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| 1. Approximately how long is a C−C single bond of an alkane?

|  |  |  |
| --- | --- | --- |
|   | a.  | 111 pm |
|   | b.  | 134 pm |
|   | c.  | 142 pm |
|   | d.  | 153 pm |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 2. What is the approximate C−C−C bond angle in propane?

|  |  |  |
| --- | --- | --- |
|   | a.  | 90° |
|   | b.  | 109° |
|   | c.  | 120° |
|   | d.  | 180° |

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| *ANSWER:* | b |
| *POINTS:* | 1 |
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| 3. What is the name of the linear hydrocarbon with the molecular formula C7H16?

|  |  |  |
| --- | --- | --- |
|   | a.  | hexane |
|   | b.  | heptane |
|   | c.  | decane |
|   | d.  | undecane |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 4. What is the name of the linear hydrocarbon with the molecular formula C11H24?

|  |  |  |
| --- | --- | --- |
|   | a.  | heptane |
|   | b.  | decane |
|   | c.  | undecane |
|   | d.  | eicosane |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 5. How many hydrogen atoms are there in nonane, the linear hydrocarbon with nine carbon atoms?

|  |  |  |
| --- | --- | --- |
|   | a.  | 16 |
|   | b.  | 18 |
|   | c.  | 20 |
|   | d.  | 22 |

|  |  |
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| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 6. How many hydrogen atoms are there in dodecane, the linear hydrocarbon with twelve carbon atoms?

|  |  |  |
| --- | --- | --- |
|   | a.  | 12 |
|   | b.  | 20 |
|   | c.  | 24 |
|   | d.  | 26 |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 7. How many constitutional isomers are there with the molecular formula C4H10?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2 |
|   | b.  | 3 |
|   | c.  | 4 |
|   | d.  | 5 |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 8. How many constitutional isomers are there with the molecular formula C5H12?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2 |
|   | b.  | 3 |
|   | c.  | 4 |
|   | d.  | 5 |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 9. How many constitutional isomers are there with the molecular formula C6H14?

|  |  |  |
| --- | --- | --- |
|   | a.  | 3 |
|   | b.  | 4 |
|   | c.  | 5 |
|   | d.  | 8 |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 10. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | 3-propylpentane |
|   | b.  | 1,1-diethylpropane |
|   | c.  | 3-ethylhexane |
|   | d.  | isooctane |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 11. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2-ethyl-4-methylpentane |
|   | b.  | 2,4-dimethylhexane |
|   | c.  | 3,5-dimethylhexane |
|   | d.  | 1,1,3-trimethylpentane |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 12. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2,2-dimethyl-4-ethylheptane |
|   | b.  | 4-ethyl-2,2-dimethyl-heptane |
|   | c.  | 6,6-dimethyl-4-ethylheptane |
|   | d.  | 4-ethyl-6,6-dimethyl-heptane |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 13. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | 5,5-dimethyl-3-ethylheptane |
|   | b.  | 5-ethyl-3,3-dimethyl-heptane |
|   | c.  | 3,3-dimethyl-5-ethylheptane |
|   | d.  | 3-ethyl-5,5-dimethyl-heptane |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 14. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2-isopropyl-5-methylpentane |
|   | b.  | 5-isopropyl-2-methylpentane |
|   | c.  | 2,3,5-trimethylhexane |
|   | d.  | 1,2-diisopropylpropane |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 15. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2,4-dimethyl-3-isopropyl-pentane |
|   | b.  | 3-isopropyl-1,5-dimethylpentane |
|   | c.  | 3-isopropyl-2,4-dimethylpentane |
|   | d.  | triisopropylmethane |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 16. Which of the following compounds has 1°, 2°, 3° and 4° carbon atoms?

|  |  |  |
| --- | --- | --- |
|   | a.  | hexane |
|   | b.  | 2-methylhexane |
|   | c.  | 2,2-dimethylhexane |
|   | d.  | 2,2,3-trimethylhexane |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 17. Which of the following compounds has only 1° and 3° carbon atoms?

|  |  |  |
| --- | --- | --- |
|   | a.  | hexane |
|   | b.  | 2-methylpentane |
|   | c.  | 3-methylpentane |
|   | d.  | 2,3-dimethylbutane |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 18. What is the correct assignment of common names for the following molecules?

|  |  |  |
| --- | --- | --- |
|   | a.  | *i* = butane; *ii* = neopentane; *iii* = isopentane |
|   | b.  | *i* = neobutane; *ii* = isobutane; *iii* = pentane |
|   | c.  | *i* = butane; *ii* = isobutane; *iii* = isopentane |
|   | d.  | *i* = butane; *ii* = isobutane; *iii* = neopentane |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 19. What is the correct assignment of common names for the following molecules?

|  |  |  |
| --- | --- | --- |
|   | a.  | *i* = pentane; *ii* = isopentane; *iii* = neopentane |
|   | b.  | *i* = neopentane; *ii* = isopentane; *iii* = pentane |
|   | c.  | *i* = pentane; *ii* = neopentane; *iii* = isopentane |
|   | d.  | *i* = neopentane; *ii* = pentane; *iii* = isopentane |

|  |  |
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| *ANSWER:* | a |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 20. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1-isopropyl-4,6-dimethylcyclohexane |
|   | b.  | 1-isopropyl-2,4-dimethylcyclohexane |
|   | c.  | 4-isopropyl-1,3-dimethylcyclohexane |
|   | d.  | 4-isopropyl-1,5-dimethylcyclohexane |

|  |  |
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| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 21. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1-methylbicyclo[2.2.1]heptane |
|   | b.  | 2-methylbicyclo[2.2.1]heptane |
|   | c.  | 3-methylbicyclo[2.2.1]heptane |
|   | d.  | 4-methylbicyclo[2.2.1]heptane |

|  |  |
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| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 22. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | bicyclo[4.3]nonane |
|   | b.  | bicyclo[4.3.0]nonane |
|   | c.  | bicyclo[6.5]nonane |
|   | d.  | bicyclo[6.5.0]nonane |

|  |  |
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| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 23. What is the IUPAC name for the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | cycloheptane |
|   | b.  | bicyclo[3.2.0]heptane |
|   | c.  | bicyclo[5.4]heptane |
|   | d.  | cyclobutylcyclopentane |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 24. What is the IUPAC name for the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | bicyclo[5.4.3]octane |
|   | b.  | bicyclo[3.2.1]octane |
|   | c.  | bicyclo[3.2.1]hexane |
|   | d.  | bicyclo[2.2.1]octane |

|  |  |
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| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 25. Which of the following Newman projections does *not* represent 2-methylhexane?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 26. Which of the following Newman projections represents 2,4-dimethylpentane?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

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| 27. Which of the following Newman projections represents the most stable conformation of 2,3-dimethylbutane?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

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| *ANSWER:* | c |
| *POINTS:* | 1 |
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| 28. Which of the following Newman projections represents the most stable conformation of 2-methylbutane?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

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| 29. Which of the following cycloalkanes has the most ring strain?

|  |  |  |
| --- | --- | --- |
|   | a.  | cyclopropane |
|   | b.  | cyclobutane |
|   | c.  | cyclopentane |
|   | d.  | cyclohexane |

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| 30. Which of the following cycloalkanes has the least ring strain?

|  |  |  |
| --- | --- | --- |
|   | a.  | cyclopropane |
|   | b.  | cyclopentane |
|   | c.  | cyclohexane |
|   | d.  | cycloheptane |

|  |  |
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| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 31. Which of the following structures represents *trans-*1,3-dimethylcyclohexane?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 32. Which of the following structures represents *trans-*1,2-dimethylcyclohexane?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
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| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 33. Which of the following is the most stable conformation of *cis-*1-isopropyl-3-methylcyclohexane?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 34. Which of the following is the most stable conformation of *trans-*1-ethyl-3-methylcyclohexane?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 35. Which of the following alkanes has the highest boiling point?

|  |  |  |
| --- | --- | --- |
|   | a.  | propane |
|   | b.  | butane |
|   | c.  | pentane |
|   | d.  | hexane |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 36. Which of the following alkanes has the highest boiling point?

|  |  |  |
| --- | --- | --- |
|   | a.  | 2,3-dimethylbutane |
|   | b.  | 2-methylpentane |
|   | c.  | 3-methylpentane |
|   | d.  | hexane |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 37. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | *trans-*1-isopropyl-4-methylcyclohexane |
|   | b.  | *cis-*1-isopropyl-4-methylcyclohexane |
|   | c.  | *cis-*2-isopropyl-5-methylcyclohexane |
|   | d.  | *cis-*1-*tert*-butyl-4-methylcyclohexane |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 38. What is the IUPAC name of the following compound?

|  |  |  |
| --- | --- | --- |
|   | a.  | *trans-*1-isopropyl-4-methylcyclopentane |
|   | b.  | *cis-*1-*tert*-butyl-2-methylcyclopentane |
|   | c.  | *trans-*1-*tert*-butyl-2-methylcyclopentane |
|   | d.  | *cis-*1-isopropyl-2-methylcyclopentane |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 39. Which one of the following structures represents a different compound from the other three?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 40. Which one of the following structures represents a different compound from the other three?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 41. In which of the following compounds are all of the carbon atoms in the same plane?

|  |  |  |
| --- | --- | --- |
|   | a.  | cyclopropane |
|   | b.  | cyclobutane |
|   | c.  | cyclopentane |
|   | d.  | cyclohexane |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 42. Which of the following compounds can adopt a chair conformation in which there are no axial methyl groups?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1,1-dimethylcyclohexane |
|   | b.  | *cis-*1,2-dimethylcyclohexane |
|   | c.  | *trans-*1,2-dimethylcyclohexane |
|   | d.  | *cis-*1,3-dimethylcyclohexane |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 43. Which of the following compounds can adopt a chair conformation in which there are no axial methyl groups?

|  |  |  |
| --- | --- | --- |
|   | a.  | *cis-*1,2-dimethylcyclohexane |
|   | b.  | *cis-*1,3-dimethylcyclohexane |
|   | c.  | *trans-*1,3-dimethylcyclohexane |
|   | d.  | *cis-*1,4-dimethylcyclohexane |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 44. Which of the following statements is not true regarding the conformation of substituted cyclohexanes?

|  |  |  |
| --- | --- | --- |
|   | a.  | ring inversion of cyclohexane between two chair conformations takes place via a boat conformation |
|   | b.  | substituted cyclohexanes are destabilized by 1,3-diaxial interactions |
|   | c.  | the boat conformation of cyclohexane is usually more stable than the chair conformation |
|   | d.  | the relative amount of two conformations of substituted cyclohexanes can be determined from the difference in strain energy |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 45. What is the approximate dihedral angle between the two chlorine atoms in *cis*-1,2-dichlorocyclohexane?

|  |  |  |
| --- | --- | --- |
|   | a.  | 0° |
|   | b.  | 60° |
|   | c.  | 120° |
|   | d.  | 180° |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 46. What is the approximate dihedral angle between the two chlorine atoms in the diequatorial conformation of *trans-*1,2-dichlorocyclohexane?

|  |  |  |
| --- | --- | --- |
|   | a.  | 0° |
|   | b.  | 60° |
|   | c.  | 120° |
|   | d.  | 180° |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 47. What is the approximate dihedral angle between the two chlorine atoms in the diaxial conformation of *trans-*1,2-dichlorocyclohexane?

|  |  |  |
| --- | --- | --- |
|   | a.  | 0° |
|   | b.  | 60° |
|   | c.  | 120° |
|   | d.  | 180° |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 48. Which of the following is *not* true regarding the properties of alkanes?

|  |  |  |
| --- | --- | --- |
|   | a.  | alkanes are nonpolar |
|   | b.  | alkanes burn in air to give H2O and CO2 |
|   | c.  | alkanes are highly miscible with water |
|   | d.  | the strongest intermolecular force between alkane molecules is the van der Waals interaction |

|  |  |
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| *ANSWER:* | c |
| *POINTS:* | 1 |
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| 49. Which of the following undergoes the most exothermic combustion?

|  |  |  |
| --- | --- | --- |
|   | a.  | octane |
|   | b.  | 2-methylheptane |
|   | c.  | 2,2-dimethylhexane |
|   | d.  | 2,2,3,3-tetramethylbutane |

|  |  |
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| *ANSWER:* | a |
| *POINTS:* | 1 |
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| 50. How many moles of molecular oxygen (O2) are consumed in the complete combustion of one mole of octane (C8H18)?

|  |  |  |
| --- | --- | --- |
|   | a.  | 12.5 |
|   | b.  | 13 |
|   | c.  | 17 |
|   | d.  | 26 |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 51. How many moles of molecular oxygen (O2) are consumed in the complete combustion of one mole of hexane (C6H14)?

|  |  |  |
| --- | --- | --- |
|   | a.  | 6 |
|   | b.  | 9.5 |
|   | c.  | 12.5 |
|   | d.  | 14 |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 52. Which of the following statements is *not* true?

|  |  |  |
| --- | --- | --- |
|   | a.  | Combustion of an alkane is an exothermic reaction. |
|   | b.  | The heat of combustion of propane is three times that of methane. |
|   | c.  | The constitutional isomers of C7H16 have different heats of combustion from one another |
|   | d.  | The products of combustion of an alkane are H2O and CO2. |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
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| 53. Which of the following is the steroid nucleus?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
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| 54. Which of the following cycloalkanes has the largest heat of combustion?

|  |  |  |
| --- | --- | --- |
|   | a.  | cyclopropane |
|   | b.  | cyclobutane |
|   | c.  | cyclopentane |
|   | d.  | cyclohexane |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 55. Which of the following cycloalkanes has the largest heat of combustion per carbon atom?

|  |  |  |
| --- | --- | --- |
|   | a.  | cyclopropane |
|   | b.  | cyclopentane |
|   | c.  | cyclohexane |
|   | d.  | cycloheptane |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 56. Which of the following cycloalkanes has the smallest heat of combustion per carbon atom?

|  |  |  |
| --- | --- | --- |
|   | a.  | cyclopropane |
|   | b.  | cyclopentane |
|   | c.  | cyclohexane |
|   | d.  | cycloheptane |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 57. Which of the following structures is different from the other three?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 58. Which of the following structures is different from the other three?

|  |  |  |
| --- | --- | --- |
|   | a.  | **1** |
|   | b.  | **2** |
|   | c.  | **3** |
|   | d.  | **4** |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 59. Which of the following substituted cyclohexanes has the most negative value of Δ*G*° for ring flipping from the conformation in which the substituent is axial to the one where it is equatorial?

|  |  |  |
| --- | --- | --- |
|   | a.  | methylcyclohexane |
|   | b.  | chlorocyclohexane |
|   | c.  | isopropylcyclohexane |
|   | d.  | ethynylcyclohexane |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 60. Which of the following substituted cyclohexanes has the most negative value of Δ*G*° for ring flipping from the conformation in which the substituent is axial to the one where it is equatorial?

|  |  |  |
| --- | --- | --- |
|   | a.  | fluorocyclohexane |
|   | b.  | methylcyclohexane |
|   | c.  | ethylcyclohexane |
|   | d.  | *tert-*butylcyclohexane |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 61. The Newman projection of the gauche conformation of 1,2-dichloroethane is shown below.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | True |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 62. The most stable conformation of an alkane occurs when carbon−carbon bonds are staggered and bulky groups are anti.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | True |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 63. The following pairs of Newman projections represent the same compound but in differing conformations.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | False |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 64. There are four constitutional isomers for the molecular formula C6H14.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | False |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 65. The following Newman projection represents 2-methylhexane.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | False |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 66. The following structures represent, from left to right,  a *cis* and a *trans* isomer.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | True |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 67. The following structures represent a pair of constitutional isomers.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | False |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 68. 3-methylhexylcyclopentane represents a correct IUPAC name.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | False |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 69. In the following structure the positions labeled a and d are equatorial positions.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | True |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 70. In the following conversion,  the conformations are of equal stability.

|  |  |  |
| --- | --- | --- |
|   | a.  | True |
|   | b.  | False |

|  |  |
| --- | --- |
| *ANSWER:* | True |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | True / False |
| *HAS VARIABLES:* | False |
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| 71. The correct IUPAC name for the following compound is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| *ANSWER:* | 3-methyl-5-(1-methylethyl)octane3-methyl-5-isopropyloctane |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Completion |
| *HAS VARIABLES:* | False |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 72. The tertiary carbon atom in the following structure is indicated by the letter\_\_\_\_\_.

|  |  |
| --- | --- |
| *ANSWER:* | bB |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Completion |
| *HAS VARIABLES:* | False |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Match the Newman projection for the conformation of 2-methylbutane to the indicated position on the potential energy diagram.                                      ​

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **A** | **B** | **C** | **D** |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 73. Conformation A is represented by Roman numeral \_\_\_\_.

|  |  |
| --- | --- |
| *ANSWER:* | II |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Completion |
| *HAS VARIABLES:* | False |
| *PREFACE NAME:* | PE Diagram |
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| 74. Conformation B is represented by Roman numeral \_\_\_\_.

|  |  |
| --- | --- |
| *ANSWER:* | III |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Completion |
| *HAS VARIABLES:* | False |
| *PREFACE NAME:* | PE Diagram |
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| 75. Conformation C is represented by Roman numeral \_\_\_\_.

|  |  |
| --- | --- |
| *ANSWER:* | IV |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Completion |
| *HAS VARIABLES:* | False |
| *PREFACE NAME:* | PE Diagram |
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| 76. Conformation D is represented by Roman numeral \_\_\_\_.

|  |  |
| --- | --- |
| *ANSWER:* | I |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Completion |
| *HAS VARIABLES:* | False |
| *PREFACE NAME:* | PE Diagram |
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| 77. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | 4-ethyl-2-methylhexane |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 78. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | 3-ethyl-2-methylhexane |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 79. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | 2,4,4-trimethylhexane |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 80. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | 2,2,4-trimethylhexane |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 81. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | bicyclo[4.2.0]octane |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 82. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | bicyclo[2.2.1]heptane |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 83. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | *cis*-1-*tert*-butyl-2-methylcyclohexane*[ignoring absolute stereochemistry in Chap 2]* |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 84. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | *cis*-1-isopropyl-3-methylcyclohexane*[ignoring absolute stereochemistry in Chap 2]* |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 85. How many hydrogen atoms are there in decane?

|  |  |
| --- | --- |
| *ANSWER:* | 22 |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
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| 86. How many hydrogen atoms are there in octane?

|  |  |
| --- | --- |
| *ANSWER:* | 18 |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 87. What are the common and IUPAC names of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | *common:* neopentane*IUPAC:* 2,2-dimethylpropane |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 88. What are the common and IUPAC names of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | *common:* isopentane*IUPAC:* 2-dimethylbutane |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 89. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | butanal |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 90. What is the IUPAC name of the following compound?

|  |  |
| --- | --- |
| *ANSWER:* | butanone |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 91. Provide a line-bond structure of hexanoic acid.

|  |  |
| --- | --- |
| *ANSWER:* |  |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 92. Provide a line-bond structure of pentanal.

|  |  |
| --- | --- |
| *ANSWER:* |  |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 93. Provide a Newman projection of the most stable conformation of 2-methylpentane, (CH3)2CHCH2CH2CH3, looking along the C2-C3 bond

|  |  |
| --- | --- |
| *ANSWER:* |  |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 94. Provide a Newman projection of the most stable conformation of 3-methylpentane, CH3CH2CH(CH3)CH2CH3 looking along the C2-C3 bond.

|  |  |
| --- | --- |
| *ANSWER:* |  |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 95. Provide a neatly drawn plot of energy versus dihedral angle for rotation around the C2-C3 bond of butane.

|  |  |
| --- | --- |
| *ANSWER:* |  |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 96. Provide a neatly drawn plot of energy versus dihedral angle for rotation around the C-C bond of ethane.

|  |  |
| --- | --- |
| *ANSWER:* |  |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Subjective Short Answer |
| *HAS VARIABLES:* | False |
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| 97. Identify the constitutional isomer with the molecular formula C7H16.​

|  |  |  |
| --- | --- | --- |
|   | a.  | Only I |
|   | b.  | Only I and II |
|   | c.  | Only II |
|   | d.  | I, II, and III |

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 98. The molecular formulas of neopentane and isobutane are \_\_\_\_\_ and \_\_\_\_\_, respectively.

|  |  |  |
| --- | --- | --- |
|   | a.  | C5H12; C4H8 |
|   | b.  | C5H10; C4H10 |
|   | c.  | C5H12; C4H11 |
|   | d.  | C5H12; C4H10 |

|  |  |
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| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
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| 99. The total numbers of 2⁰ and 3⁰ carbon atoms in the following structure are \_\_\_\_\_ and \_\_\_\_\_, respectively.​

|  |  |  |
| --- | --- | --- |
|   | a.  | 3; 7 |
|   | b.  | 7; 4 |
|   | c.  | 4; 6 |
|   | d.  | 6; 4 |

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 100. What is “X” in the following reaction?​

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| 101. What is “X” in the following reaction?​

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| *DATE MODIFIED:* | 4/11/2017 8:09 AM |

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| 102. What is “X” in the following reaction?​

|  |  |  |
| --- | --- | --- |
|   | a.  |  |
|   | b.  |  |
|   | c.  |  |
|   | d.  |  |

|  |  |
| --- | --- |
| *ANSWER:* | d |
| *POINTS:* | 1 |
| *QUESTION TYPE:* | Multiple Choice |
| *HAS VARIABLES:* | False |
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| *DATE MODIFIED:* | 4/19/2017 12:56 AM |

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| Match the structures with their IUPAC names.

|  |  |  |  |
| --- | --- | --- | --- |
| a.  |  | b.  |  |
| c.  |  |  |  |

|  |  |
| --- | --- |
| *QUESTION TYPE:* | Matching |
| *HAS VARIABLES:* | False |
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| 103. 3-ethyl-2-methylhexane

|  |  |
| --- | --- |
| *ANSWER:* | a |
| *POINTS:* | 1 |

 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 104. 4-ethyl-2,2-dimethylhexane

|  |  |
| --- | --- |
| *ANSWER:* | b |
| *POINTS:* | 1 |

 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 105. 4-ethyl-2-methylhexane

|  |  |
| --- | --- |
| *ANSWER:* | c |
| *POINTS:* | 1 |

 |