

Worksheet "Half Life"

Experience:

- (1) Put the 64 cardboard pieces in the box
 - (2) Shake the box for a short time
 - (3) Take out the pieces that are lying with their dark (brown) side up
 - (4) Count them and write down the number in the table
 - (5) Calculate the number of pieces remaining in the box and write it as well in the table
 - (6) Shake the pieces that are remaining in the box again
 - (7) Repeat steps (3) to (6) until only one piece is left
- Do the whole experience 3 times.

1st try:

Shake no	Pieces taken out	Pieces re-remaining
1		
2		
3		
4		
5		
6		
7		
8		
9		

2nd try:

Shake no	Pieces taken out	Pieces re-remaining
1		
2		
3		
4		
5		
6		
7		
8		
9		

3rd try:

Shake no	Pieces taken out	Pieces re-remaining
1		
2		
3		
4		
5		
6		
7		
8		
9		

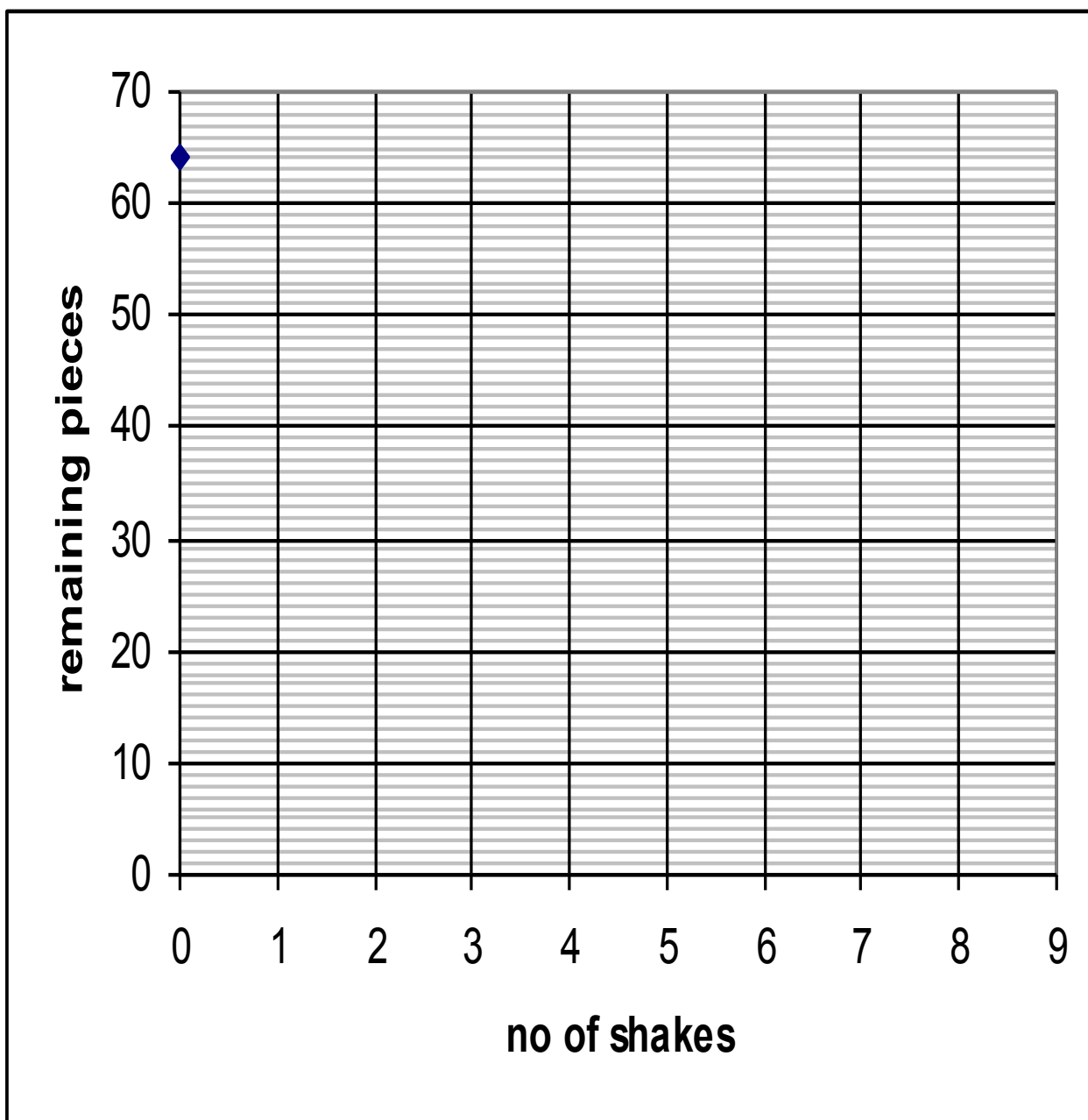
Now we will calculate the average value of the three tries.

Shake no	Pieces remaining 1st try	Pieces remaining 2nd try	Pieces remaining 3rd try	Average value of remaining pieces
1				
2				
3				
4				
5				
6				
7				
8				
9				

Approximately how many of the remaining pieces have been removed after each shake?

Each shake represents a half-life for the pieces of cardboard. What is meant by a half-life? What's the value of the half-life in this example?

Now note down the results in the following graph. Then draw a smooth line that best fits the points:



The smooth line is similar to other physical phenomenon you might know. What phenomenon?

The **half-life** of the curve above is *1 unit on the x-axis* (no of shakes). This means that you can first read the number of cardboard pieces on any point of the curve. Then read the number of pieces *1 unit* higher *on the x-axis*. This value will be approximately **half** as big as the first value.

Other examples of half-life we find in the decay of radioactive elements.

E.g.: Radium-226: half-life of 1620 years (that means that in 1620 years half of a given specimen of Radium-226 will be converted into other elements, and only half of the Radium-226 will be left)

Uranium-238: half-life of 4.5 billion years

Cobalt-60: half life of 5.27 years

Carbon-14: half life of 5730 years