Choose the **correct IUPAC name**.

Q1

$CH_3–CH(Br)–CH(CH_3)–CH_2–CH_3$

A. 2-bromo-3-methylpentane
B. 3-methyl-2-bromopentane
C. 4-bromo-3-methylpentane
D. 2-methyl-3-bromopentane

Q2

$CH_3–C(CH_3)_2–CH_2–CH(Cl)–CH_3$

A. 4-chloro-2,2-dimethylpentane
B. 2,2-dimethyl-4-chloropentane
C. 2-chloro-4,4-dimethylpentane
D. 4-chloro-3,3-dimethylpentane

Q3

$CH_2=CH–CH(CH_3)–CH_3$

A. 3-methylbut-1-ene
B. 2-methylbut-1-ene
C. 3-methylbut-2-ene
D. 2-methylbut-2-ene

Q4

$CH_3–CH=CH–C\equiv C–CH_3$

A. hex-4-en-2-yne
B. hex-2-en-4-yne
C. hex-2-yne-4-ene
D. hex-4-yne-2-ene

Q5

$CH_2=CH–C\equiv C–CH(CH_3)–CH_3$

A. 5-methylhex-1-en-3-yne
B. 2-methylhex-5-en-3-yne
C. 5-methylhex-3-en-1-yne
D. 2-methylhex-1-en-3-yne

Q6

Substituents: bromo + dimethyl

Correct order?

A. dimethyl before bromo
B. bromo before dimethyl
C. depends on numbering
D. alphabetical doesn't apply

Q7

Choose the **correct structure** for the name.

Q1

3-methylpent-1-ene

A. $CH_3–CH=CH–CH(CH_3)–CH_3$
B. $CH_2=CH–CH(CH_3)–CH_2–CH_3$
C. $CH_2=CH–CH_2–CH(CH_3)–CH_3$
D. $CH_3–CH_2–CH(CH_3)–CH=CH_2$

Q2

4-bromo-2-methylpentane

A. $CH_3–CH_2–CH(CH_3)–CH(Br)–CH_3$
B. $CH_3–CH(CH_3)–CH(Br)–CH_2–CH_3$
C. $CH_3–CH(CH_3)–CH_2–CH(Br)–CH_3$
D. $CH_3–CH_2–CH(Br)–CH(CH_3)–CH_3$

Q3

hex-2-en-4-yne

A. $CH_3–C\equiv C–CH=CH–CH_3$
B. $CH_3–CH=CH–C\equiv C–CH_3$
C. $CH_2=CH–C\equiv C–CH_2–CH_3$
D. $CH_3–CH=CH–CH_2–C\equiv CH$

Q4

5-methylhex-1-en-3-yne

A. $CH_3–CH(CH_3)–C\equiv C–CH=CH_2$
B. $CH_2=CH–CH_2–C\equiv C–CH(CH_3)$
C. $CH_2=CH–C\equiv C–CH(CH_3)–CH_3$
D. $CH_3–C\equiv C–CH=CH–CH(CH_3)$

Q5

2,2-dimethylbutane

A. $CH_3–CH(CH_3)–CH(CH_3)–CH_3$
B. $CH_3–C(CH_3)_2–CH_2–CH_3$
C. $CH_3–CH_2–C(CH_3)_2–CH_3$
D. $CH_3–C(CH_3)_2–CH(CH_3)–CH_3$

Q6

3-chlorobut-1-ene

A. $CH_3–CH=CH–CH_2Cl$
B. $CH_2=CH–CH_2–CH_2Cl$
C. $CH_3–CH(Cl)–CH=CH_2$
D. $CH_2=CH–CH(Cl)–CH_3$

Q7

Q9 A compound has molecular formula $\mathbf{C_6H_{10}}$ and contains:

- one double bond
- one triple bond

(a) Draw **TWO different structures** that satisfy this.
(b) Name both using correct IUPAC rules.
(c) Identify which would be numbered to give the **double bond priority** and explain why.

Q10 A compound is named:

4-chloro-2,2-dimethylpent-3-ene

(a) Draw the structure.
(b) Explain why the chain is numbered from that direction.
(c) State the rule used to order "chloro" and "dimethyl".

Q11 Consider the structure:

$CH_3–CH=CH–C\equiv C–CH(CH_3)–CH_3$

(a) Identify the correct parent chain.
(b) Number the chain and justify your choice.
(c) Give the full IUPAC name.
(d) Explain why an alternative numbering is incorrect.

Q12 Two students name the same compound:

$CH_3–C\equiv C–CH=CH–CH_3$

- Student A: hex-4-en-2-yne
- Student B: hex-2-en-4-yne

(a) Identify the correct name.
(b) Explain the mistake made by the incorrect student.
(c) State the rule that resolves this ambiguity.

Q13 A compound has:

- 7 carbons in the longest chain
- but only 6 carbons in a chain containing both multiple bonds

(a) Which chain should be chosen and why?
(b) Give a general rule for selecting the parent chain.

Which parent chain is correct?

A. Longest carbon chain always
B. Chain with most substituents
C. Chain with most multiple bonds
D. Chain with most halogens

Q8

$CH_3–C≡C–CH=CH–CH_2–CH_3$

A. hept-2-yne-4-ene
B. hept-4-en-2-yne
C. hept-2-en-4-yne
D. hept-4-yne-2-ene

Q9

$CH_3–CH(Cl)–CH_2–CH(Br)–CH_3$

A. 2-bromo-4-chloropentane
B. 4-bromo-2-chloropentane
C. 2-chloro-4-bromopentane
D. 4-chloro-2-bromopentane

Q10

$CH_3–CH_2–C≡C–CH_3$

A. pent-3-yne
B. pent-2-yne
C. pent-1-yne
D. pent-yne

4-methylpent-2-yne

A. $CH_3–CH(CH_3)–C≡C–CH_3$
B. $CH_3–C≡C–CH(CH_3)–CH_3$
C. $CH_3–CH_2–C≡C–CH(CH_3)$
D. $CH_3–C≡C–CH_2–CH(CH_3)$

Q8

2-bromo-3-chloropentane

A. $CH_3–CH_2–CH(Br)–CH(Cl)–CH_3$
B. $CH_3–CH(Cl)–CH(Br)–CH_2–CH_3$
C. $CH_3–CH(Br)–CH(Cl)–CH_2–CH_3$
D. $CH_3–CH(Br)–CH_2–CH(Cl)–CH_3$

Q14 (synthesis of rules)

Draw a structure that matches:

3-bromo-5-methylhex-1-en-4-yne

Then:

(a) Verify your numbering

(b) Circle the parent chain

(c) Explain how you ensured correct substituent ordering

1. A
2. A
3. A
4. B
5. A
6. B
7. C
8. B
9. D
10. B

Q1: 3-methylpent-1-ene

Answer: B

- **Double bond must be at C1 → starts CH_2=CH–**
- **Methyl at C3**

✔ Matches: CH_2=CH–CH(CH_3)–CH_2–CH_3

Q2: 4-bromo-2-methylpentane

Answer: C

- **Methyl at C2**
- **Bromo at C4**
- **Correct numbering direction used**

Q3: hex-2-en-4-yne

Answer: B

- **Double bond at C2**
- **Triple bond at C4**
- **Correct order: -en before -yne**

Q4: 5-methylhex-1-en-3-yne

Answer: C

- **Double at 1 → CH_2=**
- **Triple at 3**
- **Methyl at 5**

Q5: 2,2-dimethylbutane

Answer: B

- **Two methyl groups on C2**

Q6: 3-chlorobut-1-ene

Answer: D

- **Double bond at C1**
- **Cl at C3**

Q7: 4-methylpent-2-yne

Answer: B

- **Triple bond at C2**
- **Methyl at C4**

Q8: 2-bromo-3-chloropentane

Answer: C

- **Br at C2, Cl at C3**
- **Alphabetical order doesn't affect positions, only naming**

9 TWO valid structures

Any correct answer must:

- have **6 carbons**
- contain **1 C=C and 1 C≡C**
- satisfy valency

Structure 1

CH_2=CH–CH_2–C≡C–CH_3

Structure 2

CH_3–CH=CH–C≡C–CH_3

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10 Correct IUPAC names

Structure 1

CH_2=CH–CH_2–C≡C–CH_3
Number from double bond end:

hex-1-en-4-yne

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11 Structure 2

CH_3–CH=CH–C≡C–CH_3
Numbering gives lowest set from FPOD:

hex-2-en-4-yne

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12 Which numbering gives double bond priority + why

Correct answer: hex-2-en-4-yne

The structure is numbered so that the **double bond gets the lowest possible number** when there is a tie between multiple bond directions.

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13 Explanation (exam wording)

When numbering enynes:

- First minimise the **set of locants for multiple bonds**
- If there is a tie, the **double bond (-ene) gets priority over the triple bond (-yne)**

This is because:

- Double bonds are considered **higher priority in IUPAC nomenclature than triple bonds** for numbering purposes.

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14 Applied to this question:

- Both directions give {1,4} or {2,4}
- So choose direction giving **double bond the lowest number**