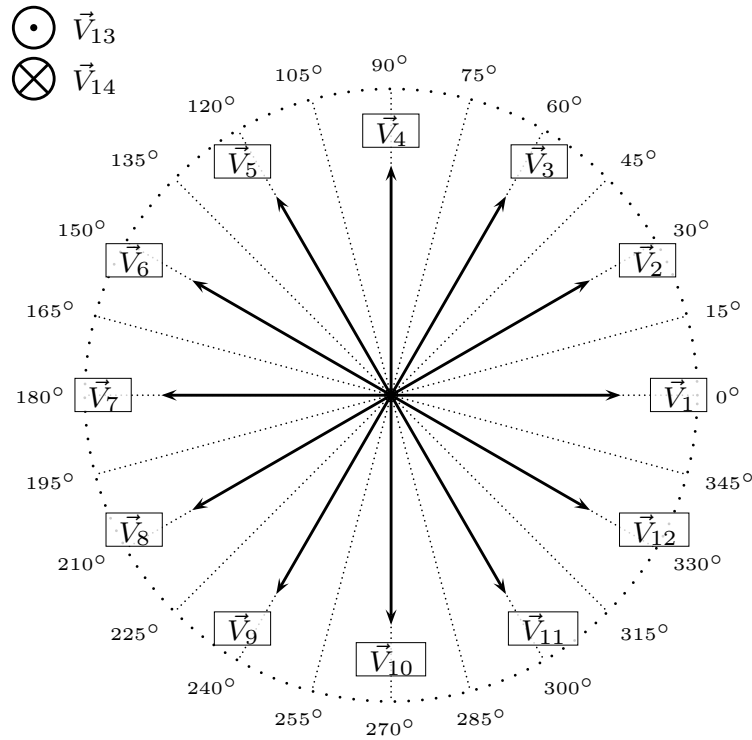


Entraînement Produits Vectoriels



Questions

Dans cette partie, on ignore la norme des vecteurs et on ne se concentre que sur la direction et le sens.

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|---|--|--|--|
| 1. $\vec{V}_{13} \wedge \vec{V}_{13} = \dots$ | 11. $\vec{V}_2 \wedge \vec{V}_{14} = \dots$ | 21. $\vec{V}_7 \wedge \vec{V}_{10} = \dots$ | 31. $\vec{V}_{14} \wedge \vec{V}_2 = \dots$ |
| 2. $\vec{V}_{13} \wedge \vec{V}_{12} = \dots$ | 12. $\vec{V}_5 \wedge \vec{V}_{10} = \dots$ | 22. $\vec{V}_8 \wedge \vec{V}_9 = \dots$ | 32. $\vec{V}_{13} \wedge \vec{V}_{14} = \dots$ |
| 3. $\vec{V}_2 \wedge \vec{V}_{12} = \dots$ | 13. $\vec{V}_{14} \wedge \vec{V}_{14} = \dots$ | 23. $\vec{V}_{13} \wedge \vec{V}_5 = \dots$ | 33. $\vec{V}_4 \wedge \vec{V}_3 = \dots$ |
| 4. $\vec{V}_1 \wedge \vec{V}_1 = \dots$ | 14. $\vec{V}_8 \wedge \vec{V}_{13} = \dots$ | 24. $\vec{V}_5 \wedge \vec{V}_8 = \dots$ | 34. $\vec{V}_{11} \wedge \vec{V}_2 = \dots$ |
| 5. $\vec{V}_{11} \wedge \vec{V}_6 = \dots$ | 15. $\vec{V}_5 \wedge \vec{V}_4 = \dots$ | 25. $\vec{V}_4 \wedge \vec{V}_5 = \dots$ | 35. $\vec{V}_{13} \wedge \vec{V}_8 = \dots$ |
| 6. $\vec{V}_1 \wedge \vec{V}_{13} = \dots$ | 16. $\vec{V}_7 \wedge \vec{V}_9 = \dots$ | 26. $\vec{V}_3 \wedge \vec{V}_{13} = \dots$ | 36. $\vec{V}_{12} \wedge \vec{V}_{13} = \dots$ |
| 7. $\vec{V}_9 \wedge \vec{V}_{12} = \dots$ | 17. $\vec{V}_6 \wedge \vec{V}_{14} = \dots$ | 27. $\vec{V}_{11} \wedge \vec{V}_{10} = \dots$ | 37. $\vec{V}_{14} \wedge \vec{V}_{13} = \dots$ |
| 8. $\vec{V}_{13} \wedge \vec{V}_{11} = \dots$ | 18. $\vec{V}_{10} \wedge \vec{V}_{12} = \dots$ | 28. $\vec{V}_{14} \wedge \vec{V}_3 = \dots$ | 38. $\vec{V}_4 \wedge \vec{V}_7 = \dots$ |
| 9. $\vec{V}_4 \wedge \vec{V}_1 = \dots$ | 19. $\vec{V}_8 \wedge \vec{V}_3 = \dots$ | 29. $\vec{V}_7 \wedge \vec{V}_6 = \dots$ | 39. $\vec{V}_{14} \wedge \vec{V}_6 = \dots$ |
| 10. $\vec{V}_{10} \wedge \vec{V}_4 = \dots$ | 20. $\vec{V}_3 \wedge \vec{V}_{14} = \dots$ | 30. $\vec{V}_{14} \wedge \vec{V}_{10} = \dots$ | 40. $\vec{V}_9 \wedge \vec{V}_{14} = \dots$ |

Ici, on attend un calcul direct (sans schéma) ; cartésien à gauche, cylindrique au milieu, sphérique à droite

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|--|--|---|
| 1. $2\vec{e}_y \wedge \vec{e}_z = \dots$ | 8. $(-\vec{e}_r - 2\vec{e}_z) \wedge (-\vec{e}_\theta) = \dots$ | 15. $-2\vec{e}_\theta \wedge (-2\vec{e}_\phi) = \dots$ |
| 2. $-\vec{e}_z \wedge (\vec{e}_y - \vec{e}_z) = \dots$ | 9. $(-2\vec{e}_\theta - \vec{e}_z) \wedge (2\vec{e}_\theta - \vec{e}_z) = \dots$ | 16. $-2\vec{e}_\theta \wedge (2\vec{e}_\theta - 2\vec{e}_\phi) = \dots$ |
| 3. $(-\vec{e}_x - 2\vec{e}_z) \wedge (\vec{e}_x + 2\vec{e}_y) = \dots$ | 10. $\vec{e}_r \wedge (-2\vec{e}_\theta) = \dots$ | 17. $-2\vec{e}_r \wedge (-\vec{e}_r) = \dots$ |
| 4. $(\vec{e}_x - 2\vec{e}_y) \wedge (-\vec{e}_x + \vec{e}_y) = \dots$ | 11. $(2\vec{e}_\theta - 2\vec{e}_z) \wedge (-2\vec{e}_\theta) = \dots$ | 18. $(2\vec{e}_r + \vec{e}_\phi) \wedge (-2\vec{e}_\phi) = \dots$ |
| 5. $(2\vec{e}_y + 2\vec{e}_z) \wedge (-2\vec{e}_x) = \dots$ | 12. $(-\vec{e}_r - \vec{e}_z) \wedge (-2\vec{e}_r) = \dots$ | 19. $2\vec{e}_r \wedge (2\vec{e}_r) = \dots$ |
| 6. $(\vec{e}_x - 2\vec{e}_y) \wedge (\vec{e}_x + 2\vec{e}_y) = \dots$ | 13. $2\vec{e}_z \wedge (-\vec{e}_r + 2\vec{e}_\theta) = \dots$ | 20. $-2\vec{e}_\phi \wedge (\vec{e}_\theta + \vec{e}_\phi) = \dots$ |
| 7. $(2\vec{e}_x - \vec{e}_y) \wedge (-2\vec{e}_y) = \dots$ | 14. $(\vec{e}_\theta + 2\vec{e}_z) \wedge (-\vec{e}_r + \vec{e}_z) = \dots$ | 21. $(\vec{e}_r - 2\vec{e}_\theta) \wedge (-\vec{e}_\phi) = \dots$ |

Réponses

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|---|---|---|--|
| 1. $\vec{V}_{13} \wedge \vec{V}_{13} = \vec{0}$ | 11. $\vec{V}_2 \wedge \vec{V}_{14} = \vec{V}_5$ | 21. $\vec{V}_7 \wedge \vec{V}_{10} = \vec{V}_{13}$ | 31. $\vec{V}_{14} \wedge \vec{V}_2 = \vec{V}_{11}$ |
| 2. $\vec{V}_{13} \wedge \vec{V}_{12} = \vec{V}_3$ | 12. $\vec{V}_5 \wedge \vec{V}_{10} = \vec{V}_{13}$ | 22. $\vec{V}_8 \wedge \vec{V}_9 = \vec{V}_{13}$ | 32. $\vec{V}_{13} \wedge \vec{V}_{14} = \vec{0}$ |
| 3. $\vec{V}_2 \wedge \vec{V}_{12} = \vec{V}_{14}$ | 13. $\vec{V}_{14} \wedge \vec{V}_{14} = \vec{0}$ | 23. $\vec{V}_{13} \wedge \vec{V}_5 = \vec{V}_8$ | 33. $\vec{V}_4 \wedge \vec{V}_3 = \vec{V}_{14}$ |
| 4. $\vec{V}_1 \wedge \vec{V}_1 = \vec{0}$ | 14. $\vec{V}_8 \wedge \vec{V}_{13} = \vec{V}_5$ | 24. $\vec{V}_5 \wedge \vec{V}_8 = \vec{V}_{13}$ | 34. $\vec{V}_{11} \wedge \vec{V}_2 = \vec{V}_{13}$ |
| 5. $\vec{V}_{11} \wedge \vec{V}_6 = \vec{V}_{14}$ | 15. $\vec{V}_5 \wedge \vec{V}_4 = \vec{V}_{14}$ | 25. $\vec{V}_4 \wedge \vec{V}_5 = \vec{V}_{13}$ | 35. $\vec{V}_{13} \wedge \vec{V}_8 = \vec{V}_{11}$ |
| 6. $\vec{V}_1 \wedge \vec{V}_{13} = \vec{V}_{10}$ | 16. $\vec{V}_7 \wedge \vec{V}_9 = \vec{V}_{13}$ | 26. $\vec{V}_3 \wedge \vec{V}_{13} = \vec{V}_{12}$ | 36. $\vec{V}_{12} \wedge \vec{V}_{13} = \vec{V}_9$ |
| 7. $\vec{V}_9 \wedge \vec{V}_{12} = \vec{V}_{13}$ | 17. $\vec{V}_6 \wedge \vec{V}_{14} = \vec{V}_9$ | 27. $\vec{V}_{11} \wedge \vec{V}_{10} = \vec{V}_{14}$ | 37. $\vec{V}_{14} \wedge \vec{V}_{13} = \vec{0}$ |
| 8. $\vec{V}_{13} \wedge \vec{V}_{11} = \vec{V}_2$ | 18. $\vec{V}_{10} \wedge \vec{V}_{12} = \vec{V}_{13}$ | 28. $\vec{V}_{14} \wedge \vec{V}_3 = \vec{V}_{12}$ | 38. $\vec{V}_4 \wedge \vec{V}_7 = \vec{V}_{13}$ |
| 9. $\vec{V}_4 \wedge \vec{V}_1 = \vec{V}_{14}$ | 19. $\vec{V}_8 \wedge \vec{V}_3 = \vec{V}_{14}$ | 29. $\vec{V}_7 \wedge \vec{V}_6 = \vec{V}_{14}$ | 39. $\vec{V}_{14} \wedge \vec{V}_6 = \vec{V}_3$ |
| 10. $\vec{V}_{10} \wedge \vec{V}_4 = \vec{0}$ | 20. $\vec{V}_3 \wedge \vec{V}_{14} = \vec{V}_6$ | 30. $\vec{V}_{14} \wedge \vec{V}_{10} = \vec{V}_7$ | 40. $\vec{V}_9 \wedge \vec{V}_{14} = \vec{V}_{12}$ |

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|---|---|
| 1. $2\vec{e}_y \wedge \vec{e}_z = 2\vec{e}_x$ | 12. $(-\vec{e}_r - \vec{e}_z) \wedge (-2\vec{e}_r) = 2\vec{e}_\theta$ |
| 2. $-\vec{e}_z \wedge (\vec{e}_y - \vec{e}_z) = \vec{e}_x$ | 13. $2\vec{e}_z \wedge (-\vec{e}_r + 2\vec{e}_\theta) = -4\vec{e}_r - 2\vec{e}_\theta$ |
| 3. $(-\vec{e}_x - 2\vec{e}_z) \wedge (\vec{e}_x + 2\vec{e}_y) = 4\vec{e}_x - 2\vec{e}_y - 2\vec{e}_z$ | 14. $(\vec{e}_\theta + 2\vec{e}_z) \wedge (-\vec{e}_r + \vec{e}_z) = \vec{e}_r - 2\vec{e}_\theta + \vec{e}_z$ |
| 4. $(\vec{e}_x - 2\vec{e}_y) \wedge (-\vec{e}_x + \vec{e}_y) = -\vec{e}_z$ | 15. $-2\vec{e}_\theta \wedge (-2\vec{e}_\phi) = 4\vec{e}_r$ |
| 5. $(2\vec{e}_y + 2\vec{e}_z) \wedge (-2\vec{e}_x) = -4\vec{e}_y + 4\vec{e}_z$ | 16. $-2\vec{e}_\theta \wedge (2\vec{e}_\theta - 2\vec{e}_\phi) = 4\vec{e}_r$ |
| 6. $(\vec{e}_x - 2\vec{e}_y) \wedge (\vec{e}_x + 2\vec{e}_y) = 4\vec{e}_z$ | 17. $-2\vec{e}_r \wedge (-\vec{e}_r) = \vec{0}$ |
| 7. $(2\vec{e}_x - \vec{e}_y) \wedge (-2\vec{e}_y) = -4\vec{e}_z$ | 18. $(2\vec{e}_r + \vec{e}_\phi) \wedge (-2\vec{e}_\phi) = 4\vec{e}_\theta$ |
| 8. $(-\vec{e}_r - 2\vec{e}_z) \wedge (-\vec{e}_\theta) = -2\vec{e}_r + \vec{e}_z$ | 19. $2\vec{e}_r \wedge (2\vec{e}_r) = \vec{0}$ |
| 9. $(-2\vec{e}_\theta - \vec{e}_z) \wedge (2\vec{e}_\theta - \vec{e}_z) = 4\vec{e}_r$ | 20. $-2\vec{e}_\phi \wedge (\vec{e}_\theta + \vec{e}_\phi) = 2\vec{e}_r$ |
| 10. $\vec{e}_r \wedge (-2\vec{e}_\theta) = -2\vec{e}_z$ | 21. $(\vec{e}_r - 2\vec{e}_\theta) \wedge (-\vec{e}_\phi) = 2\vec{e}_r + \vec{e}_\theta$ |
| 11. $(2\vec{e}_\theta - 2\vec{e}_z) \wedge (-2\vec{e}_\theta) = -4\vec{e}_r$ | |