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1.  $A(6, -5), B(-2, 1), C(0, 3)$

$$\begin{aligned} \text{Distance } (AB) &= \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2} \\ &= \sqrt{(1 - (-5))^2 + (-2 - 6)^2} \\ &= \sqrt{36 + 64} \\ &= \sqrt{100} \\ &= 10 \end{aligned}$$

$$\begin{aligned} \text{Distance } (AC) &= \sqrt{(3 - (-5))^2 + (0 - 6)^2} \\ &= \sqrt{64 + 36} \\ &= \sqrt{100} \\ &= 10 \end{aligned}$$

$$\begin{aligned} \text{Distance } (BC) &= \sqrt{(3 - 1)^2 + (0 - (-2))^2} \\ &= \sqrt{(2)^2 + (2)^2} \\ &= \sqrt{4 + 4} \\ &= \sqrt{8} \end{aligned}$$

$(AB)$  and  $(AC)$  are both 10 so the triangle is isosceles.

$$2) P = (5, -3)$$

$$Q = (-4, 9)$$

$$R = (14, -15)$$

$$\begin{array}{ccc} Q & & P & & R \\ \hline (-4, 9) & & (5, -3) & & (14, -15) \end{array}$$

$$x = 5$$

$$x_1 = -4$$

$$x_2 = 14$$

$$x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}$$

$$\Rightarrow 5 = \frac{14m_1 + (-4)m_2}{m_1 + m_2}$$

$$5m_1 + 5m_2 = 14m_1 - 4m_2$$

$$5m_1 - 14m_1 = -4m_2 - 5m_2$$

$$-9m_1 = -9m_2$$

$$\frac{m_1}{m_2} = \frac{-9}{-9}$$

$$\frac{m_1}{m_2} = \frac{1}{1}$$

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$$m_1 : m_2 = 1 : 1$$

2b)

$$P$$

$$(5, -3)$$

~~$$R$$~~

$$(14, -15)$$

$$Q$$

$$(-4, 9)$$

$$x = 14$$

$$x_1 = 5$$

$$x_2 = -4$$

$$x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}$$

$$m_1 + m_2$$

$$14 = \frac{-4m_1 + 5m_2}{m_1 + m_2}$$

$$m_1 + m_2$$

$$14m_1 + 14m_2 = -4m_1 + 5m_2$$

$$14m_1 + 4m_1 = 5m_2 - 14m_2$$

$$18m_1 = -9m_2$$

$$\frac{m_1}{m_2} = \frac{-9}{18}$$

$$m_1 = -\frac{1}{2}m_2$$

$$\frac{m_1}{m_2} = -\frac{1}{2}$$

$$m_1 : m_2 = -1 : 2$$

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