# TASKS

**TASK 1.** Define the length of side AB for the triangle with apexes A(3;-2), B(-1;5), C(0;6).

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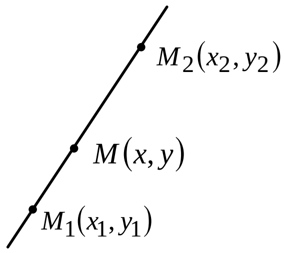
|---|---|
| **The distance between two points A and B or the length of the segment AB** is calculated according to the following formula: | $AB = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2}$ |

**TASK 2.** What is the midpoint M of the straight line segment AB joining the points A(3;-2), B(-1;5)?

| | | |
|---|---|---|
| Point $M(x, y)$ is ***the midpoint*** of $M_1M_2$ with $M_1(x_1, y_1)$ and $M_2(x_2, y_2)$ | $x_M = \frac{x_1 + x_2}{2},\ y_M = \frac{y_1 + y_2}{2}$ |   |

**TASK 3.** Form the equation of a straight line passing through two points $M_1(7,-1)$ and $M_2(2,5)$.

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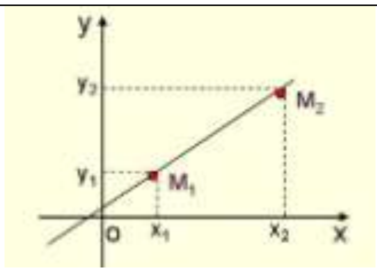
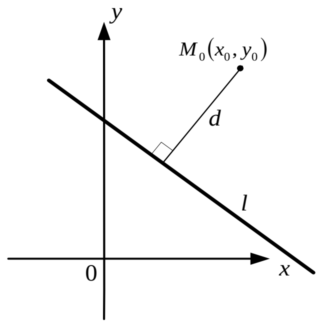
|---|---|---|
| Equation of a straight line passing through two points $M_1(x_1, y_1)$ and $M_2(x_2, y_2)$ | $\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1}$<br>or<br>$(y - y_1)(x_2 - x_1) = (x - x_1)(y_2 - y_1)$ |   |

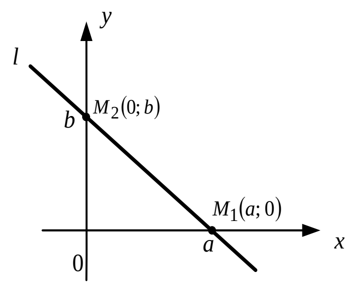
**TASK 4.** Transform the obtained equation of a straight line (see TASK 3) to the next form:

| | |
|---|---|
| General equation of a straight line | $Ax + By + C = 0, \quad \text{if } A^2 + B^2 \neq 0$ |

**TASK 5.** Find the distance from the point $M_0(4,3)$ to the given straight line (see TASK 4).

| | | |
|---|---|---|
| Distance from the point $M_0\ (x_0, y_0)$ to a straight line $Ax + By + C = 0$ | $d = \dfrac{\lvert Ax_0 + By_0 + C\rvert}{\sqrt{A^2 + B^2}}$ |  |

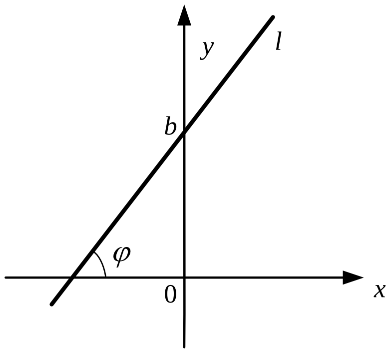
**TASK 6a.** Transform the obtained equation of a straight line (see TASK 2) to the next form:

| | | |
|---|---|---|
| Equation of a straight line with the given intercepts on the axes, i.e. a straight line intersects the axes at points $M_1(a; 0)$ and $M_2(0; b)$ | $\dfrac{x}{a} + \dfrac{y}{b} = 1$ |  |

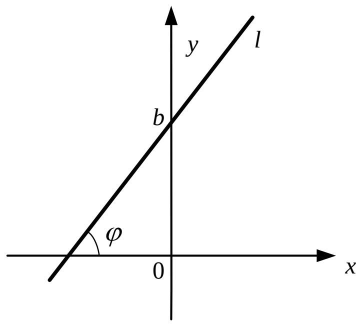
**TASK 6b.** Calculate the area of the obtained right triangle forming between the coordinate axes and the straight line.

**TASK 6c.** Plot the graph of the obtained equation of a straight line (see TASK 6a).

**TASK 7.** Transform the obtained equation of a straight line (see TASK 4) to the next form:

| | | |
|---|---|---|
| Equation of a straight line with an angular coefficient $k$ (***a slope***) and an intercept $b$ on the *y*-axis (the angle $\varphi$ is the angle with the $Ox$ -axis) | $y = kx + b$,<br>where $k = tg\varphi$,<br>$0 \le \varphi \le \pi$ |  |

**TASK 8.** Form the equation of a straight line passing through point $M(1,-3)$ with the angular coefficient $k=5$.

| | | |
|---|---|---|
| Equation of a straight line passing through the point $M_0(x_0, y_0)$ and forming the angle $\varphi$ with the $Ox$-axis (or with an angular coefficient $k$ ) | $y-y_0=k\cdot(x-x_0)$, where $k=tg\varphi$, $0\le\varphi\le\pi$ |  |

**TASK 9.** Form the equation of a straight line through the point $M(1,-3)$ ***parallel*** to the straight line $y=2x+1$.

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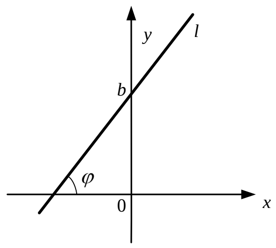
|---|---|---|
| Geometric relationship of two straight lines:<br>1) $y=k_1x+b_1$ $(l_1)$<br>2) $y=k_2x+b_2$ $(l_2)$ | if $l_1 \parallel l_2$, then $k_2=k_1$ |  |
| Equation of a straight line passing through the point $M_0(x_0, y_0)$ and forming the angle $\varphi$ with the $Ox$-axis (or with an angular coefficient $k$ ) | $y-y_0=k\cdot(x-x_0)$, where $k=tg\varphi$, $0\le\varphi\le\pi$ |  |

**TASK 10.** Form the equation of a straight line through the point $M(1,-3)$ ***perpendicular*** to the straight line $y=2x+1$.

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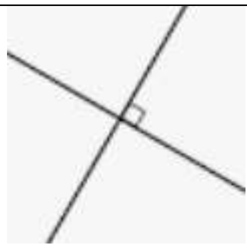
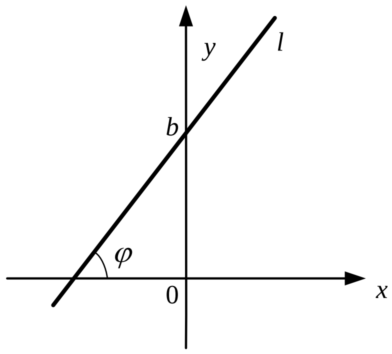
|---|---|---|
| Geometric relationship of two straight lines:<br>1) $y=k_1x+b_1$ $(l_1)$<br>2) $y=k_2x+b_2$ $(l_2)$ | if $l_1 \perp l_2$, then $k_1k_2=-1$ |  |
| Equation of a straight line passing through the point $M_0(x_0, y_0)$ and forming the angle $\varphi$ with the $Ox$-axis (or with an angular coefficient $k$ ) | $y-y_0=k\cdot(x-x_0)$, where $k=tg\varphi$, $0\le\varphi\le\pi$ |  |

**TASK 11.** Finding Equilibrium point using Linear Demand and Supply Equations: $Q_d = 100 - 3p$ and $Q_s = 2p + 20$.

https://www.youtube.com/watch?v=vUyRQ066tw0

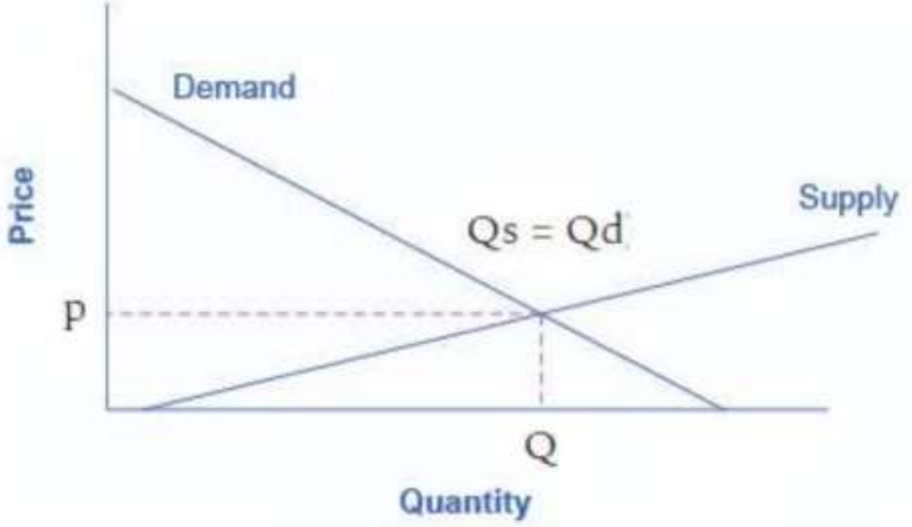



**Figure.** Supply and Demand Graph. The equations for Qd and Qs are displayed graphically by the sloped lines.

**TASK 12.** Calculate the intersection point of two straight lines: $2x - 7y - 15 = 0$ and $9x - 4y + 15 = 0$.