Projections and work worksheet – Grade 12

Grade 12 · Mixed level · 20 questions · **Version X6993**

Name: _____ Date: _____ Score: ___ / 20

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1. What is the scalar projection of $\vec{u} = [-8, 6, 0]$ onto $\vec{v} = [-9, 8, -12]$? (Give a fraction if needed.)

   Answer: _____

2. An 82 N force pulls a sled 77 m along flat ground. The force is at 74° to the ground. How much work is done, to the nearest joule?

   Answer: _____

3. Work out the scalar projection of $\vec{u} = [-2, -5, -7]$ onto $\vec{v} = [8, -9, -12]$. (Give a fraction if needed.)

   Answer: _____

4. Find the scalar projection of $\vec{u} = [2, 1, -7]$ onto $\vec{v} = [8, -12, -9]$. (Give a fraction if needed.)

   Answer: _____

5. A 309 N force pulls a sled 68 m along flat ground. The force is at 36° to the ground. How much work is done, to the nearest joule?

   Answer: _____

6. A force $\vec{F} = [16, 23, -5]$ N moves an object along $\vec{d} = [4, 1, 3]$ m. How much work is done, in joules?

   Answer: _____

7. Work out the scalar projection of $\vec{u} = [3, -5, 1]$ onto $\vec{v} = [8, 12, 9]$. (Give a fraction if needed.)

   Answer: _____

8. Write $\vec{u} = [12, 7, 9]$ as a vector along $\vec{v} = [-4, -3, -1]$ plus a vector perpendicular to it. What is the perpendicular part? Type it as [a, b, c].

   Answer: _____

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9. Work out the vector projection of $\vec{u} = [-7, -9, 1]$ onto $\vec{v} = [1, 2, 4]$. Type it as [a, b, c].

   Answer: _____

10. Find the vector projection of $\vec{u} = [10, 2, 7]$ onto $\vec{v} = [-1, -2, -4]$. Type it as [a, b, c].

    Answer: _____

11. What is the vector projection of $\vec{u} = [2, 2, -2]$ onto $\vec{v} = [0, 0, 1]$? Type it as [a, b, c].

    Answer: _____

12. Work out the vector projection of $\vec{u} = [-17, 11, -5]$ onto $\vec{v} = [-5, -4, 0]$. Type it as [a, b, c].

    Answer: _____

13. Find the vector projection of $\vec{u} = [-7, 5, 7]$ onto $\vec{v} = [2, 2, 3]$. Type it as [a, b, c].

    Answer: _____

14. What is the vector projection of $\vec{u} = [2, -18, -3]$ onto $\vec{v} = [-3, 3, 2]$? Type it as [a, b, c].

    Answer: _____

15. Work out the direction cosine $\cos\beta$ of $\vec{v} = [-4, -13, 16]$ (the cosine of its angle with the y-axis). Give a fraction.

    Answer: _____

16. Find the direction cosine $\cos\beta$ of $\vec{v} = [2, 2, -1]$ (the cosine of its angle with the y-axis). Give a fraction.

    Answer: _____

17. Find the scalar projection of $\overrightarrow{AB}$ onto $\overrightarrow{CD}$ for A(2, −9, 0), B(2, −1, −8), C(−3, 6, 9) and D(−6, 9, 9), to two decimal places.

    Answer: _____

18. What is the direction cosine $\cos\gamma$ of $\vec{v} = [-4, 8, 1]$ (the cosine of its angle with the z-axis)? Give a fraction.

    Answer: _____

19. What is the scalar projection of $\overrightarrow{AB}$ onto $\overrightarrow{CD}$ for A(−4, 1, −7), B(1, −5, 1), C(6, −8, 9) and D(3, 6, −7), to two decimal places?

    Answer: _____

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20. A constant force $\vec{F} = [1, 6, -4]$ N moves an object from P(0, 0, 5) to Q(4, −2, −4) (distances in metres). How much work is done, in joules?

    Answer: _____

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Answer key · Version X6993

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1. **120/17**
2. **1740**
3. **113/17**
4. **67/17**
5. **16999**
6. **72**
7. **-27/17**
8. **[0, -2, 6]**
9. **[-1, -2, -4]**
10. **[2, 4, 8]**
11. **[0, 0, -2]**
12. **[-5, -4, 0]**
13. **[2, 2, 3]**
14. **[9, -9, -6]**
15. **-13/21**
16. **2/3**
17. **5.66**
18. **1/9**
19. **-10.57**
20. **28**

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