Intersections of lines and planes worksheet – Grade 12

Grade 12 · Mixed level · 20 questions · **Version X1570**

Name: _____ Date: _____ Score: ___ / 20

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1. Find the point where the line $[x, y, z] = [6, -3, 0] + t[-2, -2, -4]$ meets the plane $-5x + 3y + 5z + 87 = 0$. Type it as (x, y, z).

   Answer: _____

2. What is the point where the line $[x, y, z] = [-7, 3, -1] + t[3, -1, 1]$ meets the plane $x + 5y + z - 3 = 0$? Type it as (x, y, z).

   Answer: _____

3. The line $[x, y, z] = [0, -4, -6] + t[-3, 0, -4]$ meets the plane $-4x - 3y + 2z - 12 = 0$. At what value of t?

   Answer: _____

4. Where does the line $[x, y, z] = [-4, -2, 9] + t[2, 3, -3]$ cross the xy-plane? Type the point as (x, y, z).

   Answer: _____

5. Where does the line $[x, y, z] = [4, -1, -1] + t[-4, -1, 4]$ cross the yz-plane? Type the point as (x, y, z).

   Answer: _____

6. Where does the line $[x, y, z] = [6, 8, 2] + t[1, -4, 5]$ cross the xz-plane? Type the point as (x, y, z).

   Answer: _____

7. Work out the point where the line $[x, y, z] = [2, -3, 0] + t[3, -5, -2]$ meets the plane $5x - 5y - 4z - 169 = 0$. Type it as (x, y, z).

   Answer: _____

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8. How is the line $[x, y, z] = [0, 3, 6] + t[10, 5, -9]$ related to the plane $2x + 5y + 5z - 37 = 0$?

   A. it meets the plane at exactly one point **B.** it is perpendicular to the plane

   C. it lies in the plane **D.** it is parallel to the plane and never meets it

9. Find the angle between the line $[x, y, z] = [0, -3, -1] + t[-2, 2, 4]$ and the plane $-x + 4y - 3z + 19 = 0$, to the nearest tenth of a degree.

   Answer: _____ °

10. What is the angle between the line $[x, y, z] = [-8, 0, -6] + t[1, -3, -2]$ and the plane $-3x - 4y - 4z - 14 = 0$, to the nearest tenth of a degree?

    Answer: _____ °

11. Work out the angle between the line $[x, y, z] = [2, 0, -5] + t[2, 5, -4]$ and the plane $-3x - 3y - 3z - 54 = 0$, to the nearest tenth of a degree.

    Answer: _____ °

12. Find the angle between the line $[x, y, z] = [-5, -2, 1] + t[-1, -2, -3]$ and the plane $-5x + 2y + 2z - 48 = 0$, to the nearest tenth of a degree.

    Answer: _____ °

13. What is the angle between the line $[x, y, z] = [6, -1, -6] + t[4, 1, 1]$ and the plane $-4x - 2y - z - 22 = 0$, to the nearest tenth of a degree?

    Answer: _____ °

14. How is the line $[x, y, z] = [-3, -3, 7] + t[1, 3, -5]$ related to the plane $-2x - 4y + 3z - 184 = 0$?

    A. it lies in the plane **B.** it is perpendicular to the plane

    C. it is parallel to the plane and never meets it **D.** it meets the plane at exactly one point

15. Find the distance from (−6, −6, 9) to the line $[x, y, z] = [0, 3, -5] + t[-1, 5, -4]$, to two decimal places.

    Answer: _____

16. Work out the point where the planes $2x - 2z + 16 = 0$, $3x - 2y - z + 12 = 0$, $-2x - 2y - z - 13 = 0$ meet. Type it as (x, y, z).

    Answer: _____

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17. Work out the distance from (−5, −6, 6) to the line $[x, y, z] = [-3, -7, 5] + t[2, 1, -2]$, to two decimal places.

    Answer: _____

18. Find the point where the planes $2x - 2y + 2z - 20 = 0$, $-4x - 4y - 4z + 8 = 0$, $-x - 4y + z - 10 = 0$ meet. Type it as (x, y, z).

    Answer: _____

19. What is the distance from (−2, −2, 2) to the line $[x, y, z] = [3, 6, 1] + t[2, -2, 2]$, to two decimal places?

    Answer: _____

20. What is the point where the planes $3x + y + 3z + 20 = 0$, $-4x - y - z - 19 = 0$, $2x + 4y - 6 = 0$ meet? Type it as (x, y, z).

    Answer: _____

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Answer key · Version X1570

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1. **(0, -9, -12)**
2. **(5, -1, 3)**
3. **3**
4. **(2, 7, 0)**
5. **(0, -2, 3)**
6. **(8, 0, 12)**
7. **(11, -18, -6)**
8. **D (it is parallel to the plane and never meets it)**
9. **4.6**
10. **45.2**
11. **15.0**
12. **13.5**
13. **77.8**
14. **D (it meets the plane at exactly one point)**
15. **9.91**
16. **(-5, -3, 3)**
17. **1.80**
18. **(6, -4, 0)**
19. **9.20**
20. **(-5, 4, -3)**

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