

Linear function

№1. (Ireland 2025) $p \in \mathbb{R}$ is a constant. The point $(p; 5)$ lies on the line $3x - 2y + 28 = 0$. find the value of p .

№2. (USA 2023) *Wind chill* is a measure of how cold people feel when exposed to wind outside. A good estimate for wind chill can be found using this calculation:

$$(\text{wind chill}) = (\text{air temperature}) - 0.7 \times (\text{wind speed}),$$

where temperature is measured in degrees Fahrenheit ($^{\circ}\text{F}$) and the wind speed is measured in miles per hour (mph). Suppose the air temperature is 36°F and the wind speed is 18 mph. What is the wind chill in this case?

7.87

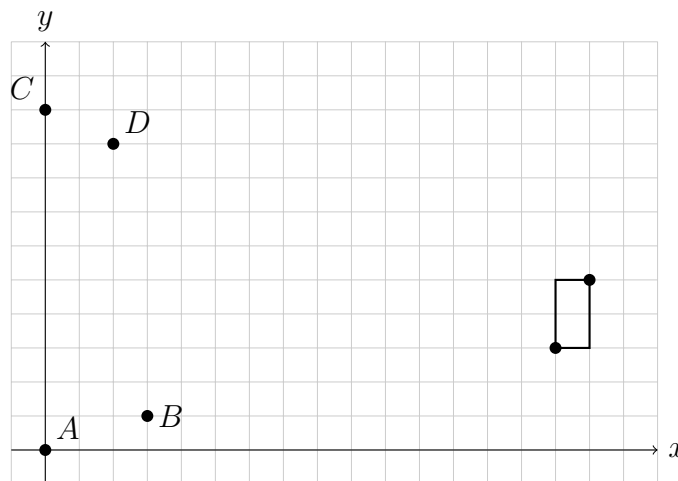
№3. Given the following conversion formulas

$$(\text{air temperature in } ^{\circ}\text{F}) = \frac{9}{5} \cdot (\text{air temperature in } ^{\circ}\text{C}) + 32,$$

$$(\text{wind speed in km/h}) = 1.609 \cdot (\text{wind speed in mph}),$$

derive an equivalent wind chill formula that uses degrees Celsius and kilometers per hour instead of degrees Fahrenheit and miles per hour.

№4. (USA 2023) A rectangle, with sides parallel to the x -axis and y -axis, has opposite vertices located at $(15, 3)$ and $(16, 5)$. A line is drawn through points $A(0, 0)$ and $B(3, 1)$. Another line is drawn through points $C(0, 10)$ and $D(2, 9)$. How many points on the rectangle lie on at least one of the two lines?



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№5. (*USA 2024*) In January 1980 the Mauna Loa Observation recorded carbon dioxide (CO_2) levels of 338 ppm (parts per million). Over the years the average CO_2 reading has increased by about 1.515 ppm each year. What is the expected CO_2 level in ppm in January 2030? Round your answer to the nearest integer.

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№6. (*Ireland 2025*) The line l has equation $y = -\frac{1}{3}x + 11$. The line h has equation $2x - 5y + 10 = 0$. Work out the size of acute angle between the lines l and h . Give your answer correct to the nearest degree.

№7. (*Ireland 2025*) A line cuts the x -axis at the point $A(a; 0)$ and the y -axis at $B(0; b)$, where $a, b \in \mathbb{Z}$. The slope of this line is $-2/3$. The area of the triangle enclosed by this line, the x -axis, and the y -axis is 12 square units.

There are two different lines that satisfy these conditions. Find the equation of each of these lines.

It may be useful to draw a diagram.