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5.3

① a) $\frac{2y}{2} = \frac{3x}{2} - \frac{5}{2}$

$y = \frac{3}{2}x - \frac{5}{2}$

$m = \frac{3}{2}$

$6x - 4y + 11 = 0$

$4y = \frac{6x}{4} + \frac{11}{4}$

$y = \frac{3}{2}x + \frac{11}{4}$

$m = \frac{3}{2}$

They're both parallel

b) $3x - 4y + 9 = 0$

$\frac{4y}{4} = \frac{3}{4}x + \frac{9}{4}$

$y = \frac{3}{4}x + \frac{9}{4}$

$m = \frac{3}{4}$

$9x + 12y - 10 = 0$

$\frac{12y}{12} = \frac{-9}{12} + \frac{10}{12}$

$y = -\frac{3}{4}x + \frac{5}{6}$

$m = -\frac{3}{4}$

They're not parallel

c) $5x + 2y - 15 = 0$

$\frac{2y}{2} = -\frac{5}{2}x + \frac{15}{2}$

$y = -\frac{5}{2}x + \frac{15}{2}$

$m = -\frac{5}{2}$

$10x + 4y + 9 = 0$

$4y = -\frac{10}{4}x - \frac{9}{4}$

$y = -\frac{5}{2}x - \frac{9}{4}$

$m = -\frac{5}{2}$

They're both parallel

(2) a) $\frac{3y}{3} = \frac{2}{3}x + \frac{7}{3}$

$y = \frac{2}{3}x + \frac{7}{3}$

$m = \frac{2}{3}$

$4x + 6y + 1 = 0$

$\frac{6y}{6} = -\frac{4}{6}x + \frac{1}{6}$

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

$m = -\frac{2}{3}$

They're not perpendicular

b) $5x - 3y + 2 = 0$

$\frac{-3y}{-3} = \frac{5}{3}x + \frac{2}{3}$

$y = \frac{5}{3}x + \frac{2}{3}$

$m = \frac{5}{3}$

$\frac{5y}{5} = \frac{3}{5}x + \frac{6}{5}$

$y = \frac{3}{5}x + \frac{6}{5}$

$m = \frac{3}{5}$

They're not perpendicular

c) $4x - y - 5 = 0$

$y = 4x - 5$

$m = 4$

$2x + 8y - 15 = 0$

$\frac{8y}{8} = -\frac{2}{8}x + \frac{15}{8}$

$y = -\frac{1}{4}x + \frac{15}{8}$

$m = -\frac{1}{4}$

They're both perpendicular

③ $2x-3y+7=0$

$\frac{3y}{3} = \frac{2x}{3} + \frac{7}{3}$

$y = \frac{2}{3}x + \frac{7}{3}$

$m = \frac{2}{3}$

$y = \frac{2}{3}x + c$

Substitute $(-3, 5)$

$5 = \frac{2}{3}(-3) + c$

$c = 7$

$(\times 3)$ $y = \frac{2}{3}x + 7$ $(\times 3)$

$3y = 2x + 21$

④ $(1, -6)$ and $(-2, 9)$

$\frac{9 - -6}{-2-1} = \frac{15}{-3} = -5$

$m = -5$

Substitute $(0, 0)$

$y = -5x + c$

$0 = -5(0) + c$

$c = 0$

$y = -5x$

$y + 5x = 0$

⑤ $4y - 8 = 3x$

$\frac{4y}{4} = \frac{3x}{4} + \frac{8}{4}$

$y = \frac{3}{4}x + 2$

Substitute x-coordinate 4

$y = \frac{3}{4}(4) + 2$

$y = 5$

$P: (4, 5)$

$L_2 : m = -\frac{4}{3}$

$y = -\frac{4}{3} + c$

Substitute P

$5 = -\frac{4}{3}(4) + c$

$c = \frac{31}{3}$

$(\times 3)$ $y = -\frac{4}{3}x + \frac{31}{3}$ $(\times 3)$

$3y = -4x + 31$

$4x + 3y - 31 = 0$

(6) a) $2y = 1 - 3x$

Substitute $P(3, -4)$

$2(-4) = 1 - 3(3)$

$-8 = -8$

b) $m = \frac{2}{3}$

$y = \frac{2}{3}x + c$

Substitute P into $L_2(-3, 4)$

$4 = \frac{2}{3}(-3) + c$

$c = 6$

$(\times 3)$ $y = \frac{2}{3} + 6$ $(\times 3)$

$3y = 2x + 18$

$2x - 3y + 18 = 0$

(7) a) $2x - 5y + 2 = 0$

$\frac{5y}{5} = \frac{2x}{5} + \frac{2}{5}$

$y = \frac{2}{5}x + \frac{2}{5}$

$m = \frac{2}{5}$

b) $m = -\frac{5}{2}$

$y = -\frac{5}{2}x + c$

Substitute $(3, 2)$

$2 = -\frac{5}{2}(3) + c$

$c = \frac{19}{2}$

$(\times 2)$ $y = -\frac{5}{2}x + \frac{19}{2}$ $(\times 2)$

$2y = -5x + 19$

$5x + 2y - 19 = 0$

(8) a) $5y - 2x - k = 0$

$\frac{5y}{5} = \frac{2}{5}x + \frac{k}{5}$

$y = \frac{2}{5}x + \frac{k}{5}$

Substitute $A(1, 3)$

$3 = \frac{2}{5}(1) + \frac{k}{5}$

$3 = \frac{2}{5} + \frac{k}{5}$

$\frac{13}{5} = \frac{k}{5}$

$k = 13$

b) $y = \frac{2x}{5} + \frac{13}{5}$

$m = \frac{2}{5}$

c) $L_2 : m = -\frac{5}{2}$

Substitute $A(1, 3)$

$3 = -\frac{5}{2}(1) + c$

$c = \frac{11}{2}$

$(\times 2) \quad y = -\frac{5}{2}x + \frac{11}{2} \quad (\times 2)$

$2y = -5x + 11$

$5x + 2y - 11 = 0$

d) $y = -\frac{5}{2}x + \frac{11}{2}$

$0 = -\frac{5}{2}x + \frac{11}{2}$

$\div 5/2 \quad -\frac{11}{2} = -\frac{5}{2}x \quad \div -\frac{5}{2}$

$x = \frac{11}{5}$

$\left(\frac{11}{5}, 0\right)$

(9) a) $(-2, 3)$, $(10, 9)$
P Q

$$\frac{9-3}{10--2} = \frac{1}{2}$$

$y = \frac{1}{2}x + c$

Substitute $P(-2, 3)$

$3 = \frac{1}{2}(-2) + c$

$c = 4$

$y = \frac{1}{2}x + 4$

b) L_2: $m = -2$

$y = -2x + c$

Substitute $R(12, 0)$

$0 = -2(12) + c$

$c = 24$

$y = -2x + 24$

$-2x + 24 = \frac{1}{2}x + 4$

$24 - 4 = \frac{1}{2}x + 2x$

$\div 5/2 \quad 20 = \frac{5}{2}x \quad \div 5/2$

$x = 8$

Substitute x into either L_1 or L_2:

$y = \frac{1}{2}(8) + 4$

$y = 8$

$(8, 8)$