UNIQUE STUDY POINT
CASE STUDY BASED WORKSHEET: CLASS X
REAL NUMBER

1.

You have a piece of construction paper that measures 32 cm by 48 cm. You want to cut it into squares of equal size.
(i)   What will be the dimensions of the largest possible square?
(ii)   How many squares will you have?

Sol :

Here we have to find HCF of 32 and 48.

$$32 = 2 \times 2 \times 2 \times 2 \times 2$$

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

$$\text{HCF }(32, 48) = 2 \times 2 \times 2 \times 2 = 16$$

Area of construction paper $= 32 \times 48 \text{ cm}^2$
Area of square $= 16 \times 16 \text{ cm}^2$

When the marbles in a bag are divided evenly between two friends, there is one marble left over. When the same marbles are divided evenly among three friends, there is one marble left over. When the marbles are divided evenly among five friends, there is one marble left over.

(i)   What is the least possible number of marbles in the bag?

(ii) What is another possible number of marbles in the bag?
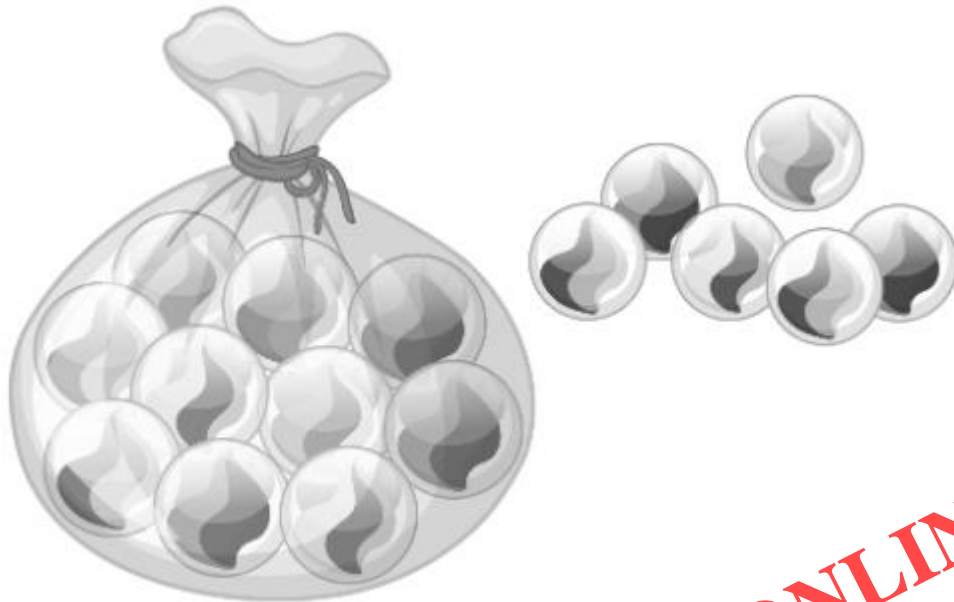
2.

Sol :

(i) In all three case one marble is left after division. Thus total marble will be one more than LCM of numbers.

$$LCM(2, 3, 5) = 2 \times 3 \times 5$$
$$= 30$$

Thus 31 marbles are in bag.

(ii) If we add one in multiple of 30, we will get another possible number of marble. These are 61, 91, 121....

Kerosene, paraffin, or lamp oil is a combustible hydrocarbon liquid which is derived from petroleum. Kerosene's uses vary dramatically from fuel for oil lamps to cleaning agents, jet fuel, heating oil or fuel for cooking.

Two oil tankers contain 825 litres and 675 litres of kerosene oil respectively.

(i)   Find the maximum capacity of a container which can measure the kerosene oil of both the tankers when used an exact number of times.

(ii)   How many times we have to use container for both tanker to fill ?

Sol :

The maximum capacity of the required container has to measure both the tankers in a way that the count is an exact number of times. So its capacity is exactly divisible by both the tankers. So we have to find the HCF of 825 and 675.

First we find prime factorization of 825 and 675.

$$675 = 3 \times 3 \times 3 \times 5 \times 5$$
$$825 = 3 \times 5 \times 5 \times 11$$
$$\text{HCF}(675, 825) = 3 \times 5 \times 5$$
$$= 75$$

(i) Thus the maximum capacity of the required container is 75 litres.

(ii) Therefore, the first tanker will require $\frac{825}{75} = 11$ times to fill it and 2nd tanker will require $\frac{675}{75} = 9$ times to fill it.

Last year my grand mother was admitted to Fortis hospital due to a small accident. She was prescribed a pain medication to be given every 4 hr and an antibiotic to be given every 5 hr. Bandages applied to the my grand mother's external injuries needed changing every 12 hr. The nurse changed the bandages and gave my grand mother both medications at 6:00 AM Monday morning.

(i) How many hours will pass before the grand mother is given both medications and has her bandages changed at the same time?

(ii) What day and time will this be?

4.

Sol :

Here we have to find LCM of 4, 5, and 12. First we have to find prime factorization of 4, 5, and 12.

$$4 = 2 \times 2$$

$$5 = 5$$

$$12 = 2 \times 2 \times 3$$

$$LCM(4,\ 5,\ 12) = 2 \times 2 \times 5 \times 3$$

$$= 60$$

(i) The shortest length of before all are done at the same time is 60 hours i.e. 2 days 12 hours,

(ii) 2 days 12 hours after 6:00 AM. Monday morning. Thus Wednesday at 6 PM.

Number of square in construction paper $= \dfrac{32 \times 48}{16 \times 16} = 6$

(i) The dimension of largest possible square is 16 cm

(ii) 6 square will be possible in construction paper.

Taniya have 54 football cards, 72 volleyball cards, and 63 basketball cards and she want to put them in a binder. Each page of the binder should have cards from a single sport, and there should be the same number of cards on each page.

(i) What is the greatest number of cards, Taniya can put on a page?

(ii) How many pages will Taniya need for each sport?
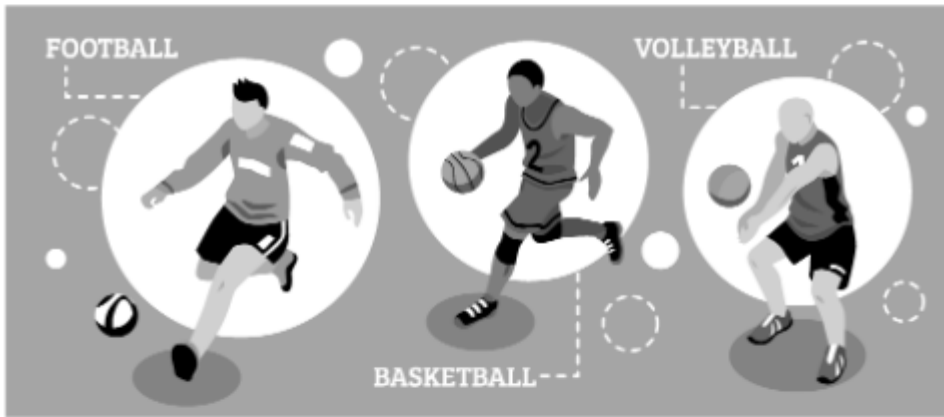
Sol :

Each page of the binder should have cards from a single sport, and there should be the same number of cards on each page. Here we have to find HCF of 54, 63 and 72.

$$54 = 2 \times 3 \times 3 \times 3$$

$$63 = 3 \times 3 \times 7$$

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

$$\text{HCF } (54, 63, 72) = 3 \times 3 = 9$$

(i) Thus Taniya can put 9 card on a page.

(ii) For football, $\frac{54}{9} = 6$, for volleyball $\frac{72}{9} = 8$ and for basketball $\frac{63}{9} = 7$ pages are needed.

Mahesh works as a manager in a hotel. He has to arrange chairs in hall for a function. The hall has a certain number of chairs. Guests want to sit in different groups like in pairs, triplets, quadruplets, fives and sixes etc. Mahesh want to arrange chairs in such a way that there are no chair left after arrangement.

When Mahesh arranges chairs in such pattern like in 2's, 3's, 4's 5's and 6's then 1, 2, 3, 4 and 5 chairs are left respectively. But when he arranges in 11's, no chair will be left.

(i) In the hall, how many chairs are available?

(ii) If one chair is removed, which arrangement is possible now?

6.

(iii) If one chair is added to the total number of chairs, how many chairs will be left when arranged in 11's.

(iv) How many chairs will be left in original arrangement if same number of chairs are arranged in 7's?

(v) How many chairs will be left in original arrangement if same number of chairs will be arranged in 9's?

Sol :

(i) By dividing all the options by 2, 3, 4, 5, 6 and 11, we will get that 539 is the only option which leaves remainder 1, 2, 3, 4, 5, 0 respectively.

(ii) After removing 1 chair, we are left with 538 chairs. On arranging chairs in pair of 3's, 4's, 5's, 6's, 11's ; 1, 2, 3 ,4, 10 chairs are left. So, only pair of 2 chairs is possible now.

(iii) 539 chairs are already arranged in pair of 11's. On adding 1 extra chair, that 1 chair will be left only.

(iv) 539 is divisible by 7 and remainder is zero, so arranging chairs in pair of 7's, no chair will be left.

(v) If 539 is divided by 9, remainder is 8, so arranging chairs in pair of 9's, 8 chair will be left.