct species in modified forms? Discuss in light of Romulus, Remus, and Khaleesi's creation. Answer in about 50 words. [2 marks]

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5. Which of the following best explains why Romulus, Remus, and Khaleesi are not considered "true" dire wolves by some scientists? [1 mark]

(A) They were born in captivity rather than the wild
(B) Their behavior differs from historical wolf data
(C) Their DNA was partially reconstructed using gray wolf genes, not fully restored from dire wolves
(D) They lack the ability to hunt like ancient predators

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6. In what way does the passage reflect the tension between scientific innovation and public imagination? Choose the best option. [1 mark]

(A) It shows how extinct animals are dangerous when revived
(B) It highlights how the media misrepresents genetic research
(C) It explores how popular culture (like *Game of Thrones*) shapes public perception of science, while the scientific reality is far more nuanced
(D) It demonstrates that science is always a few decades behind imagination

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7. In the phrase *"raises pressing questions about genetics, ethics, and the future of conservation,"* what tone does the author convey regarding the breakthrough? [1 mark]

(A) Critical and dismissive
(B) Optimistic and celebratory
(C) Balanced and cautiously reflective
(D) Indifferent and factual

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8. Based on the context, choose the best synonym for *approximates* in the line: *"…creating a creature that closely approximates their target."* [1 mark]

(A) Replaces
(B) Imitates
(C) Duplicates
(D) Enhances

Answer Key

1. (B) Ethical concerns surrounding partial genetic reconstruction of extinct species
This best captures the main conflict regarding what counts as “de-extinction.”

2. (C) It is a debated term since the recreated animals are not genetically identical to the extinct species
Scientists questioned the accuracy of calling them “de-extincted.”

3.
Answer (Sample – 2 marks):
The use of ancient DNA samples, especially one as old as 72,000 years, highlights the difficulty of recovering well-preserved genetic material. The team’s ability to sequence and edit this DNA shows how advanced biotechnology has become, enabling partial revival of extinct traits through gene editing.

4.
Answer (Sample – 2 marks):
Recreating animals like Romulus, Remus, and Khaleesi raises ethical concerns about authenticity and animal welfare. These creatures resemble dire wolves but are genetically modified hybrids, prompting questions about whether such creations are truly "revived" species or artificially designed organisms.

5. (C) Their DNA was partially reconstructed using gray wolf genes, not fully restored from dire wolves
This is why many scientists are skeptical of calling them true dire wolves.

6. (C) It explores how popular culture (like Game of Thrones) shapes public perception of science, while the scientific reality is far more nuanced
References to Romulus, Remus, and Khaleesi support this option.

7. (C) Balanced and cautiously reflective
The tone is measured and thoughtful, recognizing the excitement and concerns alike.

8. (B) Imitates
“Approximates” here means coming close to or imitating the original target.