[10-01-13-T11]

Equation line

■ Part 1

[1] State the slope and the y-intercept of the line $y = \frac{2}{3}x + 5$.

[2] Rewrite the equation $2x + 6y + 1 = 0$ in slope-intercept from.

■ Part 2

Let lines $\ell_1, \ell_2, \ell_3, \ell_4$ be defined as follows:

$\ell_1 : 2x + 3y + 3 = 0$

$\ell_2 : 6x + 9y + 17 = 0$

$\ell_3 : 3x - 2y - 2 = 0$

$\ell_4 : -x + 4y - 2 = 0$

[1] Is ℓ_1 parallel to ℓ_4? You must support your answer algebraically.

[2] Is ℓ_1 parallel to ℓ_2? You must support your answer algebraically.

[3] Is ℓ_1 perpendicular to ℓ_3? You must support your answer algebraically.

[4] Based on your answers to to the previous quesrions, is ℓ_2 perpendicular to ℓ_3?

[5] Write the equation of the line through $P(-2, 3)$ and parallel to ℓ_3. Answer in standard form.

[6] Write the equation of the line through $P(-2, 3)$ and perpendicular to ℓ_4. Answer in standard form.

[7] Write the equation of the line that has the same y-intercept as ℓ_1 and is perpendicualr to ℓ_1.

Answers

■ Part 1

[1] Slope is $\frac{2}{3}$ and y-intercept is 5. Determined by inspection.

[2] $y = -\frac{x}{3} - \frac{1}{6}$

■ Part 2

$\ell_1 : 2x + 3y + 3 = 0$, $m = \frac{-2}{3}$, y-int $= -1$

$\ell_2 : 6x + 9y + 17 = 0$, $m = \frac{-2}{3}$, y-int $= -\frac{17}{9}$

$\ell_3 : 3x - 2y - 2 = 0$, $m = \frac{3}{2}$, y-int $= -1$

$\ell_4 : -x + 4y - 2 = 0$, $\frac{x}{4}$, y-int $= \frac{1}{2}$

[1] No. $m_1 = \frac{-2}{3} \neq \frac{1}{4} = m_4$.

[2] Yes. $m_1 = \frac{-2}{3} = m_2$.

[3] Yes. $m_1 = \frac{-2}{3}$, $m_3 = \frac{3}{2}$, $m_1 m_2 = \frac{-2}{3} \cdot \frac{3}{2} = -1$.

[4] Yes. ℓ_1 is parallel to ℓ_2 and ℓ_2 is perpendicular to ℓ_3. So ℓ_1 must be perpendicular to ℓ_3.

[5] $y - 3 = \frac{3}{2}(x + 2) \Longleftrightarrow y = \frac{3}{2}x + 6$.

Well...the rest later.

[6] Write the equation of the line through $P(-2, 3)$ and perpendicular to ℓ_4. Answer in standard form.

[7] Write the equation of the line that has the same y-intercept as ℓ_1 and is perpendicualr to ℓ_1.