The cross product, areas and volumes worksheet – Grade 12

Grade 12 · Mixed level · 20 questions · **Version X2757**

Name: _____ Date: _____ Score: ___ / 20

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1. Find $\vec{u} \times \vec{v}$ for $\vec{u} = [-2, -6, 5]$ and $\vec{v} = [-3, -2, -3]$. Type it as [a, b, c].

   Answer: _____

2. Find $\vec{j} \times 4\vec{k}$. Type it as [a, b, c].

   Answer: _____

3. Find $-8\vec{k} \times (-4\vec{j})$. Type it as [a, b, c].

   Answer: _____

4. Find $\vec{v} \times \vec{u}$ for $\vec{u} = [-5, 2, -3]$ and $\vec{v} = [-2, -4, 0]$. Type it as [a, b, c].

   Answer: _____

5. Find $\vec{u} \times \vec{v}$ for $\vec{u} = [6, 4, -6]$ and $\vec{v} = [-6, -6, -4]$. Type it as [a, b, c].

   Answer: _____

6. Find $4\vec{j} \times 4\vec{i}$. Type it as [a, b, c].

   Answer: _____

7. Find $\vec{u} \times \vec{v}$ for $\vec{u} = [2, 6, -6]$ and $\vec{v} = [4, 5, -4]$. Type it as [a, b, c].

   Answer: _____

8. Find the area of the parallelogram formed by $\vec{u} = [4, -6, 1]$ and $\vec{v} = [2, -2, -3]$, to two decimal places.

   Answer: _____

9. Work out the area of the triangle with vertices A(6, −5, 1), B(2, −7, 2) and C(10, −2, −5), to two decimal places.

   Answer: _____

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10. What is the area of the parallelogram formed by $\vec{u} = [0, -6, -6]$ and $\vec{v} = [-6, -4, -3]$, to two decimal places?

    Answer: _____

11. Work out the area of the parallelogram formed by $\vec{u} = [5, 4, 5]$ and $\vec{v} = [-2, -1, 4]$, to two decimal places.

    Answer: _____

12. Which vector is perpendicular to both $\vec{u} = [-1, -6, 1]$ and $\vec{v} = [6, -6, 4]$?

    A. $[-7, 0, -3]$ **B.** $[-18, -10, 42]$ **C.** $[5, -12, 5]$ **D.** $[-27, 15, 63]$

13. What is the area of the triangle with vertices A(6, 6, −5), B(6, 5, −2) and C(6, 4, −6), to two decimal places?

    Answer: _____

14. Find the area of the triangle with vertices A(−6, 5, −7), B(−1, 8, −9) and C(−1, 5, −6), to two decimal places.

    Answer: _____

15. For what value of k are $\vec{u} = [-1, 1, 0]$, $\vec{v} = [-1, 0, -4]$ and $\vec{w} = [1, -4, k]$ coplanar?

    Answer: _____

16. Find the volume of the parallelepiped formed by $\vec{u} = [-4, -3, -4]$, $\vec{v} = [-3, -2, 6]$ and $\vec{w} = [5, 6, 0]$.

    Answer: _____

17. A 178 N force is applied to a wrench 71 cm long, at 16° to the wrench. Find the magnitude of the torque, in N·m, to one decimal place.

    Answer: _____

18. An 83 N force is applied to a wrench 78 cm long, at 64° to the wrench. Find the magnitude of the torque, in N·m, to one decimal place.

    Answer: _____

19. What is the volume of the parallelepiped formed by $\vec{u} = [-5, 6, -2]$, $\vec{v} = [2, 3, -6]$ and $\vec{w} = [1, -1, 3]$?

    Answer: _____

20. Work out the volume of the parallelepiped formed by $\vec{u} = [0, -2, -2]$, $\vec{v} = [4, 6, -4]$ and $\vec{w} = [-2, -2, 2]$.

    Answer: _____

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Answer key · Version X2757

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1. **[28, -21, -14]**
2. **[4, 0, 0]**
3. **[-32, 0, 0]**
4. **[12, -6, -24]**
5. **[-52, 60, -12]**
6. **[0, 0, -16]**
7. **[6, -16, -14]**
8. **24.74**
9. **11.15**
10. **51.26**
11. **36.74**
12. **D (**$[-27, 15, 63]$**)**
13. **3.50**
14. **10.71**
15. **-12**
16. **86**
17. **34.8**
18. **58.2**
19. **77**
20. **8**

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