3. O(0, 0), A(2, 0), B(2, 3), C(0, 3), P(4, 3), Q(6, 1), R(6, 5), S(4, 7), K(10, 5), L(7, 7), M(10, 8)

4. (i) True  (ii) False  (iii) True

EXERCISE 15.3

1. (b) (i) 20 km  (ii) 7.30 a.m.  (c) (i) Yes  (ii) ₹ 200  (iii) ₹ 3500

EXERCISE 16.1

1. A = 7, B = 6  
2. A = 5, B = 4, C = 1  
3. A = 6  
4. A = 2, B = 5  
5. A = 5, B = 0, C = 1  
6. A = 5, B = 0, C = 2  
7. A = 7, B = 4  
8. A = 7, B = 9  
9. A = 4, B = 7  
10. A = 8, B = 1

EXERCISE 16.2

1. y = 1  
2. z = 0 or 9  
3. z = 0, 3, 6 or 9  
4. 0, 3, 6 or 9

JUST FOR FUN

1. More about Pythagorean triplets

We have seen one way of writing pythagorean triplets as $2m, m^2 - 1, m^2 + 1$. 

A pythagorean triplet $a, b, c$ means $a^2 + b^2 = c^2$. If we use two natural numbers $m$ and $n(m > n)$, and take $a = m^2 - n^2, b = 2mn, c = m^2 + n^2$, then we can see that $c^2 = a^2 + b^2$.

Thus for different values of $m$ and $n$ with $m > n$ we can generate natural numbers $a, b, c$ such that they form Pythagorean triplets.

For example: Take, $m = 2, n = 1$.

Then, $a = m^2 - n^2 = 3, b = 2mn = 4, c = m^2 + n^2 = 5$, is a Pythagorean triplet. (Check it!)

For, $m = 3, n = 2$, we get,

$a = 5, b = 12, c = 13$ which is again a Pythagorean triplet.

Take some more values for $m$ and $n$ and generate more such triplets.

2. When water freezes its volume increases by 4%. What volume of water is required to make 221 cm$^3$ of ice?

3. If price of tea increased by 20%, by what per cent must the consumption be reduced to keep the expense the same?
4. Ceremony Awards began in 1958. There were 28 categories to win an award. In 1993, there were 81 categories.
   (i) The awards given in 1958 is what per cent of the awards given in 1993?
   (ii) The awards given in 1993 is what per cent of the awards given in 1958?

5. Out of a swarm of bees, one fifth settled on a blossom of Kadamba, one third on a flower of Silindhiri, and three times the difference between these two numbers flew to the bloom of Kutaja. Only ten bees were then left from the swarm. What was the number of bees in the swarm? (Note, Kadamba, Silindhiri and Kutaja are flowering trees. The problem is from the ancient Indian text on algebra.)

6. In computing the area of a square, Shekhar used the formula for area of a square, while his friend Maroof used the formula for the perimeter of a square. Interestingly their answers were numerically same. Tell me the number of units of the side of the square they worked on.

7. The area of a square is numerically less than six times its side. List some squares in which this happens.

8. Is it possible to have a right circular cylinder to have volume numerically equal to its curved surface area? If yes state when.

9. Leela invited some friends for tea on her birthday. Her mother placed some plates and some puris on a table to be served. If Leela places 4 puris in each plate 1 plate would be left empty. But if she places 3 puris in each plate 1 puri would be left. Find the number of plates and number of puris on the table.

10. Is there a number which is equal to its cube but not equal to its square? If yes find it.

11. Arrange the numbers from 1 to 20 in a row such that the sum of any two adjacent numbers is a perfect square.

Answers

2. \(212 \frac{1}{2} \text{ cm}^3\)

3. \(16 \frac{2}{3} \%\)

4. (i) 34.5% (ii) 289%

5. 150

6. 4 units

7. Sides = 1, 2, 3, 4, 5 units

8. Yes, when radius = 2 units

9. Number of puris = 16, number of plates = 5

10. – 1

11. One of the ways is, 1, 3, 6, 19, 17, 8 (1 + 3 = 4, 3 + 6 = 9 etc.). Try some other ways.