Topic: Scalar equation of a line

Question: Find the scalar equations of the line given by the point and the vector.

$$P(-1,3)$$

$$\langle -1, -4 \rangle$$

Answer choices:

A $x = -1 + t$ $y = 3 + 4t$

B $x = -1 + t$ $y = 4 + 3t$

C $x = -1 - t$ $y = 3 - 4t$

D $x = -1 - t$ $y = -4 + 3t$

Solution: C

To find the scalar equation of a line, we'll use

$$x = x_0 + at$$

$$y = y_0 + bt$$

$$z = z_0 + ct$$

where $P_0(x_0, y_0, z_0)$ is the given point and $v = \langle a, b, c \rangle$ or $v = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$ is the given vector. These formulas are based on three-dimensional vectors but we can use the same formulas for two dimensional vectors just by ignoring the equation for z.

If we plug the values we've been given into the formulas for x and y, we get

$$x = -1 + (-1)t$$

$$x = -1 - t$$

and

$$y = 3 + (-4)t$$

$$y = 3 - 4t$$

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Question: Find the scalar equations of the line given by the point and the vector.

$$P(-4,0,5)$$

$$\langle 7,2,-4 \rangle$$

Answer choices:

A $x = -4 + 7t$ $y = 2t$ $z = 5 - 4t$

B $x = -7 - 4t$ $y = -2$ $z = 4 + 5t$

C $x = 7 - 4t$ $y = 2$ $z = -4 + 5t$

D $x = -4 - 7t$ $y = -2t$ $z = 5 + 4t$

Solution: A

To find the scalar equation of a line, we'll use

$$x = x_0 + at$$

$$y = y_0 + bt$$

$$z = z_0 + ct$$

where $P_0(x_0, y_0, z_0)$ is the given point and $v = \langle a, b, c \rangle$ or $v = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$ is the given vector. These formulas are based on three-dimensional vectors but we can use the same formulas for two dimensional vectors just by ignoring the equation for z.

If we plug the values we've been given into the formulas for x and y, we get

$$x = -4 + 7t$$

and

$$y = 0 + 2t$$

$$y = 2t$$

and

$$z = 5 + (-4)t$$

$$z = 5 - 4t$$

Topic: Scalar equation of a line

Question: Find the scalar equations of the line given by the point and the vector.

$$P(11, -5, -9)$$

$$\langle -6, -3, 17 \rangle$$

Answer choices:

A $x = 11 + 6t$ $y = -5 + 3t$ $z = -9 - 17t$

B $x = -6 - 11t$ $y = -3 + 5t$ $z = 17 + 9t$

C $x = -6 + 11t$ $y = -3 - 5t$ $z = 17 - 9t$

D $x = 11 - 6t$ $y = -5 - 3t$ $z = -9 + 17t$

Solution: D

To find the scalar equation of a line, we'll use

$$x = x_0 + at$$

$$y = y_0 + bt$$

$$z = z_0 + ct$$

where $P_0(x_0, y_0, z_0)$ is the given point and $v = \langle a, b, c \rangle$ or $v = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$ is the given vector. These formulas are based on three-dimensional vectors but we can use the same formulas for two dimensional vectors just by ignoring the equation for z.

If we plug the values we've been given into the formulas for x and y, we get

$$x = 11 + (-6)t$$

$$x = 11 - 6t$$

and

$$y = -5 + (-3)t$$

$$y = -5 - 3t$$

and

$$z = -9 + 17t$$