

MPM 2D0 – Coordinate Geometry Practice

1.
 - a) Construct $\triangle ABC$ for $A(-5, -2)$, $B(5, 4)$, and $C(4, -2)$
 - b) Construct the median from vertex C .
 - c) Determine algebraically the equation of this median. Show all required calculations including the midpoint of side AB .

2.
 - a) Construct $\triangle CDE$ for $C(2, 5)$, $D(-7, -2)$, and $E(6, -4)$.
 - b) Construct an altitude from vertex D .
 - c) Determine algebraically the equation of this altitude. Show all required calculations.

3.
 - a) Construct $\triangle FGH$ for $F(-5, 5)$, $G(-1, -3)$, $H(7, -4)$
 - b) Construct the perpendicular bisector of side FG .
 - c) Determine algebraically the equation of this perpendicular bisector. Show all required calculations.

4.
 - a) Construct $\triangle JKL$ for $J(-1, 5)$, $K(-4, -2)$, $L(6, 2)$
 - b) Construct the altitude from vertex J .
 - c) Using algebra, find the area of the triangle. Show all required calculations. ($A = \frac{1}{2}bh$)

5.
 - a) On the grid provided, construct the quadrilateral PQRS for $P(-2, 5)$, $Q(-8, 2)$, $R(-3, -1)$, $S(3, 2)$.
 - b) Using distances and slopes, algebraically determine the specific type of quadrilateral that PQRS must be.

6. The equations of two adjacent sides of a quadrilateral are $2x + y - 8 = 0$ and $x - 2y - 4 = 0$.
 - a) Graph the equations and label their point of intersection as vertex A . Label the two y -intercepts as B and D .
 - b) Plot vertex $C(-4, 6)$, diagonal to vertex A , and draw the remaining sides.
 - c) Show algebraically that quadrilateral ABCD is a rectangle

Assignment Answers

$$1. M_{AB} = \left(\frac{-5+5}{2}, \frac{-2+4}{2} \right) = (0, 1) \checkmark$$

$$m_{\text{med}} = \frac{1+2}{0-4} = -\frac{3}{4} \checkmark$$

$$y = -\frac{3}{4}(x-0) + 1$$

$$y = -\frac{3}{4}x + 1 \quad \checkmark$$

5 marks

$$2. m_{CE} = \frac{5+4}{2-6} = -\frac{9}{4} \checkmark$$

$$m_{\perp} = \frac{4}{9} \quad \checkmark$$

$$y = \frac{4}{9}(x+7) - 2 \quad \checkmark$$

$$y = \frac{4}{9}x + \frac{28}{9} - \frac{18}{9}$$

$$y = \frac{4}{9}x + \frac{10}{9} \quad \checkmark$$

5 marks

$$2. M_{FG} = \left(-\frac{5-1}{2}, \frac{5-3}{2} \right) = (-3, 1) \checkmark$$

$$m_{FG} = \frac{5+3}{-5+1} = \frac{8}{-4} = -2 \checkmark$$

$$m_{\perp} = \frac{1}{2} \checkmark$$

$$y = \frac{1}{2}(x+3) + 1$$

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

$$y = \frac{1}{2}x + \frac{5}{2} \checkmark$$

5 marks

$$4. m_{KL} = \frac{-2-2}{-4-6} = \frac{-4}{-10} = \frac{2}{5} \checkmark$$

$$m_{\perp} = -\frac{5}{2} \checkmark$$

$$\begin{aligned} JA &= \sqrt{(-1-1)^2 + (5-0)^2} \\ &= \sqrt{4+25} \\ &= \sqrt{29} \checkmark \end{aligned}$$

$$\begin{aligned} KL &= \sqrt{(6+4)^2 + (2+2)^2} \\ &= \sqrt{100+16} \\ &= \sqrt{116} \checkmark \\ &= \sqrt{4 \times 29} \\ &= 2\sqrt{29} \checkmark \end{aligned}$$

$$\begin{aligned} A &= \frac{1}{2} \sqrt{29} \times 2\sqrt{29} \\ &= 29 \text{ units}^2 \checkmark \end{aligned}$$

7 marks

$$5. \quad m_{QP} = \frac{5-2}{-2+8} = \frac{3}{6} = \frac{1}{2} \checkmark \quad m_{PS} = \frac{5-2}{-2-3} = -\frac{3}{5} \checkmark$$

$$m_{RS} = \frac{2+1}{3+3} = \frac{3}{6} = \frac{1}{2} \checkmark \quad m_{QR} = \frac{2+1}{-8+3} = -\frac{3}{5} \checkmark$$

\therefore OPPOSITE SIDES ARE PARALLEL but \therefore angles are not 90°
 The shape is a parallelogram, a rhombus. \checkmark

$$\begin{aligned} QP &= \sqrt{(-8+2)^2 + (2-5)^2} \\ &= \sqrt{36+9} \\ &= \sqrt{45} \\ &= 3\sqrt{5} \quad \checkmark \end{aligned}$$

$$\begin{aligned} QR &= \sqrt{(-8+3)^2 + (2+1)^2} \\ &= \sqrt{25+9} \\ &= \sqrt{34} \quad \checkmark \end{aligned}$$

\therefore adjacent sides are not equal PQRS is a parallelogram, not a rhombus. \checkmark

$$6. \quad \begin{aligned} 2x+y-8 &= 0 \\ y &= -2x+8 \end{aligned}$$

$$\begin{aligned} x-2y-4 &= 0 \\ -2y &= -x+4 \end{aligned}$$

$$m_{AB} = -2 \quad \checkmark$$

$$\begin{aligned} y &= \frac{1}{2}x - 4 \checkmark \\ m_{AD} &= \frac{1}{2} \end{aligned}$$

$\therefore AB \perp DA$

$$m_{CO} = \frac{6+2}{-4} = -2 \quad \checkmark$$

$$m_{CP} = \frac{6-8}{-4} = \frac{1}{2} \quad \checkmark$$

\therefore OPP. SIDES ARE PARALLEL + ALL ANGLES ARE 90° . It is a rect/square. \checkmark (Opposite slopes)

- Cont'd.

$$\begin{aligned} CB &= \sqrt{(-4)^2 + (6-8)^2} & CD &= \sqrt{(-4)^2 + (8)^2} \\ &= \sqrt{16+4} & &= \sqrt{80} \\ &= \sqrt{20} & &= 2\sqrt{20} \checkmark \\ &= 2\sqrt{5} \checkmark & &= 4\sqrt{5} \end{aligned}$$

$CB \neq CD$, adjacent sides not equal

∴ ABCD is a rectangle not a square ~~etc~~