The mystery of science

CONDITIONAL PROBABILITY

Description

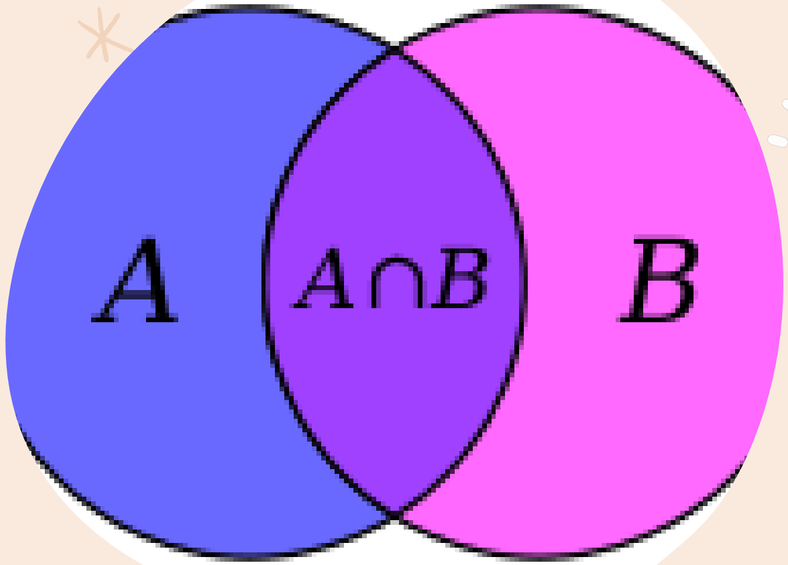
1

THE CONDITIONAL PROBABILITY OF OCCURRENCE OF EVENT A, PROVIDED THAT EVENT B OCCURS, IS CALCULATED FROM THE FORMULA:

$$P(A \mid B) = P(A \cap B)/P(B)$$

2

MAYBE THE NEXT EXAMPLE WILL BRING US CLOSER TO THIS TOPIC



Example

If you select a random card from a pack of 52, then the probability that it will be a heart is 13/52 = 1/4

However, if you are given the additional information that the card selected is red, then the probability is increased to 13/26 = 1/2

Going back to cards A is the event obtain a heart and B is the event obtain a red card, so A ∩ B is the event obtain a red heart card. Now use a formula: P (A | B) = P (A∩B)/P (B)

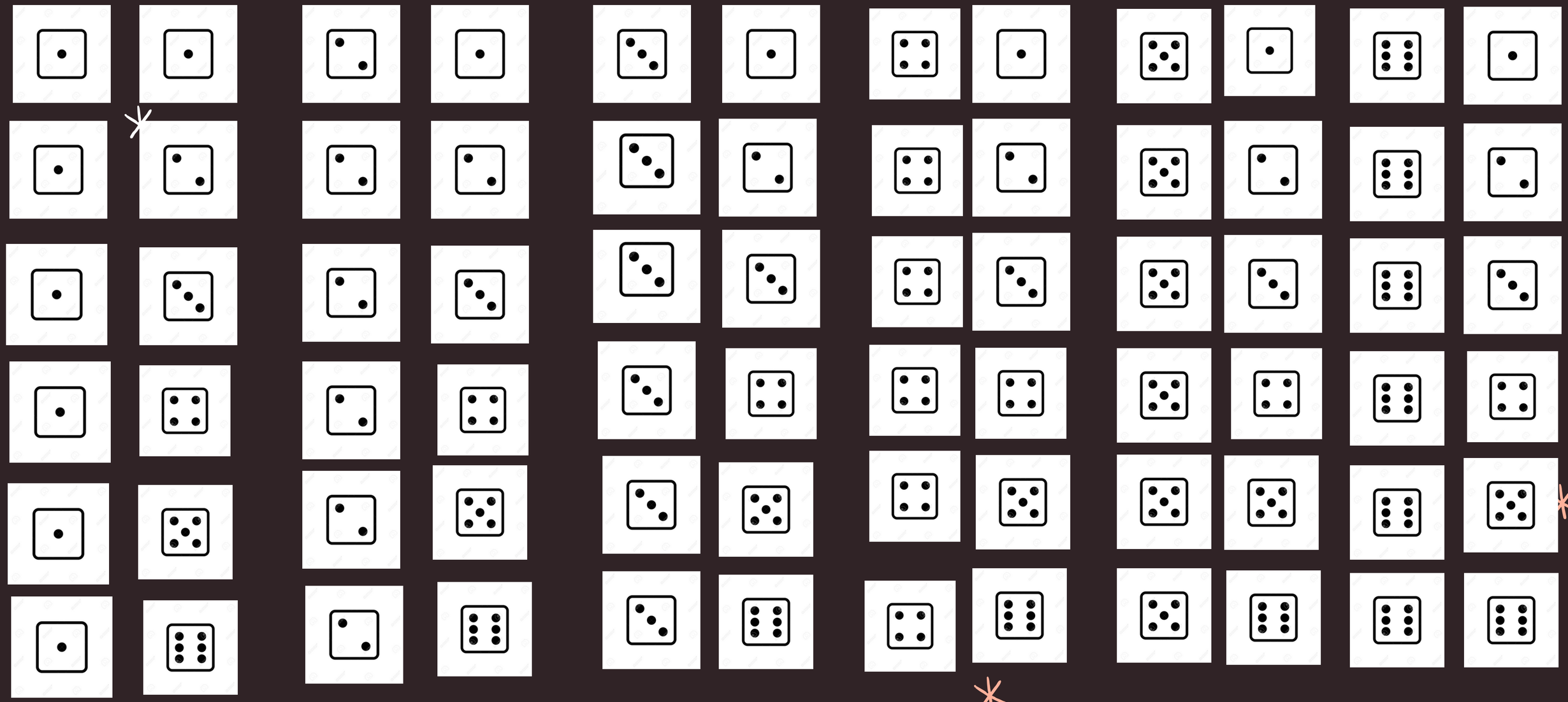
P(A∩B)=13/52 and P(B)=26/52 therefore: P(A|B)= 12/52/26/52=1/2

Easy Round

EXERCISE 1

TWO FAIR DICE THROWN

Task: find the probability that one of the dice shows a four given that the total of the two dice is 10.



Task: find the probability that one of the dice shows a four given that the total of the two dice is 10.

Let F denote the event that one of the dice shows a four and
T denote the event that the total on the two dice is ten.

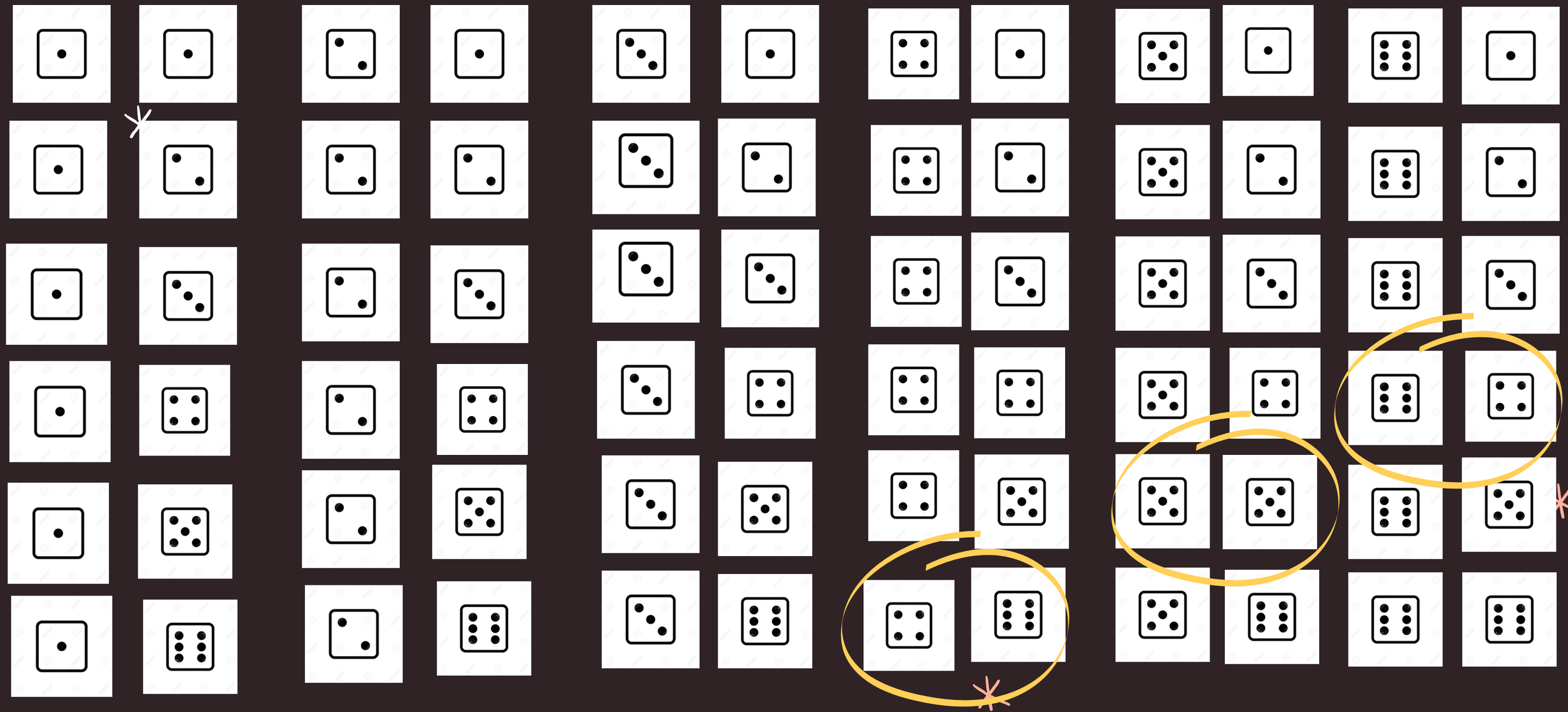
Then $F \cap T$ means [4,6] or [6,4], and T means [4,6] or [5,5] or [6,4].

Therefore $P(F \cap T)=2/36$ and $P(T)=3/36$

$P(F|T)=P(F \cap T)/P(T)$ Then $P(F|T)=2/36/3/36=2/3$

TWO FAIR DICE THROWN

Task: find the probability that one of the dice shows a four given that the total of the two dice is 10.

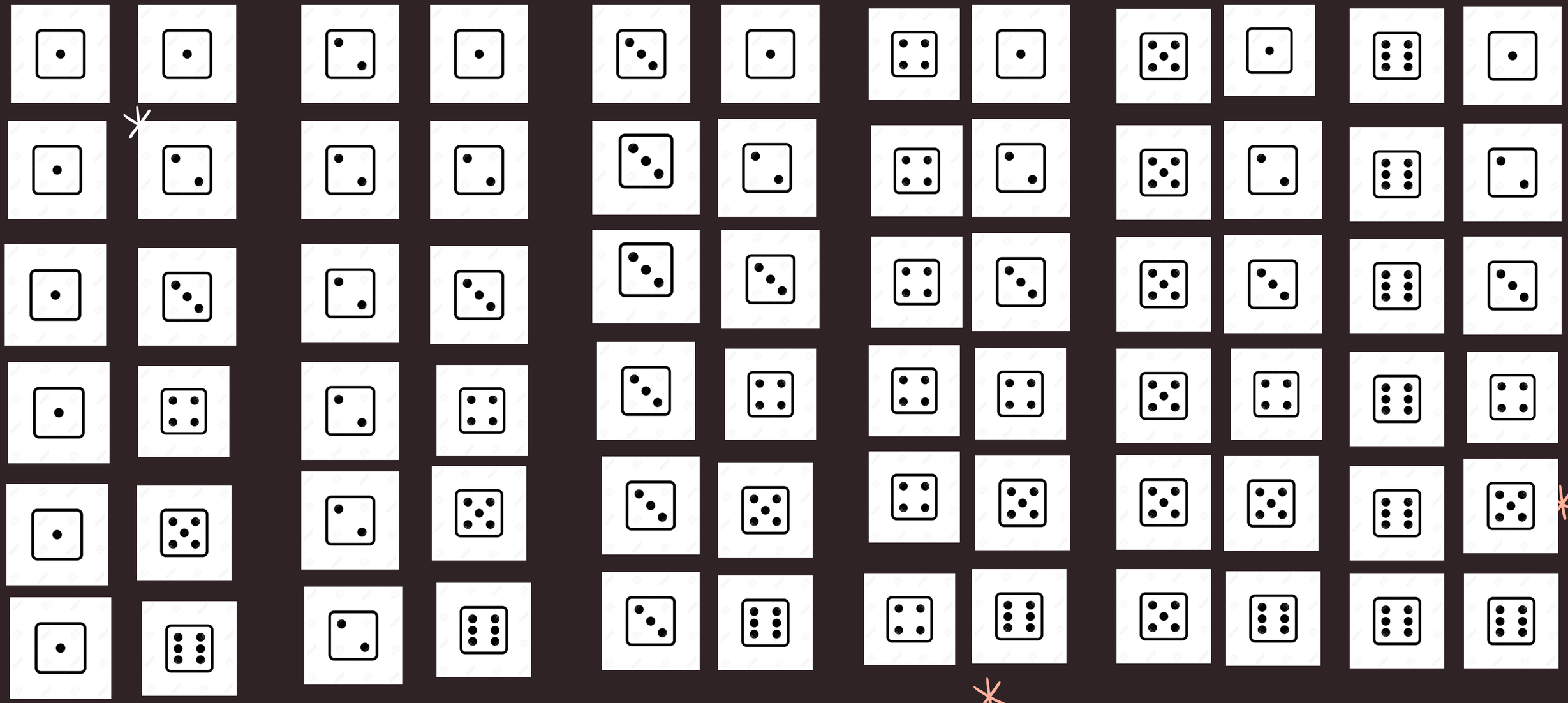


SECOND ROUND

EXERCISE 2

EXERCISE 2

Task: Find the probability that one of the dice shows a two given that the total on the two dice is six.



EXERCISE 2

Task: Find the probability that one of the dice shows a two given that the total on the two dice is six.

F denote the event that one of the dice shows a two

T denote the event that the total on two dice is six

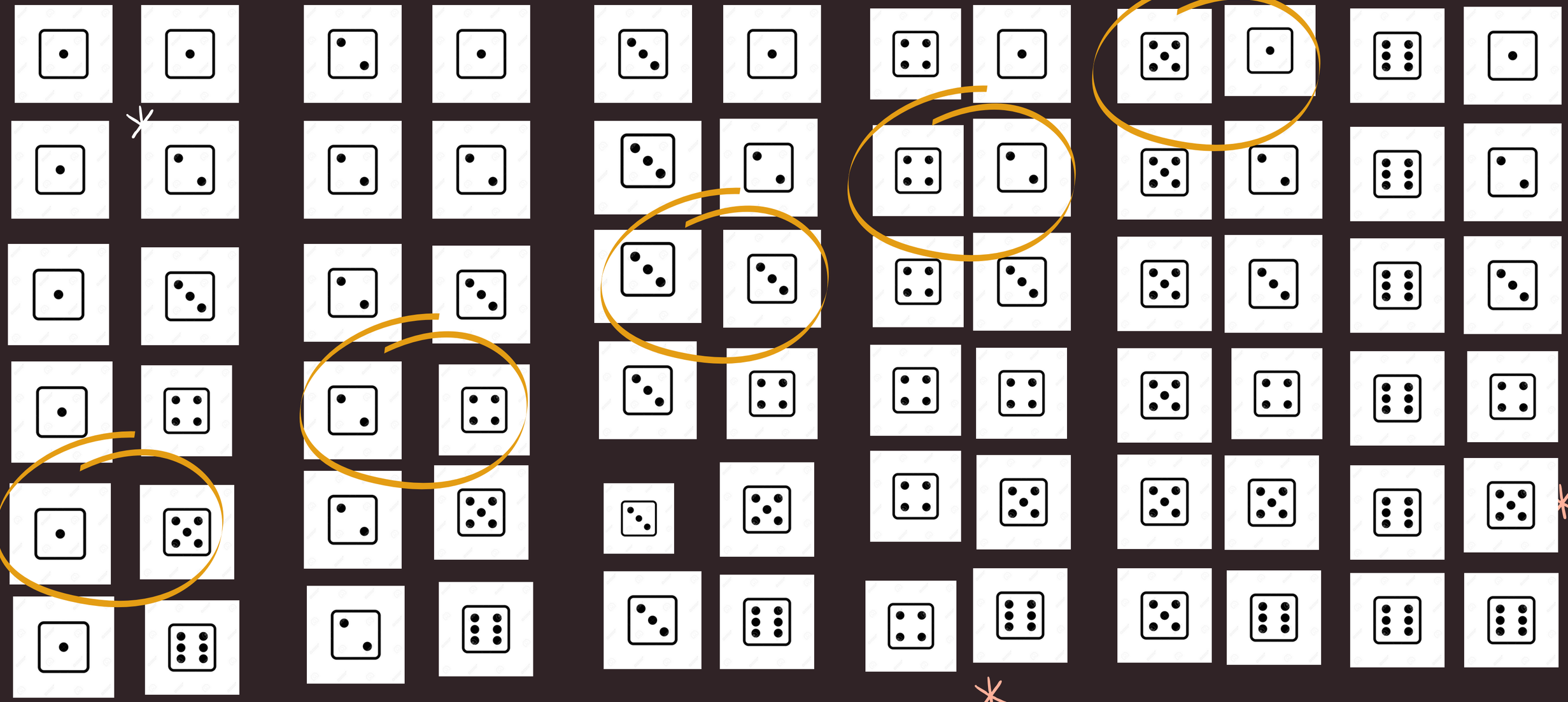
Then F∩T means [2,4] [4,2]

T means [1,5], [5,1], [2,4], [4,2], [3,3]

$$P(F|T) = P(F \cap T)/P(T) = 2/36/5/36 = 2/5$$

EXERCISE 2

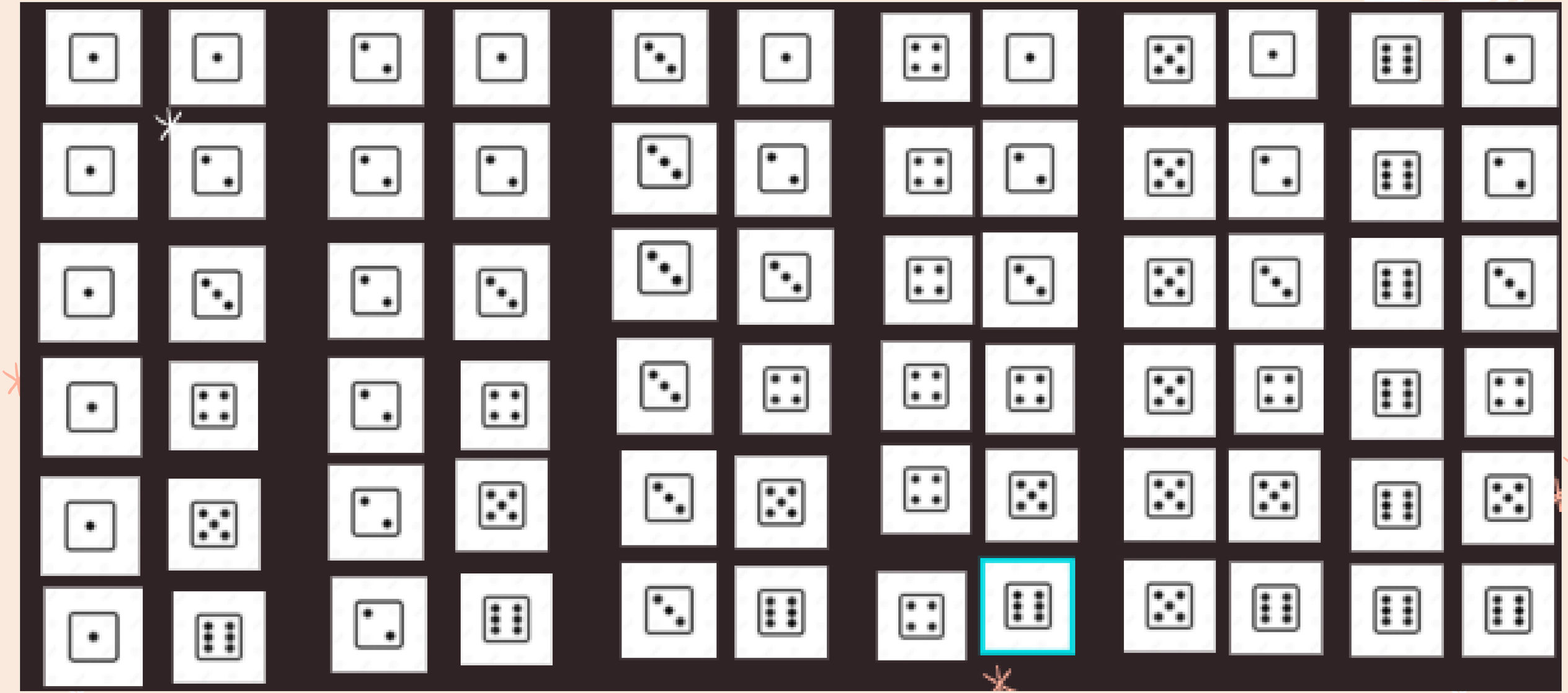
Task: find the probability that one of the dice shows a four given that the total of the two dice is 10.



THIRD ROUND

EXERCISE 3

TASK THREE: FIND THE PROBABILITY THAT ONE OF THE DICE SHOWS A THREE GIVEN THAT THE TOTAL ON THE TWO DICE IS SEVEN.



Task 3: Find the probability that one of the dice shows a three given that the total on the two dice is seven.

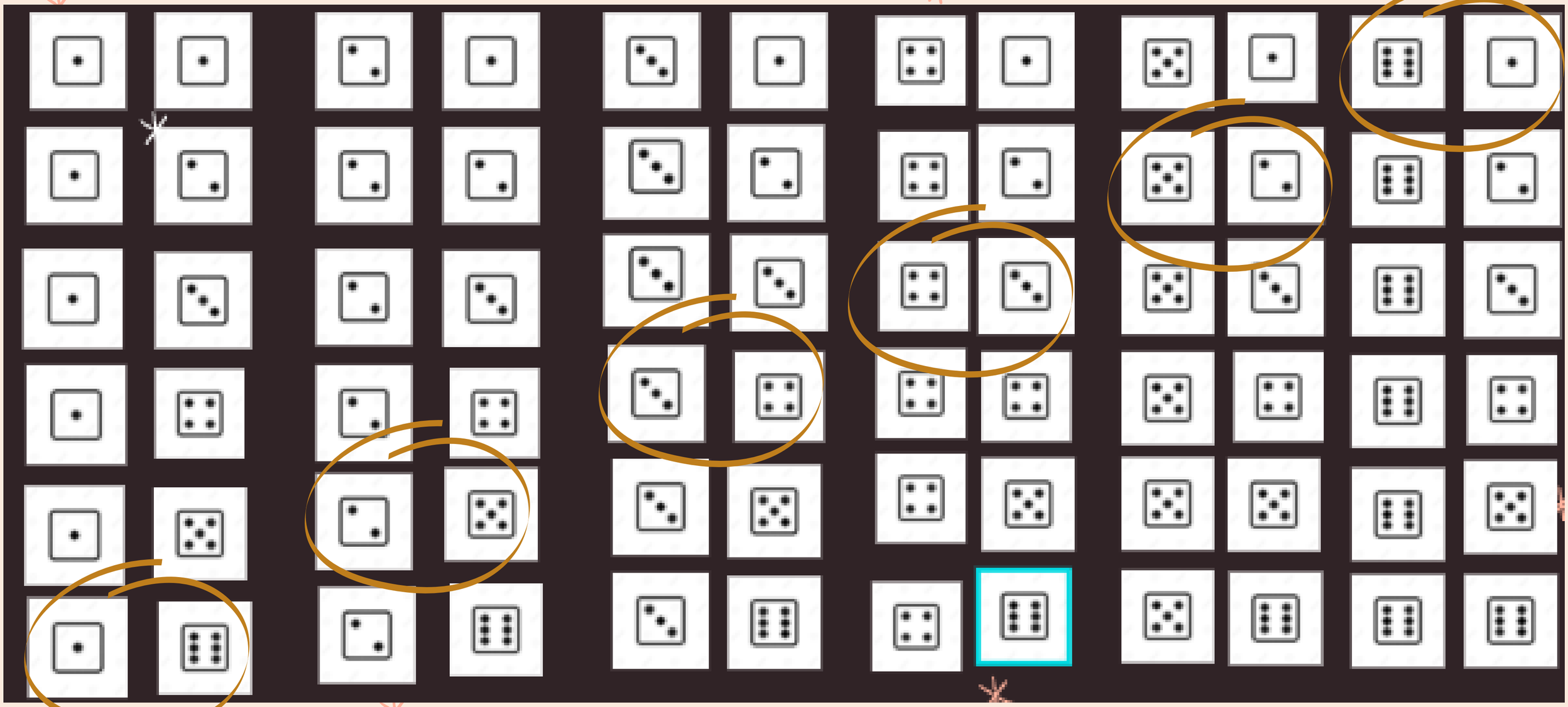
1 F denote the event that one of the dice shows a three

2 T denote the event that the total on two dice is seven

Then $F \cap T$ means [3,4] [4,3]

T means [2,5], [5,2], [3,4], [4,3], [1,6], [6,1],

$$P(F|T) = P(F \cap T)/P(T) = 2/36/6/36 = 1/3$$



FOURTH ROUND

EXERCISE 4

Multiple Choice

TASK: Find the probability that the scores on each of the two dice are the same given that the total on the two dice is four.

SIGNS:

F denote the event that the scores on each of the two dice are the same

T denote the event that the total on two dice is four

a 1/12

b 1/36

c 1/3

d 1/2

Multiple Choice

TASK: Find the probability that the scores on each of the two dice are the same given that the total on the two dice is four.

SIGNS:

F denote the event that the scores on each of the two dice are the same

T denote the event that the total on two dice is four

a 1/12

b 1/36

c 1/3

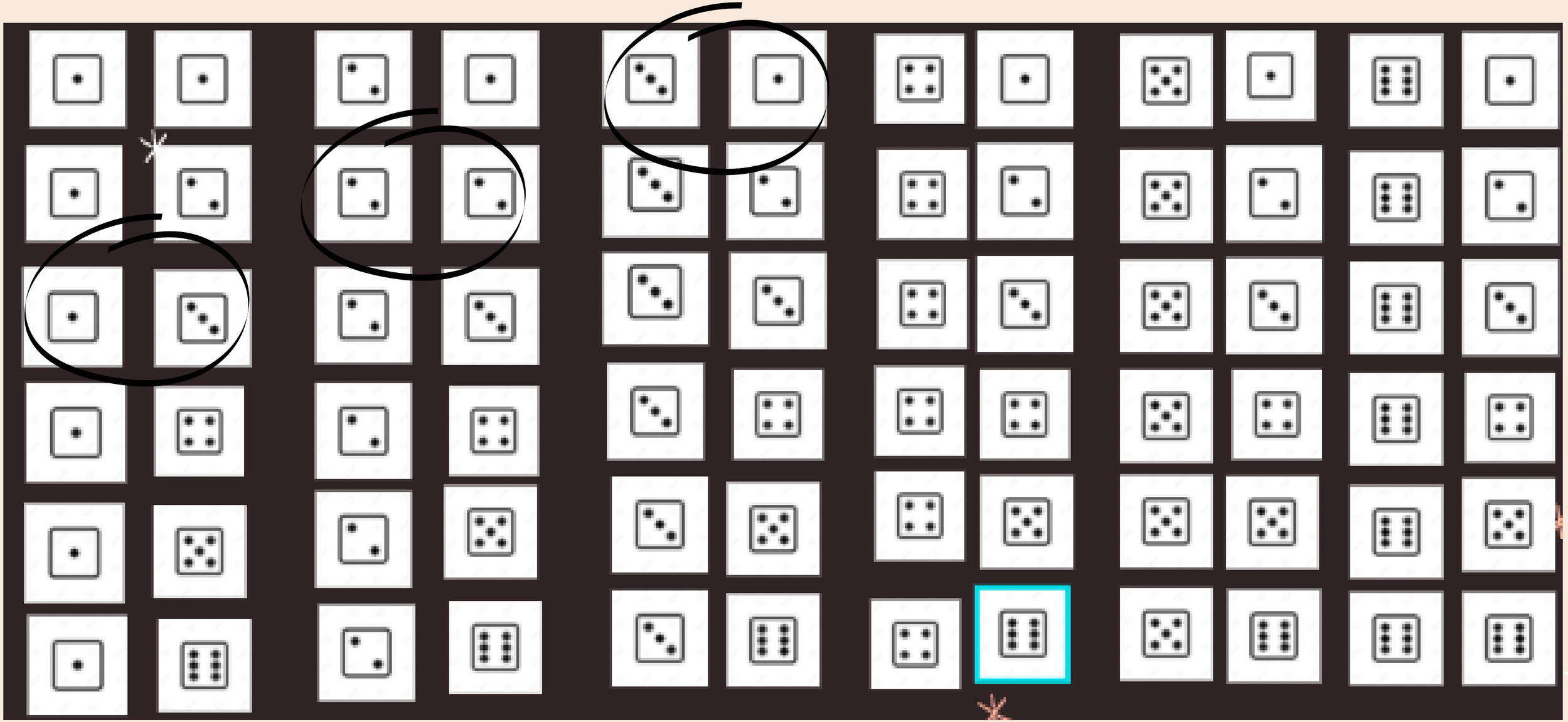
d 1/2

$F \cap T \rightarrow [2,2]$

$T \rightarrow [1,3][3,1][2,2]$

$P(F|T) = P(F \cap T)/P(T) = 1/36/3/36 = 1/3$

EXERCISE 4

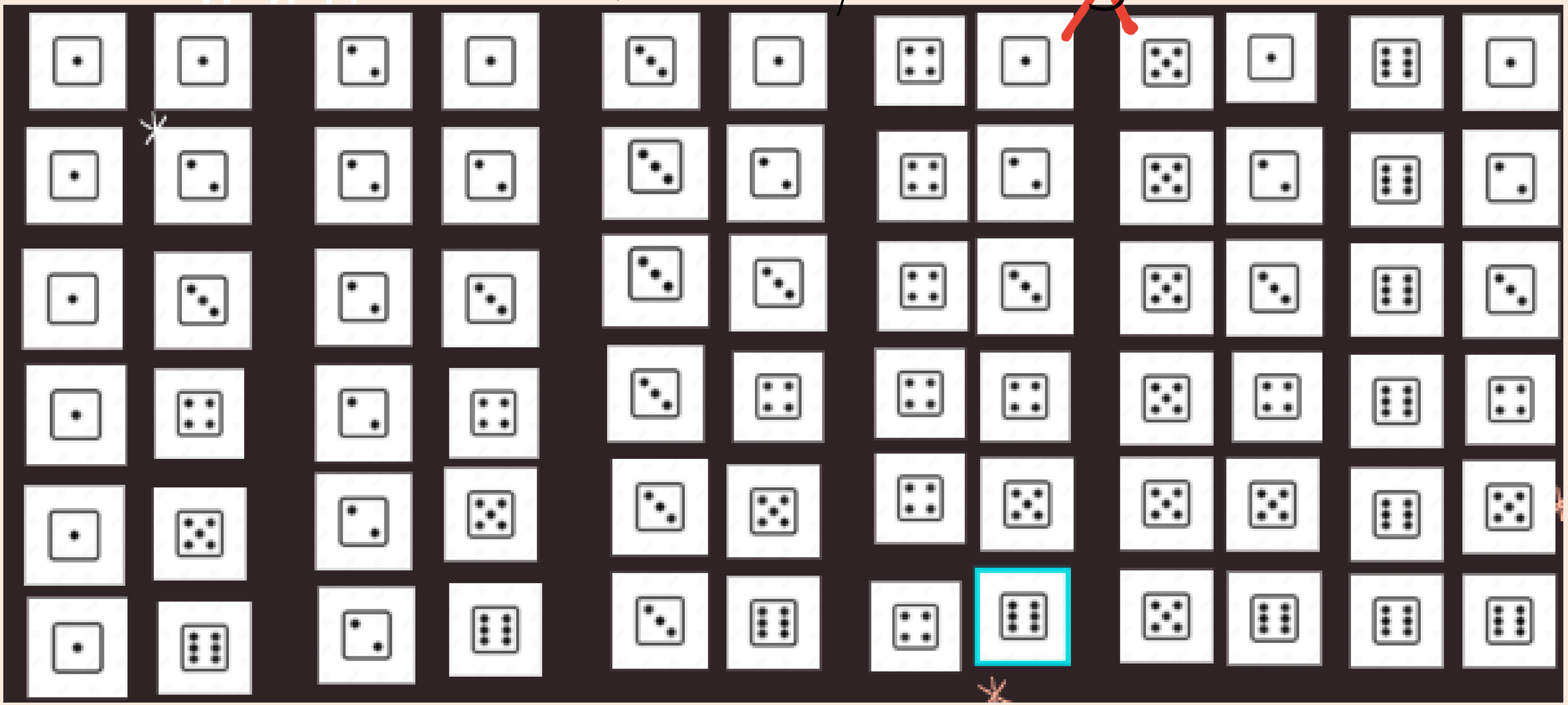


FIFTH ROUND

EXERCISE 5

EXERCISE 5

Find the probability that the total on the two dice is eight given that neither die shows a five.



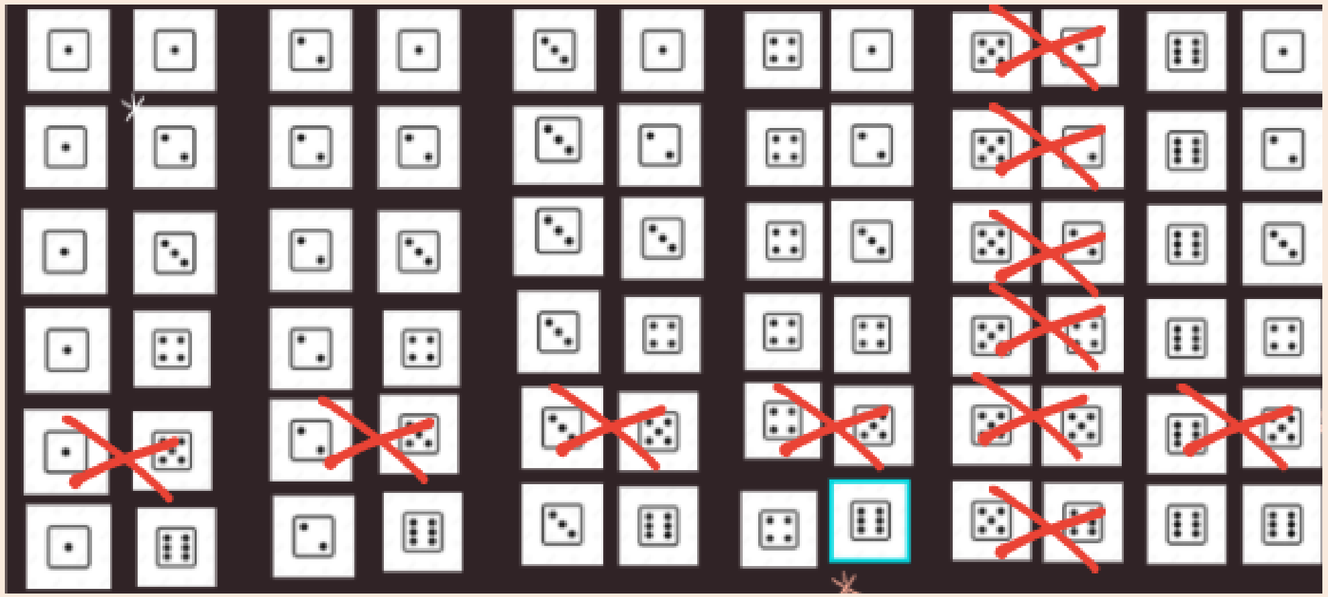
EXERCISE 5

F denote the event that the total on the two dice is eight

T denote the event that neither die shows a five

$F \cap T$ -> [4,4], [2,6],[6,2]

T -> 25 options



$F \cap T \rightarrow [4,4], [2,6], [6,2]$

$T \rightarrow 25$ options

multiple choice

* 3/25
* 7/9
* 25/36
* 1/3
* 3/25

$F \cap T$ -> [4,4], [2,6],[6,2]

T -> 25 options

multiple choice

- 3/25
- 7/9
- 25/36
- 1/3
- 3/25

$P(F|T) = P(F \cap T)/P(T) = 3/36/25/36 = 3/25$

APPLAUSE PLEASE!

Thank you for your attention, hope you had a good time!