

Worksheet: Systems of Linear Equations in Three Variables



Q1: Solve the simultaneous equations

$$\begin{aligned}2x + 3y + 2z &= \frac{21}{5}, \\ -6x - 2y + 7z &= -\frac{67}{5}, \\ x + 5y + 3z &= \frac{22}{5}.\end{aligned}$$

- A $x = \frac{1,478}{565}, y = \frac{877}{565}, z = -\frac{507}{565}$
- B $x = \frac{752}{315}, y = \frac{187}{315}, z = \frac{5}{189}$
- C $x = \frac{244}{255}, y = \frac{181}{85}, z = -\frac{219}{85}$
- D $x = \frac{6}{5}, y = 1, z = -\frac{3}{5}$
- E $x = \frac{1,344}{505}, y = \frac{221}{101}, z = -\frac{195}{101}$

Q2: The sum of the ages of three brothers is 123 years. The first brother is 3 years older than the second brother who is 9 years older than the third. Find their current ages.

- A 34 years, 37 years, 46 years
- B 37 years, 46 years, 49 years
- C 34 years, 37 years, 43 years
- D 37 years, 40 years, 46 years
- E 34 years, 43 years, 46 years

Q3: Given that the solution set of the simultaneous equations

$$-2x + 9y + 2z = a,$$

$$-4x + 9y - 3z = b,$$

$$4x - 3y + 8z = c$$



Question Video

is $\{(-6, 7, 8)\}$, find the values of a , b , and c .

A $a = 91, b = 63, c = 19$

B $a = -6, b = 7, c = 8$

C $a = \frac{14}{687}, b = \frac{4}{967}, c = \frac{20}{953}$

D $a = -\frac{21}{905}, b = \frac{46}{47}, c = -\frac{1,124}{683}$

E $a = -35, b = -63, c = 19$

Q4: Given that the solution set of the simultaneous equations

$$-7x + 7y - 6z = 24,$$

$$8x + 3y - 4z = 6,$$

$$8x + 6y - 3z = a.$$

is $\{(0, b, c)\}$, find the values of a , b , and c .

A $a = 27, b = 0, c = 8$

B $a = 0, b = 6, c = 3$

C $a = 18, b = -4, c = 3$

D $a = 27, b = 6, c = 3$

E $a = 0, b = 6, c = -4$

Q5: Solve the simultaneous equations

$$-3x - 9y - 2z = 118,$$

$$-2x + 6y - 9z = 32,$$

$$4x - 8y - 5z = 84.$$

A $x = -7, y = -9, z = -8$

B $x = -\frac{824}{155}, y = -\frac{1,234}{155}, z = -\frac{332}{31}$

C $x = 0, y = -9, z = -50$

D $x = 5, y = -2, z = -\frac{135}{2}$

E $x = \frac{550}{17}, y = -\frac{409}{34}, z = -\frac{154}{17}$

Q6: Solve the simultaneous equations

$$5y + 9z = 57,$$

$$6x - 7z = 3,$$

$$5x + 6y = 56.$$

A $x = -\frac{272}{499}, y = \frac{5,154}{499}, z = \frac{297}{499}$

B $x = 0, y = -2, z = \frac{67}{9}$

C $x = 4, y = 6, z = 3$

D $x = 3, y = \frac{27,959}{499}, z = 0$

E $x = 3, y = 0, z = \frac{15}{7}$

Q7: Solve the simultaneous equations

$$-4x + 3y - 6z - 12 = 0,$$

$$7x + y - 8z - 127 = 0,$$

$$9x + 8y - 5z - 121 = 0.$$

A $x = -\frac{2,721}{167}, y = -\frac{9,324}{167}, z = -\frac{8,770}{167}$

B $x = 5, y = -6, z = \frac{11}{2}$

C $x = -2, y = 5, z = -5$

D $x = 9, y = 0, z = -8$

E $x = \frac{1,181}{149}, y = \frac{4,192}{447}, z = -\frac{1,408}{149}$

Q8: Solve the simultaneous equations

$$9x + 8y + 6z - 5 = 0,$$

$$7x - 7y - 4z - 44 = 0,$$

$$9x - 8y - z - 64 = 0.$$

A $x = \frac{455}{29}, y = -\frac{3,371}{145}, z = \frac{6,483}{145}$

B $x = -1, y = 6, z = \frac{19}{3}$

C $x = -4, y = -8, z = -\frac{23}{6}$

D $x = 3, y = -5, z = 3$

E $x = -\frac{2,077}{77}, y = -41, z = -\frac{1,093}{11}$

Q9: Solve the simultaneous equations

$$9x + 8y + 4z = 117,$$

$$8x - 2y + 7z = 70,$$

$$2x - y = 4.$$

A $x = -5, y = 3, z = 31$

B $x = -\frac{347}{65}, y = \frac{2,322}{65}, z = \frac{126}{13}$

C $x = \frac{1,355}{223}, y = \frac{698}{223}, z = \frac{3,338}{223}$

D $x = 7, y = 6, z = 0$

E $x = 5, y = 6, z = 6$

Q10: Solve the simultaneous equations

$$2x + 6y + 3z = 17,$$

$$-9x - 4z = 27,$$

$$-3x + 2y = 11.$$

A $x = 1, y = 7, z = 0$

B $x = -\frac{145}{71}, y = \frac{416}{71}, z = -\frac{441}{71}$

C $x = -\frac{281}{55}, y = \frac{17}{11}, z = \frac{261}{55}$

D $x = -3, y = 0, z = -\frac{7}{2}$

E $x = 1, y = 7, z = -9$

Q11: Solve the simultaneous equations

$$-7x + 9y - 8z = 19,$$

$$4x - 7z = 2,$$

$$-3x + 8y = 44.$$

A $x = 4, y = 7, z = 0$

B $x = -\frac{1,580}{53}, y = -\frac{397}{53}, z = \frac{1,034}{53}$

C $x = -\frac{412}{93}, y = \frac{1,337}{279}, z = -\frac{262}{93}$

D $x = -1, y = 0, z = -\frac{48}{7}$

E $x = 4, y = 7, z = 2$

Q12: Solve the simultaneous equations

$$-9x - 5y - z = 1,$$

$$-4x - 6y - 5z = 1,$$

$$4x - 4y + 3z = 1.$$

A $x = -\frac{2}{9}, y = -\frac{4}{19}, z = \frac{1}{19}$

B $x = -\frac{1}{13}, y = -\frac{4}{19}, z = \frac{1}{19}$

C $x = \frac{22}{31}, y = \frac{1}{31}, z = \frac{5}{31}$

D $x = 0, y = -\frac{4}{19}, z = \frac{1}{19}$

E $x = -\frac{1}{5}, y = -\frac{4}{19}, z = \frac{1}{19}$

Q13: Find the solution of the system of equations $65x + 84y + 16z = 546$, $81x + 105y + 20z = 682$, $84x + 110y + 21z = 713$, giving your answer in terms of an arbitrary real number t if necessary.

A $x = -2, y = 4, z = 5$

B $x = 2, y = 6, z = -3$

C $x = 4, y = 2, z = 5$

D $x = 5, y = 4, z = 2$

E $x = 2, y = 4, z = 5$

Q14: Find the solution of the system of equations $9x - 2y + 4z = -17$, $13x - 3y + 6z = -25$, and $-2x - z = 3$, giving your answer in terms of an arbitrary real number t if necessary.

A $x = 1, y = -3, z = 2$

B $x = -1, y = -2, z = 1$

C $x = 1, y = -2, z = 1$

D $x = 1, y = 2, z = -1$

E $x = -1, y = 2, z = -1$

Q15: Find the solution of the system of equations $7x + 14y + 15z = 22$, $2x + 4y + 3z = 5$, $3x + 6y + 10z = 13$, giving your answer in terms of an arbitrary real number t if necessary.

A $x = 1 - 2t, z = 1, y = t$

B $x = 1 + 2t, z = 1, y = -t$

C $x = 1 - 2t, z = -1, y = t$

D $x = 1 - 3t, z = -1, y = 2t$

E $x = 1 + 2t, z = 1, y = -t$

Q16: Find the solution of the system of equations $3x - y + 4z = 6$, $y + 8z = 0$, $-2x + y = -4$, giving your answer in terms of an arbitrary real number t if necessary.

A $x = 2 + 4t, z = t, y = 8t$

B $x = 2 - 4t, z = t, y = -8t$

C $x = 2 + 3t, z = 2t, y = -8t$

D $x = 2 - 4t, z = t, y = 8t$

E $x = 2 + 4t, z = t, y = -8t$

Q17: The sum of the length and width of a cuboid is 24 cm. Its width plus its height is 19 cm and the sum of its height and length is 31 cm. Calculate the volume of the cuboid.

A 37 cm^3

B $14,136 \text{ cm}^3$

C $1,404 \text{ cm}^3$

D 74 cm^3

Q18: In the triangle ABC , one of the angles is the arithmetic mean of the other two. Find each angle of the triangle given the difference between the smaller and larger angles is 61° .

A $46^\circ, 64.5^\circ, 83^\circ$

B $90.5^\circ, 60^\circ, 29.5^\circ$

C $29.5^\circ, 120^\circ, 90.5^\circ$

D $98^\circ, 60^\circ, 22^\circ$