Angle between a line and x -axis - answers

Task1. Calculate the angle α between the given line and the x-axis.

If a line is given by a slope - interception equation $y = ax + b$ then then $tg\alpha = a$.

(1) $y = -x + 23$ Answer: $\alpha = 135°$

Explanation:

$a = -1$ $tg\alpha = -1$ $tg(180° - \alpha) = 1$ $180° - \alpha = 45°$ $\alpha = 135°$

(2) $y = \frac{\sqrt{3}}{3}x + 23$ Answer: $\alpha = 30°$

Explanation:

$a = \frac{\sqrt{3}}{3}$ $tg\alpha = \frac{\sqrt{3}}{3}$ $\alpha = 30°$

(3) $y = -\sqrt{3}x + \sqrt{2}$ Answer: $\alpha = 120°$

Explanation:

$a = -\sqrt{3}$ $tg\alpha = -\sqrt{3}$ $tg(180° - \alpha) = \sqrt{3}$ $180° - \alpha = 60°$ $\alpha = 120°$

(4) $y = x - \frac{\sqrt{3}}{3}$ Answer: $\alpha = 45°$

Explanation:

$a = 1$ $tg\alpha = 1$ $\alpha = 45°$

(5) $y = 1 - \frac{\sqrt{3}}{3}$ Answer: $\alpha = 0°$

Explanation:

$y = 0 \cdot x + 1 - \frac{\sqrt{3}}{3}$ $a = 0$ $tg\alpha = 0$ $\alpha = 0°$

(6) $y = 5.4 + x$ Answer: $\alpha = 45°$

Explanation:

$y = 1 \cdot x + 5.5$ $a = 1$ $tg\alpha = 1$ $\alpha = 45°$

(7) $y = 7 - x$ Answer: $\alpha = 135°$

Explanation:

$y = -x + 7$

$a = -1$ $tg\alpha = -1$ $tg(180° - \alpha) = 1$ $180° - \alpha = 45°$ $\alpha = 135°$

(8) $y = \frac{2+x\sqrt{6}}{\sqrt{2}}$

Explanation:

$y = \sqrt{3} \cdot x + \sqrt{2}$

$a = \sqrt{3}$ $tg\alpha = \sqrt{3}$ $\alpha = 60°$

Task 2. Calculate the angle γ between the given lines.

(a) $y = 5$ and $y = x$

Let α be the angle between the line $y = 5$. Then $\alpha = 0°$.

Let β be the angle between the line $y = x$. Then $\alpha = 45°$.

Therefore $\gamma = |0° - 45°| = 45°$

Answer: $\gamma = 45°$

(b) $y = x - \frac{\sqrt{3}}{3}$ and $y = -\sqrt{3}x + \sqrt{2}$

Let α be the angle between the line $y = x - \frac{\sqrt{3}}{3}$. Then $\alpha = 45°$.

Let β be the angle between the line $y = -\sqrt{3}x + \sqrt{2}$. Then $\alpha = 120°$.

Therefore $\gamma = |45° - 120°| = 75°$

Answer: $\gamma = 75°$