17. A box contains three cards bearing the numbers 1, 2, 3. A second box contains four cards with numbers 2, 3, 4, 5. A card is chosen at random from each box. Draw the sample space. Then find the probability

	2	3	4	5
1	1,2	1,3	1,4	1,5
2	2,2	2,3	2,4	2,5
3	3,2	3,3	3,4	3,5

a. The cards have the same number

$$\frac{2}{12} = \frac{1}{6}$$

b. The larger of the two numbers drawn is 3

$$\frac{3}{12} = \frac{1}{4}$$ (if you don't consider 3,3)

c. The sum of the two numbers on the cards is less than 7

$$\frac{9}{12} = \frac{3}{4}$$

d. The product of the numbers on the cards is at least 8

$$\frac{5}{12}$$

e. At least one even number is chosen

$$\frac{8}{12} = \frac{2}{3}$$

18. One bag contains 3 red and 2 white balls, another bag contains 1 red and 4 white balls. A ball is selected at random from each bag. Find the probability that

a. Both balls are red

$$\frac{3}{5} \cdot \frac{1}{5} = \frac{3}{25}$$

b. The balls are different colors

$$\frac{3}{5} \cdot \frac{4}{5} + \frac{2}{5} \cdot \frac{1}{5} = \frac{12+2}{25} = \frac{14}{25}$$

c. At least one ball is white

$$\left(1 - \text{Both Red}\right) = 1 - \frac{3}{25} = \frac{22}{25}$$

19. Adam is playing in a cricket match and a game of hockey this weekend. The probability his is team will win the cricket match is 0.75 and the probability of winning the hockey match is 0.85. Assume that these events are independent. What is the probability he will win both matches?

$$P(\text{both wins}) = (.75)(.85)$$ because the 2 events are independent

$$= \left(\frac{3}{4}\right)\left(\frac{17}{20}\right) = \frac{51}{80}$$

20. Three events are such that A and B are mutually exclusive and P(A) = 0.2, P(C) = 0.3, P($A \cup B$) = 0.4 and P($B \cup C$) = 0.34. Calculate P(B) and P($B \cap C$). Determine whether B and C are independent. ← if true ↓

$P(A \cup B) = P(A) + P(B)$

$04 = 02 + P(B)$

$\boxed{0.2 = P(B)}$

$P(B \cup C) = P(B) + P(C) - P(B \cap C)$

$.34 = .2 + .3 - P(B \cap C)$

$34 = 5 - P(B \cap C)$

$\boxed{P(B \cap C) = .16}$

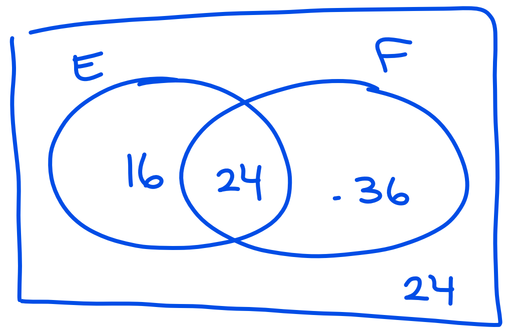
$P(B) \times P(C) = P(B \cap C)$

$2 \times 3 \neq 16$

they are not independent

21. Given that P(E') = P(F) = 0.6 and P($E \cap F$)= 0.24

a. Write down P(E) $= 1 - .6 = .4$



b. Explain why E and F are independent.

$P(E) \times P(F) = P(E \cap F)$

$4 \times 6 = 24$

c. Explain why E and F are not mutually exclusive

$P(E \cap F) = .24 \neq 0$

d. Find P($E \cup F'$)

$P(E \cup F') = P(E) + P(F') - P(E \cap F')$

formula was confusing w/o venn diagram

$.4 + 24 = .64$

or

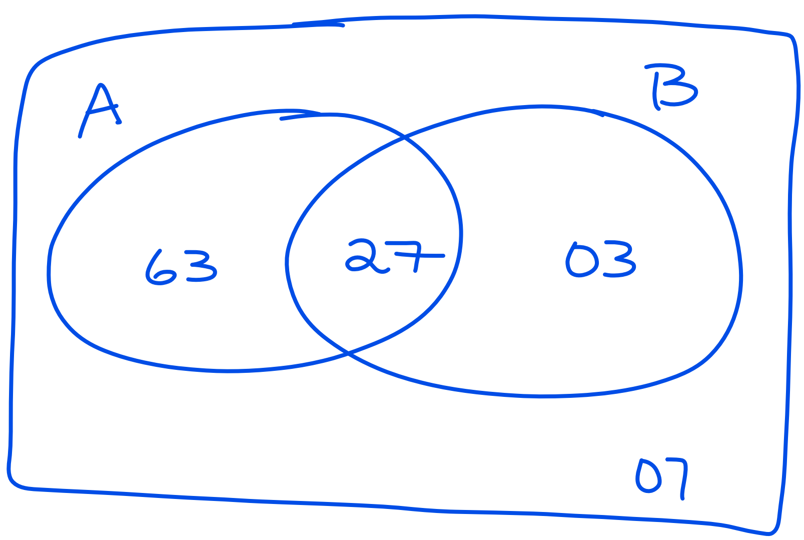
$1 - 36 = 64$

22. A and B are independent events such that P(A) = 0.9 and P(B) = 0.3. Find

$P(A \cap B) = P(A)\,P(B)$
$= 09 \times 03 = 27$

a. P($A \cap B$)

$.27$



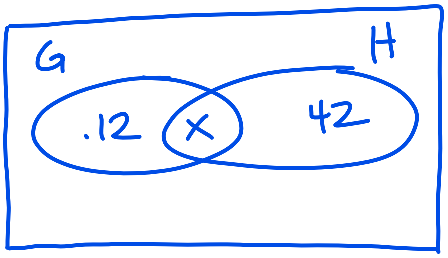
b. P($A \cap B'$)

63

c. P($A \cup B$)'

07

23. Independent events G and H are such that P($G \cap H'$) = 0.12 and P($G' \cap H$) = 0.42. Draw a Venn diagram. Let P($G \cap H$) = x. Find two possible values of x.



$x = (x + 12)(x + 42)$

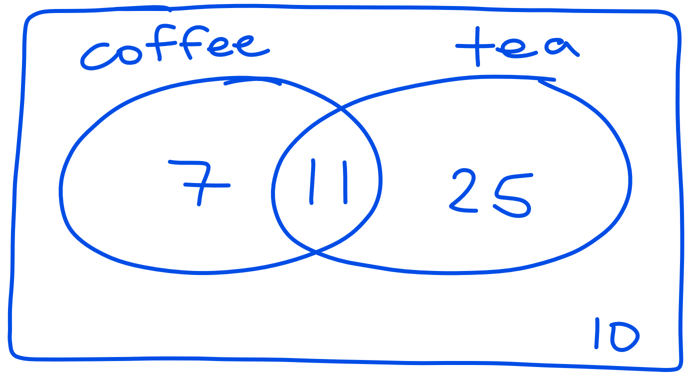
$x = x^2 + 54x + 0504$

$0 = x^2 - 46x + 0504$

$\boxed{x = 18,\ 28}$

24. Of the 53 staff at a school, 36 drink tea, 18 drink coffee, and 10 drink neither tea nor coffee. How many staff drink both tea and coffee? One member of staff is chosen at random. Find the probability that

$53 - 10 = 43$ $\quad 36 + 18 = 54$ $\quad 54 - 43 = 11$



a. They drink tea but not coffee

$\frac{25}{53}$

b. If they are a tea drinker they drink coffee as well (conditional probability)

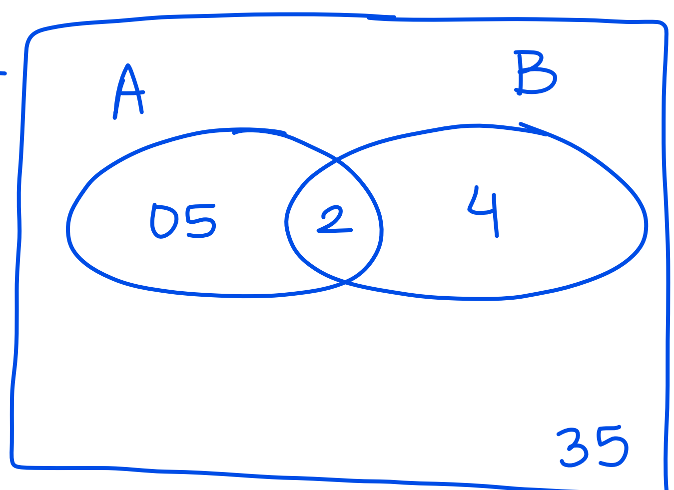
$\frac{11}{36}$

c. If they are a tea drinker they do not drink coffee

$\frac{25}{36}$

25. For events A and B, it is known that P($A' \cap B'$) = 0.35, P(A) = 0.25 and P(B) = 0.6. Find

$1 - 0\ 35 = 0\ 65$ $\quad 0\ 25 + 60 = 85$ $\quad 85 - 65 = 20$



a. P($A \cap B$)

0 2

b. P($A|B$)

P(A given B) $= \frac{.2}{.6} = \frac{1}{3}$

c. P($B'|A'$)

P(Not B given not A) $= \frac{.35}{.75} = \frac{7}{15}$

26. There are 27 students in a class. 15 take Art and 20 take Theater. Four do neither subject. How many students do both subjects? One student is chosen at random. Find the probability that

a. They take theater but not Art $\frac{8}{27}$

b. They take at least one of the two subjects $\frac{23}{27}$

c. They take Theater, given that they take Art $\frac{12}{15}$

27. The table shows the number of left and right handed table tennis players in a sample of 50 males and females.

	Left handed	Right handed	Total
Male	5	32	37
Female	2	11	13
Total	7	43	50

A player is chosen at random. Find the probability that the player is

a. male and left handed $\frac{1}{10}$

b. right handed $\frac{43}{50}$

c. right handed, given that the player is female

$\frac{11}{13}$

28. *J* and *K* are independent events. Given that $P(J|K) = 0.3$ and $P(K) = 0.5$, find $P(J)$.

.3