1 (a) $\sqrt{50} - \sqrt{18}$

$= \sqrt{25 \times 2} - \sqrt{9 \times 2}$

$= 5\sqrt{2} - 3\sqrt{2}$

$= 2\sqrt{2}$

(b) $\dfrac{12\sqrt{3}}{\sqrt{50} - \sqrt{18}}$

$= \dfrac{12\sqrt{3}}{2\sqrt{2}}$

$= \dfrac{6\sqrt{3}}{\sqrt{2}}$ ← Rationalise

$= \dfrac{6\sqrt{3}}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}}$

$= \dfrac{6\sqrt{3 \times 2}}{2}$

$= 3\sqrt{6}$

2 (a) $(2^5)^{\frac{1}{5}}$

$= 2$

(b) $(32x^5)^{-2/5}$

$= (32)^{-\frac{2}{5}} \times (x^5)^{-\frac{2}{5}}$

$= (2^5)^{-\frac{2}{5}} \times (x^5)^{-\frac{2}{5}}$

$= 2^{5 \times -\frac{2}{5}} \times$

$= 2^{-2} \times x^{-2}$

$= \dfrac{1}{4x^2}$

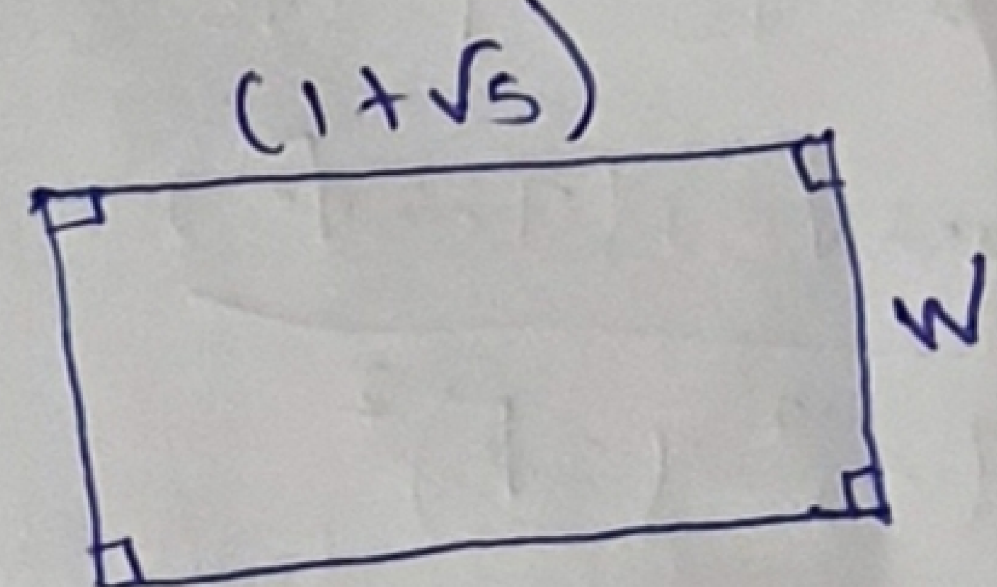
3 (a) $\sqrt{80}$

$= \sqrt{16 \times 5}$

$= \sqrt{16} \times \sqrt{5}$

$= 4\sqrt{5}$

(b)



Area of rectangle $= \sqrt{80}$

$(1 + \sqrt{5}) \times W = \sqrt{80}$

$W = \dfrac{\sqrt{80}}{1+\sqrt{5}}$

$W = \dfrac{4\sqrt{5}}{1+\sqrt{5}} \times \dfrac{1-\sqrt{5}}{1-\sqrt{5}}$

$W = \dfrac{4\sqrt{5}(1-\sqrt{5})}{(1)^2 - (\sqrt{5})^2}$

$W = \dfrac{4\sqrt{5} - 20}{1-5}$

$W = \dfrac{4\sqrt{5} - 20}{-4}$

$W = \dfrac{4\sqrt{5}}{-4} - \dfrac{20}{-4}$

$W = (5 - \sqrt{5})$ cm

4(a) $(3\sqrt{5})^2$

$= (3)^2 \times (\sqrt{5})^2$

$= 9 \times 5$

$= 45$

(b) $\dfrac{(3\sqrt{5})^2 + \sqrt{5}}{(7+3\sqrt{5})}$

$= \dfrac{45+\sqrt{5}}{(7+3\sqrt{5})} \times \dfrac{(7-3\sqrt{5})}{(7-3\sqrt{5})}$

$= \dfrac{(45+\sqrt{5})(7-3\sqrt{5})}{(7+3\sqrt{5})(7-3\sqrt{5})}$

$= \dfrac{45(7-3\sqrt{5}) + \sqrt{5}(7-3\sqrt{5})}{(7)^2 - (3\sqrt{5})^2}$

$= \dfrac{315 - 135\sqrt{5} + 7\sqrt{5} - 15}{49 - 45}$

$= \dfrac{300 - 128\sqrt{5}}{4}$

$= 75 - 32\sqrt{5}$

5(a) 9^{3x+1}

$= (3^2)^{3x+1}$

$= 3^{2(3x+1)}$

$= 3^{6x+2}$

(b) (i) $4^x = (4)^x$

$= (2^2)^x$

$= (2^x)^2$

$4^x = y^2$

(ii) $8(4^x) - 9(2^x) + 1 = 0$

$8(y^2) - 9(y) + 1 = 0$

$8y^2 - 9y + 1 = 0$

$(8y - 1)(y - 1) = 0$

Either $8y - 1 = 0$

$y = \frac{1}{8}$

$y = \frac{1}{2^3}$

$y = 2^{-3}$

replace y by 2^x

$2^x = 2^{-3}$

$x = -3$

Or $y - 1 = 0$

$y = 1$

$2^x = 1$

$2^x = 2^0$

1 is same as 2^0

$x = 0$

6 (a) $5x+3y+3=0$

$3y=-5x-3$

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

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

Gradient of line AB $=-\frac{5}{3}$

(b) Equation of line AB

$\Rightarrow \quad y=-\frac{5}{3}x+7$

$(\underbrace{2k+3}_{x}, \underbrace{4-3k}_{y})$

Replace x by $2k+3$ and y by $4-3k$ in $y=-\frac{5}{3}x+7$

$y=-\frac{5}{3}x+7$

$4-3k=-\frac{5}{3}(2k+3)+7$

Multiply throughout by 3

$12-9k=-5(2k+3)+21$

$12-9k=-10k-15+21$

$-9k+10k=-15+21-12$

$k=6$

7 (a) $3x+5y=7$

$5y=-3x+7$

$y=-\frac{3}{5}x+\frac{7}{5}$

Gradient of AB $=-\frac{3}{5}$

(b) Gradient of perpendicular line $=\frac{5}{3}$ pt $(-2,-3)$

$y=mx+c$

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

$-3=-\frac{10}{3}+c$

$c=-3+\frac{10}{3}$

$c=\frac{1}{3}$

Equation of perpendicular bisector is $y=\frac{5}{3}x+\frac{1}{3}$

$$8.\ P(\overset{x_1}{\sqrt{3}}, \overset{y_1}{2\sqrt{3}}) \quad Q(\overset{x_2}{\sqrt{5}}, \overset{y_2}{4\sqrt{5}})$$

$$\text{Gradient of } PQ = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{4\sqrt{5} - 2\sqrt{3}}{\sqrt{5} - \sqrt{3}}$$

$$= \frac{4\sqrt{5} - 2\sqrt{3}}{\sqrt{5} - \sqrt{3}} \times \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} + \sqrt{3}}$$

$$= \frac{(4\sqrt{5} - 2\sqrt{3})(\sqrt{5} + \sqrt{3})}{(\sqrt{5} - \sqrt{3})(\sqrt{5} + \sqrt{3})}$$

$$= \frac{4\sqrt{5}(\sqrt{5} + \sqrt{3}) - 2\sqrt{3}(\sqrt{5} + \sqrt{3})}{(\sqrt{5})^2 - (\sqrt{3})^2}$$

$$= \frac{20 + 4\sqrt{15} - 2\sqrt{15} - 6}{5 - 3}$$

$$= \frac{14 + 2\sqrt{15}}{2}$$

$$= \frac{14}{2} + \frac{2\sqrt{15}}{2}$$

$$= 7 + \sqrt{15}$$

$$n = 7$$

$$9)\ 2^{2x+1} - 17(2^x) + 8 = 0$$

$$(2^x)^2 \times 2^1 - 17(2^x) + 8 = 0$$

$$\text{let } y = 2^x$$

$$y^2 \times 2 - 17(y) + 8 = 0$$

$$2y^2 - 17y + 8 = 0$$

$$(2y - 1)(y - 8) = 0$$

$$\text{Either } 2y - 1 = 0$$

$$y = \frac{1}{2}$$

$$y = 2^{-1}$$

$$2^x = 2^{-1}$$

$$x = -1$$

$$\text{or } y - 8 = 0$$

$$y = 8$$

$$2^x = 2^3$$

$$x = 3$$

10. $y-x=4$ -- equa ①

$2x^2+xy=-1$ - equa ②

From equa ① $y=4+x$

Substitute y by $4+x$ in equa ②

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

$2x^2+4x+x^2=-1$

$3x^2+4x+1=0$

$(3x+1)(x+1)=0$

Either $3x+1=0$

$x=-\frac{1}{3}$

or $x+1=0$

$x=-1$

when $x=-\frac{1}{3}$

$y=4-\frac{1}{3}$

$y=\frac{11}{3}$

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

when $x=-1$

$y=4-1$

$y=5$

11 (a) $2x+3y=26$

$3y=-2x+26$

$y=-\frac{2}{3}x+\frac{26}{3}$

Gradient of $l_2=\frac{3}{2}$ pt $(0,0) \rightarrow c=0$

Equation of $L_2 \Rightarrow y=\frac{3}{2}x$

(b) On y-axis, $x=0$

$2x+3y=26$

$2(0)+3y=26$

$3y=26$

$y=\frac{26}{3}$

$B(0,\frac{26}{3})$

~~For~~ To find coordinates of c, solve equation of L_1 and L_2 simultaneously

$2x+3y=26$ - equa ①

$y=\frac{3}{2}x$ - equa ②

Substitute y by $\frac{3}{2}x$ in equa ①

$2x+3(\frac{3}{2}x)=26$

$2x+\frac{9}{2}x=26$

$\frac{13}{2}x=26$

$x=26\times\frac{2}{13}$

$x=4$

when $x=4$

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

$y=6$

$C(4,6)$