CHAPTER TEST 1

Answer key

1. A (−3, −5)
B (3, −9)

a. Length $= \sqrt{6^2+4^2}$
$= \sqrt{36+16} = \sqrt{52}$

b. Gradient
$m_{AB} = \frac{4}{-6} = -\frac{2}{3}$

c. Mid-point
M (0, −7)

d. $3 = \frac{-3+x_C}{2}$ $\quad -9 = \frac{-5+y_C}{2}$
$x_C = 6+3 = 9$ $\quad y_C = -18+5 = -13$
$\therefore$ C (9, −13)

1. A (−5, −3)
B (5, −7)

a. Length $= \sqrt{10^2+4^2}$
$= \sqrt{116}$ [2]

b. Gradient
$m_{AB} = \frac{4}{-10} = -\frac{2}{5}$ [2]

c. Mid Point
M (0, −5) [2]

d. $5 = \frac{-5+x_C}{2}$ $\quad -7 = \frac{-3+y_C}{2}$
$x_C = 10+5 = 15$ ✓ $\quad y_C = -14+3 = -11$ ✓
$\therefore$ C (15, −11) ✓ [3]

2. (−1, 5)

i. (−4, 9) $m = -\frac{4}{3}$
$y-5 = -\frac{4}{3}(x+1)$
$3y-15 = -4x-4$
$\therefore 4x+3y-11 = 0$

(ii) $\parallel$ $x-2y+3=0$ $\quad m = \frac{1}{2}$
$y-5 = \frac{1}{2}(x+1)$
$2y-10 = x+1$
$\therefore x-2y+11 = 0$

(iii) $\perp$ $3x-y+5=0$ $\quad m = 3$
$m_\perp = -\frac{1}{3}$
$y-5 = -\frac{1}{3}(x+1)$
$3y-15 = -x-1$
$\therefore x+3y-14 = 0$

2. (5, −1)

i. (−4, 20) $\quad m = -\frac{21}{9} = -\frac{7}{3}$ [1]
$y+1 = -\frac{7}{3}(x-5)$ [1]
$3y+3 = -7x+35$
$\therefore 7x+3y-32 = 0$ [1]

(ii) $\parallel$ $x+2y-3=0$ $\quad m = -\frac{1}{2}$ [1]
$y+1 = -\frac{1}{2}(x-5)$ [1]
$2y+2 = -x+5$
$\therefore x+2y-3 = 0$ [1]

(iii) $\perp$ $3x+y+5=0$ $\quad m = -3$ [1]
$m_\perp = \frac{1}{3}$
$y+1 = \frac{1}{3}(x-5)$ [1]
$3y+3 = x-5$
$\therefore x-3y-8 = 0$ [1]

3. A (5,7)
B (9,-1)

(i) Midpoint (7,3)

$m_{AB} = \frac{8}{-4} = -2$

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

Eq^n of perpendicular bisector of AB:

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

$2y-6 = x-7$

$\therefore x-2y-1=0$

(ii) C (1,2), $m = -2$

a. $y-2 = -2(x-1)$

$y = -2x+2+2$

$\therefore y = -2x+4$

b. $y = -2x+4$
$x-2y-1=0$

$x-2(-2x+4)-1=0$

$x+4x-8-1=0$

$5x=9$

$x=\frac{9}{5}$

$y=-2\left(\frac{9}{5}\right)+4$

$y=-\frac{18}{5}+4=-\frac{18}{5}+\frac{20}{5}$

$=\frac{2}{5}$

$\therefore X\left(\frac{9}{5},\frac{2}{5}\right)$

3. A (7,5)
B (-1,9)

(i) Midpoint (3,7) [1]

$m_{AB} = -\frac{4}{8} = -\frac{1}{2}$

$m_{\perp} = 2$ [1]

Eq^n of perpendicular bisector of AB:

$y-7 = 2(x-3)$

$y = 2x-6+7$

$\therefore y = 2x+1$ [1]

(ii) C (2,1), $m = -\frac{1}{2}$ [1]

a. $y-1 = -\frac{1}{2}(x-2)$ [1]

$2y-2 = -x+2$

$\therefore x+2y-4=0$ [1]

b. $x+2y-4=0$
$y=2x+1$

$x+2(2x+1)-4=0$ [1]

$x+4x+2-4=0$

$5x=2$

$x=\frac{2}{5}$ [1]

$y=2\left(\frac{2}{5}\right)+1$

$=\frac{4}{5}+\frac{5}{5}=\frac{9}{5}$

$\therefore X\left(\frac{2}{5},\frac{9}{5}\right)$ [1]

4. A(3,a) B(b,−5)

(i) B : midpoint of AC :

$b = \frac{3+x_C}{2}$ $\quad -5 = \frac{a+y_C}{2}$

$x_C = 2b-3$ $\quad \therefore C(2b-3, -10-a)$

$y_C = -10-a$

(ii) $y = -x+1$

$-10-a = -2b+3+1$ $\quad m_{AB} = \frac{a+5}{3-b} = 1$

$-a+2b = 14$ } $\quad a+5 = 3-b$

$a+b = -2$ } $\quad a+b = -2$

$3b = 12$

$b = 4$ //

$a+4 = -2$

$a = -6$ //

4. A(2,a) B(b,−6)

(i) B : Midpoint of AC

$b = \frac{2+x_C}{2}$ $\quad -6 = \frac{a+y_C}{2}$ [1]

$x_C = 2b-2$

$y_C = -12-a$

$\therefore C(2b-2, -12-a)$ [1]

(ii) $y = x+1$ pass through C and ⊥ to AB

$-12-a = 2b-2+1$ [1] $\quad m_{AB} = \frac{-6-a}{b-2} = -1$ [1]

$a+2b = -11$ } [1] $\quad -6-a = -b+2$

$a-b = -8$ }

$3b = -3$

$b = -1$ // [1]

$a+1 = -8$

$a = -9$ // [1]