

3a $A(-1, 3) B(5, 7) C(0, 8)$

$$m_{AB} = \frac{7-3}{5-(-1)} = \frac{4}{6} = \frac{2}{3}$$

$$m_{AC} = \frac{8-3}{0-(-1)} = 5$$

$$m_{BC} = -\frac{1}{5}$$

$$m_{AC} \times m_{BC} = 5 \times \left(-\frac{1}{5}\right) = -1$$

$\therefore AC \perp BC$ @C

4 $A(7, 2) C(1, 4) \rightarrow m = \frac{2}{-6} = -\frac{1}{3}$

mid-point of AC $(4, 3)$

length: $\sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$

a $m_{BD} = 3$ $(4, 3)$

BD: $y-3 = 3(x-4)$

$$y = 3x - 12 + 3$$

$$y = 3x - 9$$

b $BO = \sqrt{10} = \sqrt{(4-x)^2 + (3-y)^2}$

$$10 = (4-x)^2 + (3-y)^2$$

$$10 = 16 - 8x + x^2 + (3 - 3x + 9)^2$$

$$0 = 6 - 8x + x^2 + 144 - 72x + 9x^2$$

$$10x^2 - 80x + 150 = 0$$

$$x^2 - 8x + 15 = 0$$

$$(x-3)(x-5) = 0$$

$$x = 3, 5$$

$$x = 3, y = 0 \quad (3, 0)$$

$$x = 5, y = 15 - 9 = 6 \quad (5, 6)$$

b Through B // AC $\rightarrow m = 5$

$$y - 7 = 5(x - 5)$$

$$y = 5x - 25 + 7$$

$$y = 5x - 18$$

$$x \text{ axis } \rightarrow y = 0$$

$$0 = 5x - 18$$

$$x = \frac{18}{5} \quad \left(\frac{18}{5}, 0\right)$$

6. $P(7, 5)$

$$l_1 \equiv 3x + 4y = 16$$

a. $m_{l_1} = -\frac{3}{4}$

 l_2 :

$$m_{l_2} = \frac{4}{3}$$

$$y - 5 = \frac{4}{3}(x - 7)$$

$$3y - 15 = 4x - 28$$

$$l_2 \equiv 4x - 3y = 13$$

b. $l_1 \equiv 12x + 16y = 64$

$$l_2 \equiv 12x - 9y = 39$$

$$25y = 25$$

$$y = 1$$

$$3x + 4 = 16$$

$$3x = 12$$

$$x = 4 \quad Q(4, 1)$$

c $P - l_1 = PQ$

$$= \sqrt{9+16} = 5$$

7 $P(-2, 8) Q(3, 20) R(11, 8)$

$$PQ = \sqrt{5^2 + 12^2} = 13$$

$$PR = \sqrt{13^2 + 0} = 13$$

$$QR = \sqrt{8^2 + 12^2} = \sqrt{64+144} = \sqrt{208} = 4\sqrt{13}$$

height = $\sqrt{13^2 - 5^2} = \sqrt{117}$

Area = $\frac{1}{2} 4\sqrt{13} \sqrt{117} = 2\sqrt{13} \sqrt{13 \cdot 9} = 78$

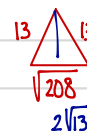
g $(1, 3) // 2x + 7y = 5 \quad m = -\frac{2}{7}$

$$y - 3 = -\frac{2}{7}(x - 1)$$

$$7y - 21 = -2(x - 1)$$

$$2x + 7y = 2 + 21$$

$$2x + 7y = 23$$



10 $(2, -5) (-4, 3)$
 $m = \frac{8}{-6} = -\frac{4}{3}$ $m_{\perp} = \frac{3}{4}$
 mid-point : $(-1, -1)$
 $y + 1 = \frac{3}{4}(x + 1)$
 $y = \frac{3}{4}x + \frac{3}{4} - 1$
 $y = \frac{3}{4}x - \frac{1}{4}$
 $4y = 3x - 1$
 $3x - 4y = 1$

14. $4x + ky = 20$ $A(8, -4) B(b, 2b)$
 $32 - 4k = 20$ $4b + 3(2b) = 20$
 $32 - 20 = 4k$ $10b = 20$
 $12 = 4k$ $b = 2$
 $k = \underline{3}, b = \underline{2}$ $B(2, 4)$
 $\parallel (5, 0)$

11 $M_{AC} = (\frac{7}{2}, 4)$
 $\frac{7}{2} = \frac{1}{2}(3 + x_D) \Rightarrow x_D = 4$
 $4 = \frac{1}{2}(5 + y_D) \Rightarrow y_D = 3$ $(4, 3)$

15 $m_{AB} = -\frac{6}{3} = -2$
 $m_{AD} = \frac{1}{2}$
 line AB: $y - 8 = \frac{1}{2}(x - 3)$
 $2y = 16 + x - 3$
 $x - 2y = -13$
 $2x - 4y = -26$
 line CD: $y - 2 = -2(x - 10)$
 $y - 2 = -2x + 20$
 $2x + y = 22$
 $\frac{2x + y = 22}{5y = 48} -$
 $y = \frac{48}{5}$
 $x = 2(\frac{48}{5}) - 13$
 $= \frac{96}{5} - \frac{65}{5} = \frac{31}{5}$
 $D(\frac{31}{5}, \frac{48}{5})$

12 $y = 3x$
 $m = 3$
 $m_{\perp} = -\frac{1}{3}$
 $y - 3 = -\frac{1}{3}(x - 0)$

16 $A(3, -2)$
 $B(15, 22)$

111 Perpendicular bisector of AB
 $m = -\frac{1}{2}$ $y - 10 = -\frac{1}{2}(x - 9)$
 mid point of AB $2y - 20 = -x + 9$
 $= (9, 10)$ $2y = -x + 29$

a $y = -\frac{1}{3}x + 3$
 b $3x = -\frac{1}{3}x + 3$
 $\frac{10}{3}x = 3$
 $x = \frac{9}{10}$

i $m_{AB} = 2m = \frac{24}{12} = 2, m = 1$
 ii $m_{AC} = -2m = -2$
 $m_{BC} = m = 1$

AC $y + 2 = -2(x - 3)$
 $y = -2x + 4$
 BC $y - 22 = x - 15$
 $y = x + 7$

$y = x + 7$
 $2y = -x + 29$
 $3y = 36$
 $y = 12, x = 5$
 $D(5, 12)$

c. $AP = \sqrt{\frac{81}{100} + \frac{9}{100}} = \sqrt{\frac{90}{100}} = \sqrt{0.9}$

C $-2x + 4 = x + 7$
 $-3 = 3x$
 $x = -1, y = 6$

C $(-1, 6)$

13 $A(-1, 3) B(4, 7) C(-11, -5)$
 $m_{AB} = \frac{4}{5}$
 $m_{AC} = \frac{-8}{-10} = \frac{4}{5}$ } collinear

17 $2y = x + 4 \Rightarrow m = \frac{1}{2}$

D (10, -3)

$m_{BD} = -2$

BD $y + 3 = -2(x - 10)$

$y = -2x + 20 - 3$

$y = -2x + 17$

AC $2y = x + 4$

$4y = 2x + 8$

$5y = 25$

$y = 5, x = 6$ B(6, 5)

A. (0, y) $\rightarrow y = 2$

(0, 2)

B(6, 5)

$6 = \frac{0+x}{2}$ $x = 12$

$5 = \frac{2+y}{2}$ $y = 8$

C(12, 8)

19 $3x - 4y = 8$ $m = \frac{3}{4}$

$0 - 4y = 8$

$y = -2$ A(0, -2) //

C(-2, 9) $m = -\frac{4}{3}$

$y - 9 = -\frac{4}{3}(x + 2)$

$3y - 27 = -4x - 8$

I $3y = -4x + 19$ } @B

II $3x - 4y = 8$ }

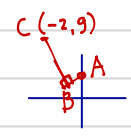
I (x3) $12x + 9y = 57$

II (x4) $12x - 16y = 32$

$25y = 25$

$y = 1$ $x = 4$

B(4, 1) //



$BC = \sqrt{6^2 + 8^2} = 10$

$AB = \sqrt{4^2 + 3^2} = 5$

$A = \frac{1}{2} \times 5 \times 10 = 25$

21 A(0, 2) B(6, 0) C(4, 4)

Midpoint of AB (3, 1) P

" " AC (2, 3) Q

" " BC (5, 2) R

AR

$m_{AR} = 0$ $y = 2$ //

BQ.

$m_{BQ} = -\frac{3}{4}$

$y = -\frac{3}{4}(x - 6)$

$4y = -3x + 18$

CP

$m_{CP} = 3$

$y - 4 = 3(x - 4)$

$y = 3x - 8$

$y = 2$ } $3x = 18 - 8$

$4y = -3x + 18$ } $x = \frac{10}{3}, y = 2$ ($\frac{10}{3}, 2$) //

$y = 3x - 8$

$4y = -3x + 18$ }

$y = 3x - 8$ }

$5y = 10$

$y = 2$ $x = \frac{10}{3}$ ($\frac{10}{3}, 2$) //

$y = 2$

$y = 3x - 8$

$2 = 3x - 8$

$3x = 10$

$x = \frac{10}{3}$ ($\frac{10}{3}, 2$) //

20 A(-3, -4) C(5, 4) $m_{AC} = \frac{8}{8} = 1$

$m_{BD} = -1$ Mid-point AC: (1, 0)

a $y - 0 = -1(x - 1)$

$y = -x + 1$ BD

b $m_{BC} = \frac{5}{3} = m_{AD}$

$y - 4 = \frac{5}{3}(x - 5)$

$3y - 12 = 5x - 25$

$3y = 5x - 13$ BC

$3y = -3x + 3$ BD } @B

$0 = 8x - 16$

$x = 2, y = -1$

B(2, -1) //

AD

$y + 4 = \frac{5}{3}(x + 3)$

$3y + 12 = 5x + 15$

$3y = 5x + 3$ } @D

$3y = -3x + 3$ }

$0 = 8x$

$x = 0, y = 1$

D(0, 1) //