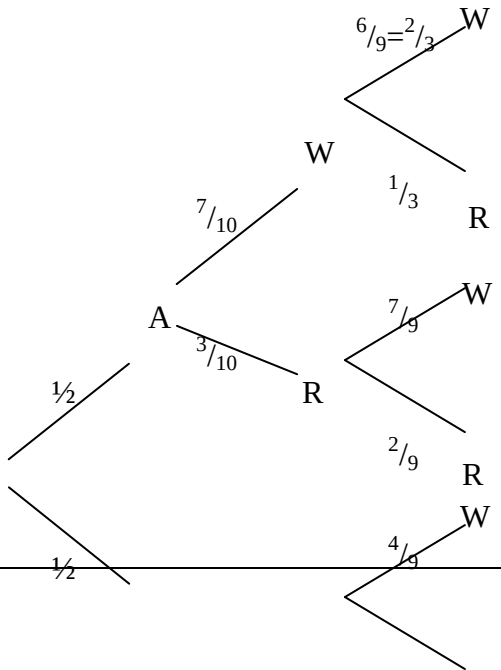
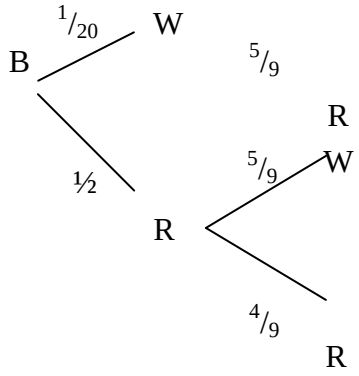
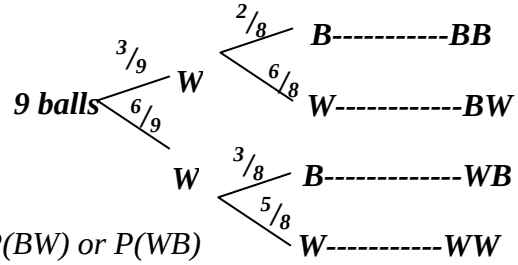
2. Probability

1	a) $P(R)=\frac{1}{8}$ and $P(H)=\frac{3}{7}$ $\therefore \frac{1}{8}\times\frac{3}{7}=\frac{3}{56}$ b) $P(RH')$ or $P(R'H)$ or $P(RH)$ $\left(\frac{1}{8}\times\frac{4}{7}\right)+\left(\frac{7}{8}\times\frac{3}{7}\right)+\frac{3}{56}$ $\frac{4}{56}+\frac{21}{56}+\frac{3}{56}$ $=\frac{28}{56}$ *or* $\frac{1}{2}$ *or* 0.5	B_1 M_1 M_1 A_1	
		4	
2.		B2	

	 (b) (i) (½ x 7/10 x 2/3) + (½ x 3/10 x 2/9) + (½ + 4/9 x ½) + ½ x ½ x4/9) = 22/45 (ii) 1 – 22 45 = 23 45 (iii) (½ x 7/10 x 1/3) + (½ x 3/10 x 7/10) + (½ x ½ x 5/9) + (½ x ½ x ½) 7/60 + 7/60 + 5/36 + 5/36 = 23/45 (iv) 1 – 23 = 22 45 45	U1 A1 M1 A1 M1 A1 B1 A1	
		10	

1. (a) (i) Total balls = 3 + 6 = 9



= P(BW) or P(WB)

$= \left(\frac{3}{9} \times \frac{6}{8}\right) + \left(\frac{6}{9} \times \frac{3}{8}\right)$

= 18 + 18 = 36

$\frac{72}{72} \quad \frac{72}{72}$

$= \frac{1}{2}$

(ii) = P(BW) or P(WB)

$= \left(\frac{3}{9} \times \frac{6}{9}\right) + \left(\frac{6}{9} \times \frac{3}{9}\right)$

$= \frac{18}{81} + \frac{18}{81}$

$= \frac{36}{81} = \frac{4}{9}$

(b) (i) P(WW) $= \frac{6}{9} \times \frac{5}{8}$

$= \frac{30}{72} = \frac{5}{12}$

(ii) P(WW) $= \frac{6}{9} \times \frac{6}{9}$

$= \frac{4}{9}$

2. $P(W) = {}^{7}/_{12} \quad P(B) = {}^{5}/_{12}$

(2 white and one brown)

=(WWB or WBW or BWW

$= ({}^{7}/_{12} \times {}^{6}/_{11} \times {}^{5}/_{10}) + ({}^{7}/_{12} \times {}^{5}/_{11} \times {}^{6}/_{10}) + ({}^{7}/_{12} \times {}^{7}/_{11} \times {}^{6}/_{10})$

$= {}^{22}/_{44}$

(ii) P(BBW or BWB or WBB)

$= ({}^{5}/_{12} \times {}^{4}/_{11} \times {}^{7}/_{10}) + ({}^{5}/_{12} \times {}^{7}/_{11} \times {}^{4}/_{10}) + ({}^{7}/_{12} \times {}^{5}/_{11} \times 4/_{10})$

$= {}^{7}/_{22}$

(iii) P (at least one white cup)

$= (1\text{-}P(BBB) = 1\text{-}({}^{5}/_{12} \times {}^{4}/_{11} \times {}^{3}/_{10})$

$= {}^{21}/_{22}$

(iv) P (same colour) = P(BBB or WWW)

$= ({}^{7}/_{12} \times {}^{6}/_{11} \times {}^{5}/_{10}) + ({}^{5}/_{12} \times {}^{4}/_{11} \times 3/_{10})$

$= {}^{9}/_{44}$

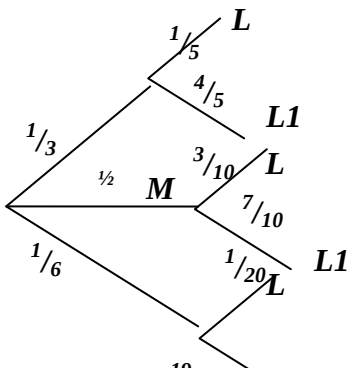
3. a)

2	3	5	7
2	32	52	72
3	23	53	73
5	25	35	75
7	27	37	57

b) P(E) $= \frac{4}{16}$

$= \frac{1}{4}$

4.



(a) P(late) = ($^1/_3$ x $^1/_5$) + (½ x $^3/_{10}$) + ($^1/_6$ x $^1/_{20}$)

= $^1/_{15}$ + $^3/_{20}$ + $^1/_{120}$

= $^9/_{40}$

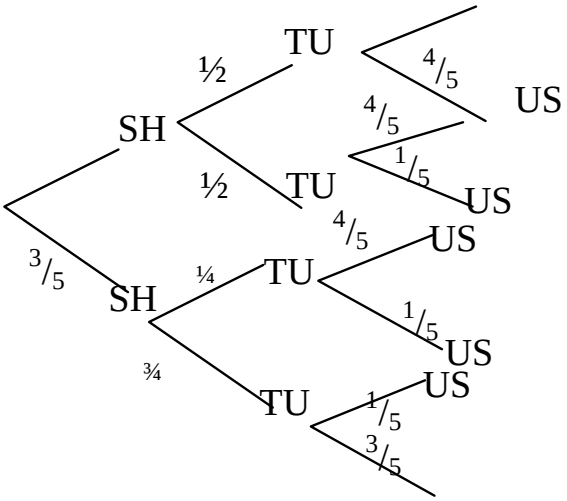
(b) P = $^1/_3$ x $^1/_5$) + ($^1/_6$ x 1/$_{20}$)

= $^1/_{15}$ + 1/$_{20}$

= $^3/_{40}$

(c) P= (not late) = (1- $^9/_{40}$)

5. *a)*

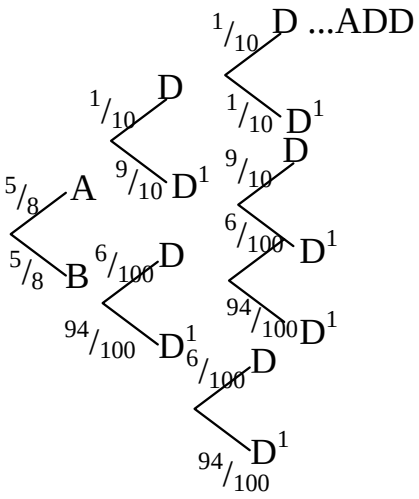


b) *i) P(all faults)= P(SH and TU and US)*

= $^2/_5$ x ½ x $^4/_5$ = $^4/_{25}$

ii) P(exactly two) = $^2/_5$ x ½ x $^1/_5$ + $^2/_5$ x ½ x $^1/_5$ + $^3/_5$ x ¾ x $^1/_5$

6.



Both defective

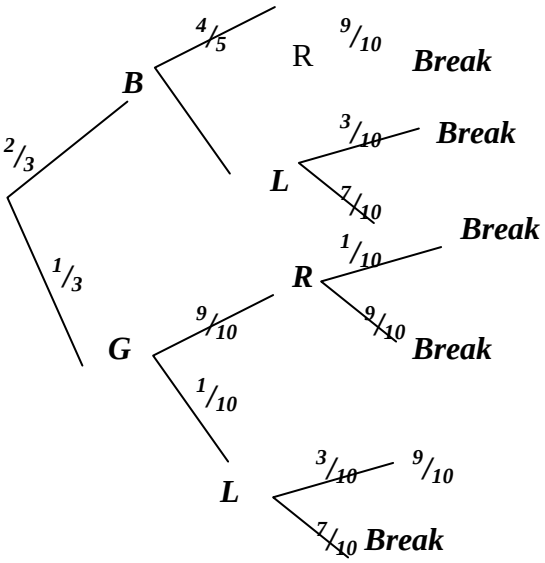
$= \frac{3}{8} \times \frac{1}{10} \times \frac{1}{10} + \frac{5}{8} \times \frac{6}{100} \times \frac{6}{100}$

$= \frac{3}{800} + \frac{180}{80000}$

$= \frac{24}{4000}$

$= \frac{3}{500}$

7. a)



b) i) P (BL or GL) = $^2/_3 X {}^1/_{10} + {}^1/_3 X {}^1/_{10}$

$= {}^2/_{15} + {}^1/_{30} = {}^5/_{30}$

ii) P(BL break or GR break)

$= {}^2/_3 X {}^1/_5 X {}^3/_{10} + {}^1/_3 X {}^1/_{10} X {}^3/_{10}$

$= {}^2/_{50} + {}^1/_{100} = {}^{4+1}/_{100} = {}^5/_{100}$

iii) P(BR break or GR break)

$= {}^2/_3 X {}^4/_5 X {}^1/_{10} + {}^1/_3 X {}^9/_{10} X {}^1/_{10}$

$= {}^8/_{150} + {}^9/_{300} = {}^{16+9}/_{300} = {}^{25}/_{300}$

iv) $1 - (^{5}/_{100} + {}^{25}/_{300}) = 1 - {}^{15+25}/_{300}$

$= {}^{260}/_{300}$

8.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

P(a two days outing) $= {}^{10}/_{36} = {}^{5}/_{18}$

(b) 1 2 3 4 5 6

H H1 H2 H3 H4 H5 H6

T T1 T2 T3 T4 T5 T6

P(2days and one day pocket money)

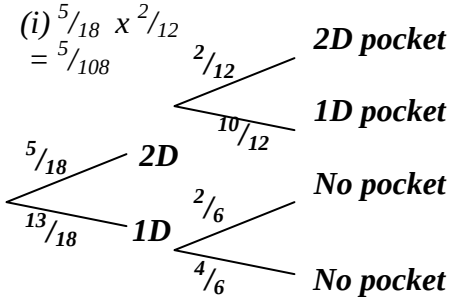
$= \frac{5}{18} \times \frac{10}{12}$

$= \frac{25}{108}$

(c) *(i)* ${}^{5}/_{18} \times {}^{2}/_{12}$

$= {}^{5}/_{108}$

(ii)



P(get pocket money)

$= {}^{5}/_{18} \times {}^{2}/_{12} + {}^{5}/_{18} \times {}^{10}/_{12} + 1^{3}/_{18} \times {}^{2}/_{6}$

9. (a) (i) $P(WW) = \frac{4}{10} \times \frac{3}{9}$

$= \frac{2}{15}$

(ii) $P(WW) \text{ or } (RR) = \frac{4}{10} \times \frac{3}{9} + \frac{6}{10} \times \frac{5}{9}$

$= \frac{2}{15} + \frac{1}{3} = \frac{7}{15}$

(iii) P (at least Red) $= 1 - P(WW)$

$= 1 - \frac{2}{15}$

$\frac{13}{15}$

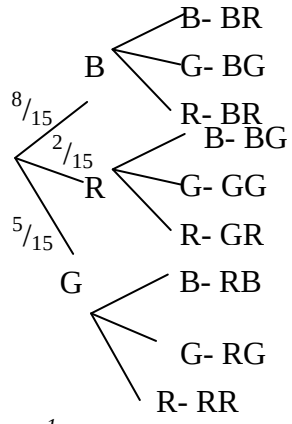
(iv) $P(WR) \text{ or } P(RW) = \frac{3}{5} \times \frac{4}{9} + \frac{2}{5} \times \frac{2}{3}$

$= \frac{8}{15}$

10. a) *i)* ${}^{8}/_{15}$

ii) $^{2}/_{15} + {}^{5}/_{15} = {}^{7}/_{15}$

b) i)



Gh $= {}^{2}/_{15} \times {}^{1}/_{14} = {}^{2/}{}_{21}0 = {}^{1}/_{105}$

ii) RG or RB

$${}^{3}/_{21} + {}^{7}/_{45} = \frac{45 + 147}{945}$$

$$= \frac{192}{945}$$

(c)(i)

	H	*T*
1	*1H*	*1T*
2	*2H*	*2T*
3	*3H*	*3T*
4	*4H*	*4T*
5	*5H*	*5T*
6	*6H*	*6T*

11. *(a)*

(b) *(i) same colour* $= {}^{5}/_{9} \times {}^{4}/_{2} \times {}^{3}/_{7} + {}^{4}/_{9} \times {}^{3}/_{8} \times {}^{2}/_{7}$

$= {}^{5}/_{42} + {}^{1}/_{7}$

$= {}^{11}/_{42}$

(ii) more red balls $= {}^{5}/_{89} \times ½ \times {}^{3}/_{7} + {}^{5}/_{9} \times ½ \times {}^{4}/_{7} + {}^{5}/_{9} \times ½ \times {}^{4/}7$

$= {}^{5}/_{42} + {}^{10}/_{63} = {}^{10}/_{63}$

$= {}^{5}/_{42} + {}^{20}/_{63} = \frac{15 + 40}{126} = \frac{55}{126}$

(iii) at least black ball was picked

$= 1 - {}^{5}/_{9} \times ½ \times {}^{3}/_{7}$

$= 1 - {}^{5}/_{21}$

$= {}^{16}/_{21}$

(iv) Atmost 1 red ball picked

$= {}^{5}/_{9} \times {}^{4}/_{2} \times {}^{3}/_{7} + {}^{4}/_{9} \times {}^{5}/_{8} \times {}^{3}/_{7} + {}^{4}/_{9} \times {}^{3}/_{8} \times {}^{2}/_{7}$

$= {}^{5}/_{42} + 5/_{92} + {}^{1}/_{21}$

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

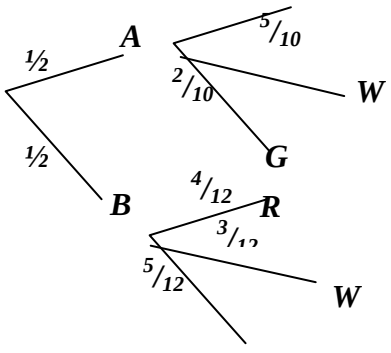
42

$= {}^{12}/_{42}$

$= {}^{2}/_{7}$

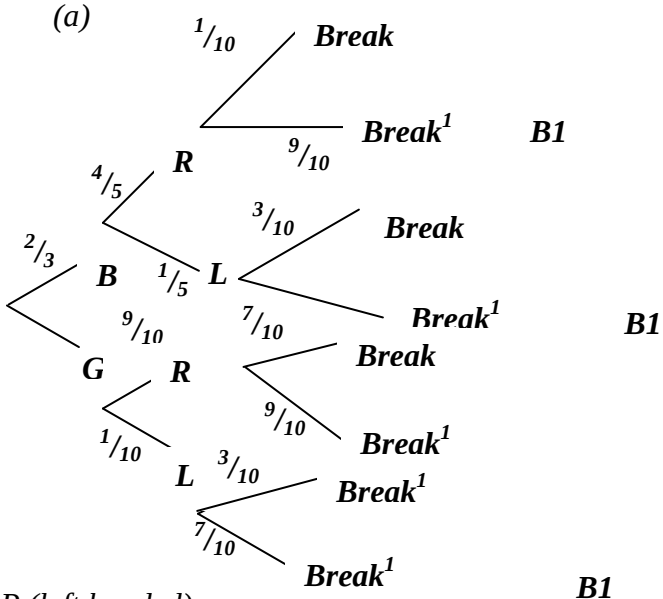
$^{3}/_{10}$

12.



P (Red) = (½ x $^{3}/_{10}$) + (½ x $^{4}/_{12}$)= 19 60

13. (a)



B1

bi) P (left handed)

$= {}^{2}/_{3} \times {}^{1}/_{5} + {}^{1}/_{3} \times {}^{1}/_{10}$

$= {}^{2}/_{15} + {}^{1}/_{3}$

$= {}^{5}/_{30} = {}^{1}/_{6}$

ii) P (Right handed and will break)

$= {}^{2}/_{3} \times {}^{4}/_{5} \times {}^{1}/_{10} + {}^{1}/_{3} \times {}^{1}/_{9} \times {}^{1}/_{10}$

$= {}^{8}/_{150} + {}^{9}/_{300}$

$= {}^{25}/_{300} = {}^{1}/_{18}$

c) P (= $^{2}/_{3} \times {}^{4}/_{5} \times {}^{1}/_{10} + {}^{2}/_{3} \times {}^{1}/_{5} \times {}^{3}/_{10} + {}^{1}/_{3} \times {}^{9}/_{10} \times {}^{1}/_{10} + {}^{1}/_{3} \times {}^{1}/_{10} \times {}^{3}/_{10}$

14. (i) P (RRR) = $\frac{5}{15} X \frac{5}{15} X \frac{5}{15}$

$= \frac{125}{3375}$

$= \frac{1}{27}$

(ii) $\frac{125}{3375} + \frac{64}{3375} + \frac{216}{3375}$

$= \frac{405}{3375}$

$= \frac{3}{25}$

(iii) P (RBG) + P (GRB) + P(BGR)

$\frac{5}{15} X \frac{4}{15} X \frac{6}{15} + \frac{6}{15} X \frac{5}{15} X \frac{4}{15} + \frac{4}{15} X \frac{6}{15} X \frac{5}{15}$

$= \frac{120}{3375} + \frac{120}{3375} + \frac{120}{3375}$

$= \frac{24}{}$

(iv) P(BBB) + P(GGG) + P(BBG) + P (GGB)

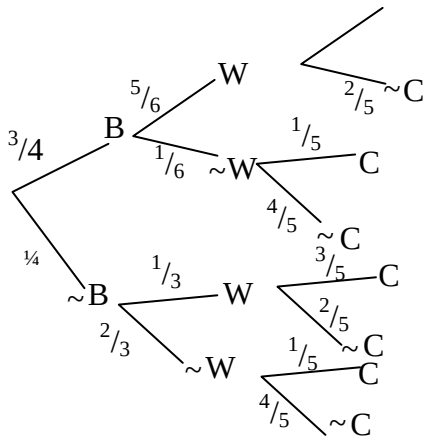
$= \frac{4}{15} X \frac{4}{15} X \frac{4}{15} + \frac{6}{15} X \frac{6}{15} X \frac{6}{15} + \frac{4}{15} X \frac{4}{15} X \frac{6}{15} + \frac{6}{15} X \frac{6}{15} X \frac{4}{15}$

$= \frac{64}{3375} + \frac{216}{3375} + \frac{96}{3375} + \frac{144}{3375}$

$= \frac{520}{3375} + \frac{104}{3375}$

B- To bed on time
B- To bed late
W- Waking upon time
W- waking up late
C- Getting to class on time
C- Getting to class late

15.



B- To bed on time
~B- To bed late
W- Waking upon time
~W- waking up late
C- Getting to class on time
~C- Getting to class late

(a) (i) $P(Bnw) = \frac{3}{4} \times \frac{5}{6}$

$= \frac{5}{8}$

✓tree diagram.

✓Addition of probability

ii) P(Waking up late)

$\left(\frac{1}{4} \times \frac{1}{6}\right) + \left(\frac{1}{4} \times \frac{2}{3}\right)$

$= \frac{1}{8} + \frac{1}{6} = \frac{3+4}{24}$

$= \frac{7}{24}$

✓Addition of prob.

✓Addition of prob.

b) (i) P (BW~C) or P(B~W~C)

$\left(\frac{3}{4} \times \frac{1}{1} \times \frac{4}{1}\right) + \left(\frac{3}{4} \times \frac{5}{1} \times \frac{2}{1}\right)$

$$\frac{4}{2}\quad\frac{6}{}\quad\frac{5}{}\qquad\frac{4}{2}\quad\frac{6}{1}\quad\frac{5}{}$$

$$\frac{1}{10} + \frac{1}{4} = \frac{4 + 10}{40}$$

$$= \frac{7}{20}$$

ii) $P(\sim B \sim C) = \frac{1}{4} \times \frac{1}{3} \times \frac{3}{5} + \frac{1}{4} \times \frac{2}{3} \times \frac{1}{5}$

$$= \frac{1}{20} + \frac{1}{30} = \frac{3 + 2}{60} = \frac{5}{60}$$

$$= \frac{1}{12}$$