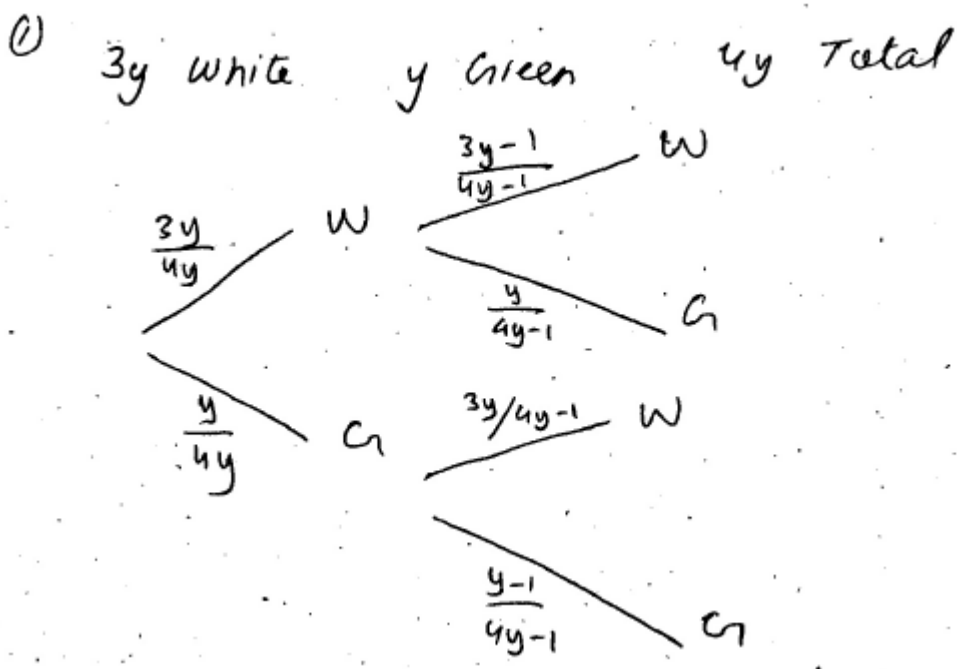
ANSWERS

PROBABILITY EQUATIONS ANSWERS

Q1-

(i)



$\frac{y}{4y} \times \frac{y-1}{4y-1} = \frac{1}{20}$

$\frac{1}{4} \times \frac{y-1}{4y-1} = \frac{1}{20}$

$\frac{y-1}{4(4y-1)} = \frac{1}{20}$

$20(y-1) = 4(4y-1)$

$20y - 20 = 16y - 4$

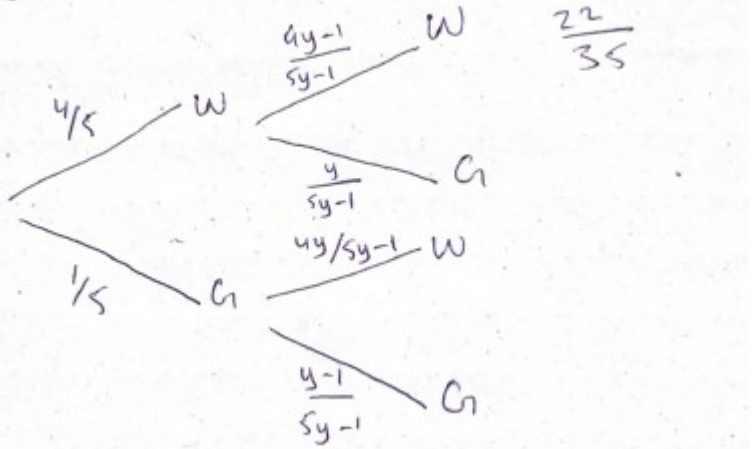
$4y = 16$

$y = 4$

Q2-

(2)

4y white & Green 5y Total



$$\frac{4}{5} \times \frac{4y-1}{5y-1} = \frac{22}{35}$$

$$\frac{4(4y-1)}{5(5y-1)} = \frac{22}{35}$$

$$\frac{16y-4}{25y-5} = \frac{22}{35}$$

$$560y - 140 = 550y - 110$$

$$10y - 140 = -110$$

$$10y = 30$$

$$y = 3$$

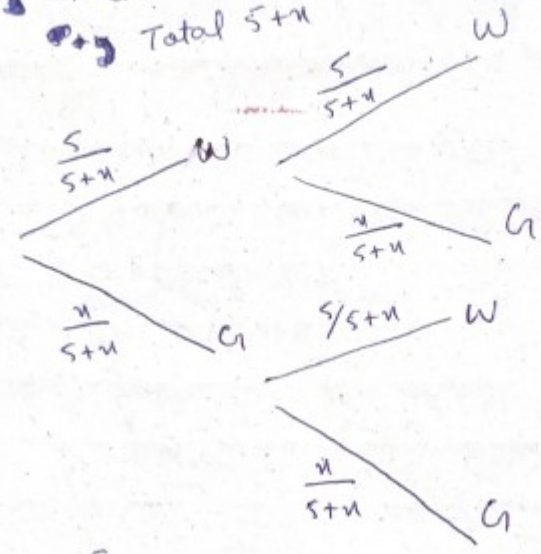
Q3-

(3)

5 White

n Green

Total $5+n$



$$\frac{5}{5+n} \times \frac{5}{5+n} = \frac{1}{9}$$

$$\frac{25}{(5+n)(5+n)} = \frac{1}{9}$$

$$225 = 25 + 5n + 5n + n^2$$

$$225 = 25 + 10n + n^2$$

$$0 = n^2 + 10n - 200$$

$$0 = (n+20)(n-10)$$

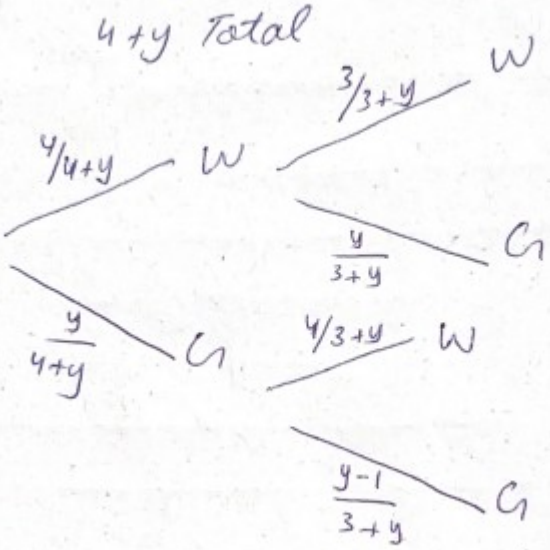
$n = -20$ and $\boxed{n = 10}$

(n cannot be negative)

Q4

(4) 4 white y Green

4+y Total



$\frac{1}{3}$

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

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

$$3y(y-1) = (4+y)(3+y)$$

$$3y^2 - 3y = 12 + 4y + 3y + y^2$$

$$3y^2 - 3y = 12 + 7y + y^2$$

$$2y^2 - 10y - 12 = 0$$

$$y^2 - 5y - 6 = 0$$

$$(y-6)(y+1) = 0$$

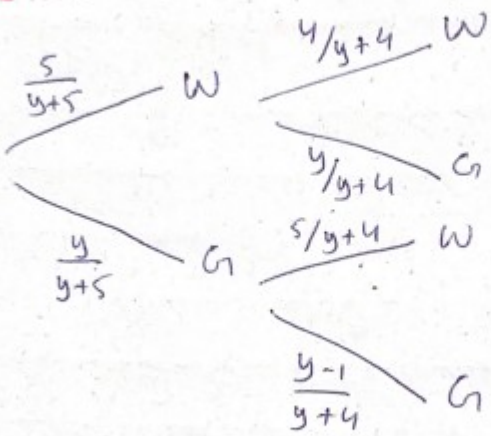
$y = 6$ $y = -1$

(y connot be negative)

Q5-

(5) 5 white y Green

$y+5$ Total



$$\frac{5}{y+5} \times \frac{4}{y+4} = \frac{5}{33}$$

$$\frac{20}{(y+5)(y+4)} = \frac{5}{33}$$

$$660 = 5(y+5)(y+4)$$

$$132 = (y+5)(y+4)$$

$$132 = y^2 + 4y + 5y + 20$$

$$132 = y^2 + 9y + 20$$

$$0 = y^2 + 9y - 112$$

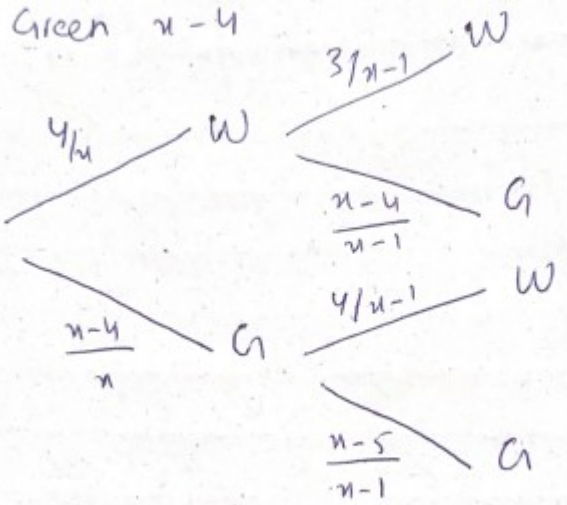
$$(y+16)(y-7)$$

$y = -16$ and $\boxed{y = 7}$

(y cannot be negative)

Q6-

⑥ Total n
White 4
Green $n-4$



$$\frac{x-4}{n} \times \frac{n-5}{n-1} = \frac{1}{3}$$

$$\frac{(n-4)(n-5)}{n(n-1)} = \frac{1}{3}$$

$$\frac{n^2-5n-4n+20}{n^2-n} = \frac{1}{3}$$

$$3(n^2-9n+20) = 3n^2-3n$$

$$3n^2-27n+60 = 3n^2-3n$$

$$2n^2-26n+60 = 0$$

$$n^2-13n+30 = 0$$

For n,

$$n^2-13n+30 = 0$$
$$(n-3)(n-10) = 0$$
$$n = 3, \quad n = 10$$

n cannot be smaller than 4, so, $\boxed{n = 10}$

Q7-

(7) y Total
8 white
$y-8$ Green

a) Show $y^2-21y+90=0$

$$\frac{y-8}{y}\times\frac{y-9}{y-1}=\frac{1}{5}$$

$$\frac{(y-8)(y-9)}{y(y-1)}=\frac{1}{5}$$

$$\frac{y^2-8y-9y+72}{y^2-y}=\frac{1}{5}$$

$$\frac{y^2-17n+72}{y^2-y}=\frac{1}{5}$$

$$5y^2-85y+360=y^2-y$$

$$4y^2-84y+360=0$$

$$y^2-21y+90=0$$

b) $y^2-21y+90=0$

$(y-6)(y-15)=0$

$y=6$ and $y=15$

y can't be smaller than 8, so, $\boxed{y=15}$