IB Math 1 24E Compound Events

1. A six-sided die is rolled and a coin is tossed.

P(H) = $\frac{1}{2}$

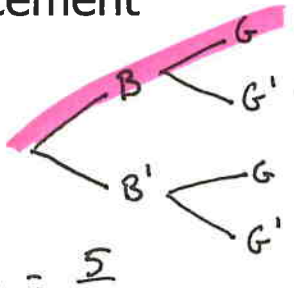
P(3) = $\frac{1}{6}$

P(H and 3) = $\frac{1}{12}$ = $\frac{1}{2} \cdot \frac{1}{6}$

Independent Events:
One event does not affect the probability of the other.
A and B are independent if and only if P(A and B) = $P(A) \cdot P(B)$

2. A bag has 4 Blue, 5 Green, 2 Red, and 9 Yellow marbles.
Two marbles are drawn.

Without replacement
P(B, then G)



$P(B) = \frac{4}{20} = \frac{1}{5}$

$P(2^{nd}\ G \text{ after } 1^{st}\ B) = \frac{5}{19}$

$P(B, \text{ then } G) = \frac{1}{5} \cdot \frac{5}{19}$

Dependent Events $= \boxed{\frac{1}{19}}$

With replacement
P(B, then G)

$P(B) = \frac{1}{5}$

$P(2^{nd}\ G \text{ after } 1^{st}\ B) = \frac{1}{4}$

Independent Events

$P(B, \text{ then } G) = \frac{1}{5} \cdot \frac{1}{4}$

$= \boxed{\frac{1}{20}}$

Dependent Events:
The probability of the 2nd event depends on the 1st outcome.

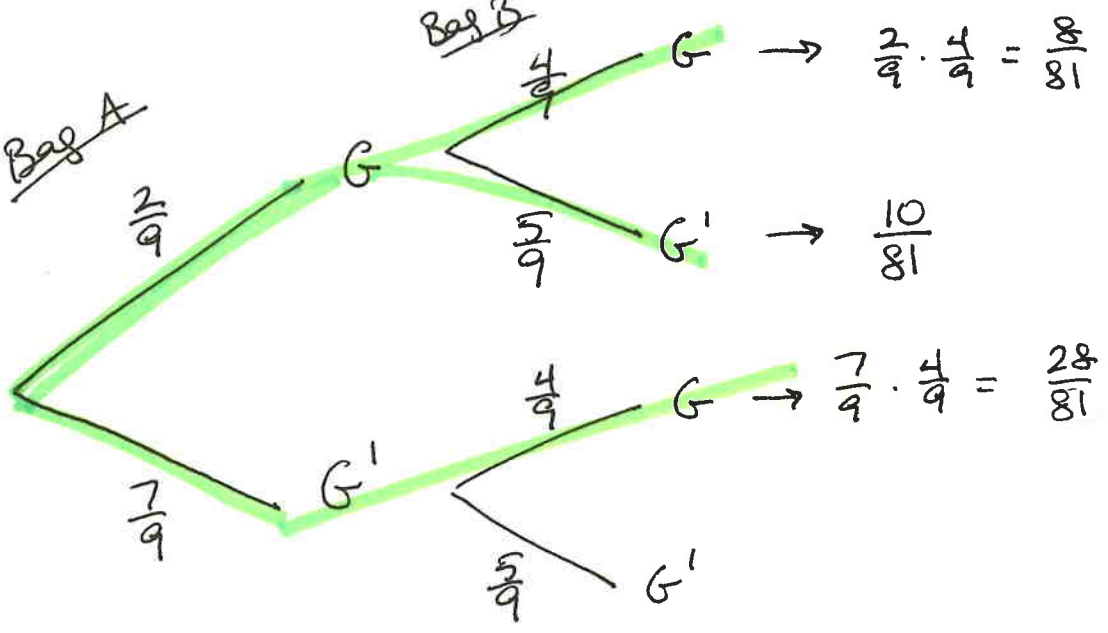
P(A, then B) = $P(A) \cdot P(B, \text{ given that A has occured})$

24F Tree Diagrams

3. Holly has two bags of marbles:
   Bag A has 3 Red, 2 Green, and 4 Blue
   Bag B has 2 Red, 4 Green, and 3 Blue

Holly randomly selects a marble from each bag.

a. What is the probability that she gets at least one Green?



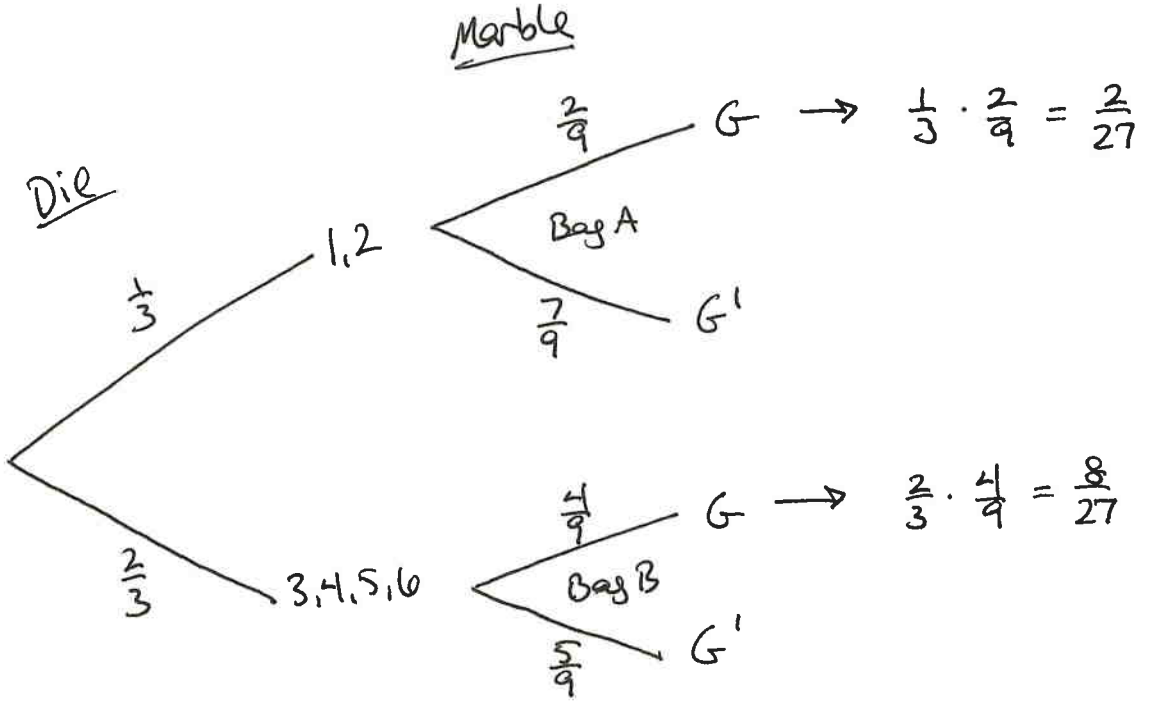
$\frac{8}{81} + \frac{10}{81} + \frac{28}{81} = \boxed{\frac{46}{81}}$

b. What is the probability that she gets no Greens?

$1 - \frac{46}{81} = \boxed{\frac{35}{81}}$ $\qquad \frac{7}{9} \cdot \frac{5}{9} = \boxed{\frac{35}{81}}$

4. Carolyn has a six-sided die. If she rolls a...
   ...1 or 2, Holly draws a marble from Bag A (3R, 2G, 4B)
   ...3, 4, 5, or 6, Holly draws a marble from Bag B (2R, 4G, 3B)

What is the probability that Holly draws a Green marble?



$P(G) = P(1,2, \text{then } G \quad \text{OR} \quad 3,4,5,6, \text{then } G)$

$= P(1,2) \cdot P(\text{then } G) + P(3,4,5,6) \cdot P(\text{then } G)$

$= \frac{1}{3} \cdot \frac{2}{9} + \frac{2}{3} \cdot \frac{4}{9}$

$= \frac{2}{27} + \frac{8}{27}$

$= \boxed{\frac{10}{27}}$

HW 24 E.1
24 E.2
24 F (1, 3, 5, 7)