DOT & LINE

Sample Lessons

6.1

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Lesson-2

Addition and Subtraction with Real Numbers

Note: In this lesson we will learn to add and subtract real numbers.

Integers are positive or negative whole numbers as shown on the number line below.

For addition and subtraction of positive and negative numbers, we will use a number line.

If moving 3 places on the right on a number line is +3, then moving 5 places on the left would be −5.

No sign means a positive sign.
So 3 is actually +3

Adding 2 positive numbers is simply addition.

For example: + 3 + 7 is like first moving 3 places right from 0 and then further moving 7 places right. So, we will land on 10. Therefore, + 3 + 7 = + 10

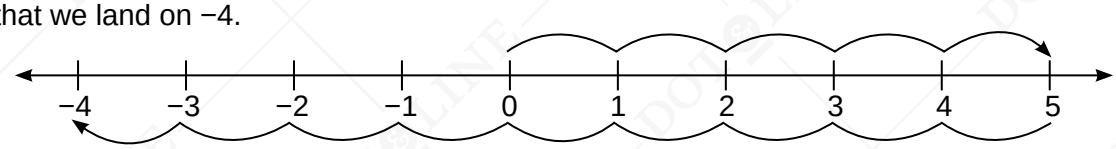
Similarly, adding 2 negative (−ve) numbers is also addition but the answer will carry a −ve sign.

For example: − 5 − 2 means moving 5 places to the left of 0 and then again moving 2 places on the left.

We see that we finally land on −7.

Therefore, we conclude that: + x + y = + (x + y) and − x − y = − (x + y) OR − x + (− y) = − (x + y)

Now if we move 5 places towards the right (which is +5) and then we move 9 places towards the left, we see that we land on −4.



We are on the left side because we are moving more towards the left as compared to the right.

Hence, we see that + 5 − 9 = − 4

Which means when +ve and −ve both movements are involved we find the difference of the two numbers and the sign of the number which has a greater value is carried in the answer. In the case above, the difference of 9 and 5 is 4 and since 9 > 5, we use the sign of 9 and the answer is −4.

2. Teacher Note: Students will be able to understand real numbers and the relationship between positive and negative numbers.

Lesson-2

Addition and Subtraction with Real Numbers

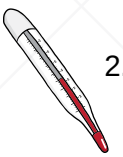
1. Solve the following:

   a) + 3 + 19 b) + 5 − 19 c) + 15 + 20 + 3 d) − 5 − 6 − 2

   e) + 17 + (− 14) f) 24 + (− 12) g) 16 + (− 13) h) − 6 + (− 8)

   i) 1.35 – (−1.65) j) – 3.4 + (3.4 – 4.6) k) (1.66 – 3.2) + (−1.5) l) $\frac{2}{3} + (-\frac{5}{6})$

   m) $(\frac{9}{10} - \frac{15}{2}) + (\frac{3}{5})$ n) $\frac{4}{3} - (-\frac{2}{7})$



2. At 10 am, the temperature of Faisalabad was −2°C. By afternoon, it had risen by 10°C. What was the city's temperature in the afternoon?

3. How much debt would Zain be in if he has Rs. 150 in his bank and he spends Rs. 350 on his bank card to buy a shirt?

4. Increase − 7 by + 13.

5. A roller coaster first climbs 50 m high. Then it drops 65 m down. How many metres below the ground level will it be after dropping?

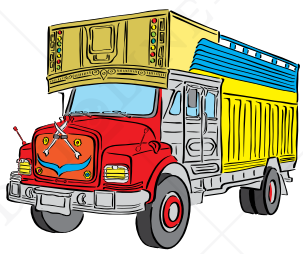
6. Ahsan has 3 285 truck art mugs. Sara kept 2 136 of her truck art mugs with him before she left.

   a) How many truck art mugs does Ahsan have now?
   b) Sara comes back and takes 1 542 mugs back from the total number of truck art mugs. How many truck art mugs does Ahsan have now?

7. Ali's bicycle was worth Rs. 7 600 when he bought it. He used it for a year and its worth reduced by Rs. 1 800. He then renovated it by adding fancy lights and horns and its worth increased to its original price.

   a) What was the worth of his bicycle before renovation?
   b) By how much did its worth increase after renovation?

8. Mirza is a truck driver. He has a consignment weighing 670 kg which has to be delivered from Karachi to Lahore. In Lahore, after delivering the first consignment, he gets another consignment weighing 920 kg to be delivered to Multan on his way back to Karachi. If the original weight of the truck is 2 500 kg, what will the weight of the truck be when:



   a) Mirza departed from Karachi? b) Mirza departed from Lahore?
   c) Mirza departed after delivering the parcel in Multan?

Lesson-3

Multiplication and Division with Real Numbers

6.1-BO-Quiz2

Note: Subhan is learning horse riding. He trains for 4 hours per day on Saturday and Sunday.

The total number of hours he trains for can be written mathematically as:

4 x 2 = 2 x 4 = 8

Suppose that his parents know his total training hours and the number of days he trains for in a week. How would they find the number of hours he trains for each day?

They can find that out by performing division:

8 ÷ 2 = 4 x 2 ÷ 2 = 4

The numbers used in the above equation are the same as that in the earlier equation. The only difference is in the operation applied (division in place of multiplication) and the places of 4 and 8. Instead of 4 being multiplied with 2, it is being divided by 8.

What division will Subhan's parents need to carry out if they want to know the number of days trained, using the total number of hours trained and the hours trained for each day? It would simply be:

8 ÷ 4 = 2 x 4 ÷ 4 = 2

If a quantity is first multiplied with and then divided by the same number, the quantity remains unchanged.

8 x 2 ÷ 2
= 16 ÷ 2
= 8

If it is divided first and multiplied later, it still remains unchanged.
Looking at the previous example, we see:

8 ÷ 2 x 2
= 4 x 2
= 8

The reciprocal of a number is the result of dividing 1 by it. For example, the reciprocal of 8 is $\frac{1}{8}$ and the reciprocal of $\frac{1}{8}$ is $1 \div (\frac{1}{8}) = 8$.

The product of a number and its reciprocal is always 1. For example, $8 \times \frac{1}{8} = 1$ and $\frac{1}{8} \times 8 = 1$.

3. Teacher Note: Students will be able to understand the relationship between multiplication and division of positive and negative numbers.

Lesson-3

Multiplication and Division with Real Numbers

Let us learn how to multiply positive and negative numbers.

4 × 3 is read as 4 groups of 3's. Similarly 4 × (− 3) means four groups of (− 3) which means (− 3) is added 4 times.

4 × (− 3) = (− 3) + (− 3) + (− 3) + (− 3) = − 12
Similarly (− 3) × 4 = − 12

Remember: a × b = b × a

Now let us see − 5 × − 4
We know that 5 × 4 = 20.

= − 5 × (− 4)
= (− 5) × (− 4)
= − (5 × 4)
= − (20)
= − 20

Negative means opposite or in reverse direction. Therefore, − (−20) means opposite of negative which is positive.

Hence − [− 20] is + 20
− 5 x − 4 = 20

This is true for division as well

Proof (− 20) ÷ (− 5).

$= -20 \times -\frac{1}{5} = +4$

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1. Write the reciprocals of the following numbers:

a) 4 b) −7 c) $\frac{1}{2}$ d) $-\frac{1}{6}$

e) $\frac{3}{4}$ f) $\frac{9}{2}$ g) $\frac{6}{13}$ h) 10

2. Fill in the blanks given below.

a) 3 x _____ = 1 b) −7 x _____ = 1 c) $\frac{1}{5}$ x _____ = 1

d) $-\frac{3}{4}$ x _____ = 1 e) _____ x 5 = 1 f) _____ x −8 = 1

g) _____ x $\frac{6}{7}$ = 1 h) _____ x $-\frac{5}{2}$ = 1 i) _____ x $-\frac{1}{7}$ = 1

3. Fill the circles below. The first one has been done for you.

a) 7 x 6 = 14 x 3

b) 15 x 8 = 5 x ○

c) 24 x 20 = 96 x ○

d) 65 x 7 = 13 x ○

Lesson-3

Multiplication and Division with Real Numbers

4. In Bahria Town, the apartments are divided in 8 phases. Each phase contains 300 houses.

   a) What is the total number of houses in Bahria Town?

   b) Using your answer to (a) and the number of phases in Bahria Town, write an equation involving division to find the number of houses in each phase.

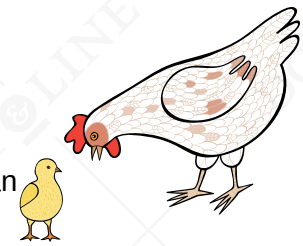
   c) Using your answer to (a) and the number of houses in each phase, write an equation involving division to find the number of phases in Bahria Town.

5. Shabana owns a poultry farm containing 250 chickens.

   a) What are the total number of legs in the farm? (Hint: A chicken has 2 legs)

   b) Using your answer to (a) and the number of chickens in the farm, write an equation involving division to find the number of legs each chicken has.

   c) Using your answer to (a) and the number of legs each chicken has, write an equation involving division to find the number of chickens in the farm.



6. Solve the following:

   a) $70 \div (-5)$ b) $5 \times (-6)$ c) -3×-7

   d) $6 \times (-7)$ e) $40 \div (-4)$ f) $-60 \div (-15)$

   g) $72.4 \div (-0.2)$ h) $54.3 \times (-1.6 \div 0.002)$ i) $[-14.7 \div (-7) + 3.6]$

   j) $\frac{3}{4} \div (-\frac{3}{5} + \frac{1}{2})$ k) $-\frac{15}{2} \div \frac{6}{2} \times (\frac{1}{9})$ l) $\frac{12}{5} \div [\frac{5}{4} \times (-\frac{8}{3})]$

7. During summer, the water level of a lake decreases by 4 inches every week. By how many inches will it decrease in a month's time. (Assume that there are 4 weeks in a month)

8. What is the product of (−15) and (−7)

9. What is the quotient when 1 284 is divided by (−4).

10. Shariq and his 5 friends set up a cold drink stall in a school carnival. Unfortunately, they had to face a loss of Rs. 3 300. How much loss did each friend have to bear?

Mind Benders

1. $2.6 \times 2\ [(-3\ \frac{1}{6}) + 2]$ 2. $(-1.5) \div (-\ 1\ \frac{1}{3}) + (-1.5)^3$