NCERT QUESTIONS WITH SOLUTIONS

EXERCISE : 11.1

1. Find the rule, which gives the number of matchsticks required to make the following matchstick patterns. Use a variable to write the rule.

(a) A pattern of letter T as T

(b) A pattern of letter Z as Z

(c) A pattern of letter U as U

(d) A pattern of letter V as V

(e) A pattern of letter E as E

(f) A pattern of letter S as S

(g) A pattern of letter A as A

Sol. (a) Pattern of letter T = 2n (as two matchsticks used in each letter)

(b) Pattern of Z letter = 3n (as three matchsticks used in each letter)

(c) Pattern of letter U = 2n+1 (as three matchsticks used in each letter)

(d) Pattern of letter V = 2n (as two matchsticks used in each letter)

(e) Pattern of letter E = 5n (as five matchsticks used in each letter)

(f) Pattern of letter S = 5n (as five matchsticks used in each letter)

(g) Pattern of letter A = 2+4n (as six matchsticks used in each letter)

2. We already know the rule of the pattern of letters L, C and F. Some of the letters from Q.1 (given above) given us the same rule as that given by L. Which are these? Why does this happen?

Sol. The letter "T" and "V" that has pattern 2n, since 2 matchsticks are used in all these letters.

3. Cadets are marching in a parade. There are 5 cadets in a row. What is the rule, which gives the number of cadets, given the number of rows? (Use n for number of rows.)

Sol. Number of rows = n

Cadets in each row = 5

Therefore, total number of cadets = 5n

4. If there are 50 mangoes in a box, how will you write the total number of mangoes in terms of the number of boxes? (Use b for the number of boxes.)

Sol. Number of boxes = b

Number of mangoes in each box = 50

Therefore, total number of mangoes = 50b

5. The teacher distributes 5 pencils per student. Can you tell how many pencils are needed, given the number of students? (Use s for the number of students.)

Sol. Number of students = s

Number of pencils to each student = 5

Therefore, total number of pencils needed = 5s

6. A bird flies 1 kilometre in one minute. Can you express the distance covered by the bird in terms of its flying time in minutes? (Use t for flying time in minutes)

Sol. Time taken by bird = t minutes

Speed of bird = 1 km per minute

Therefore, Distance covered by bird

= speed × time = 1 × t = t km

7. Radha is drawing a dot Rangoli (a beautiful pattern of lines joining dots) with chalk powder. She has 9 dots in a row. How many dots will her Rangoli have for r rows ?
How many dots are there if there are 8 rows? If there are 10 rows?

Sol. Number of dots in each row = 9 dots
Number of rows = r
Therefore, number of dots = 9r
When there are 8 rows, then number of dots = 9 × 8 = 72 dots
When there are 10 rows, then number of dots = 9 × 10 = 90 dots

8. Leela is Radha's younger sister. Leela is 4 years younger than Radha. Can you write Leela's age in terms of Radha's age? Take Radha's age to be x years.

Sol. Radha's age = x years
Therefore, Leela's = (x – 4) years

9. Mother has made laddus. She gives some laddus to guests and family members; still 5 laddus remain. If the number of laddus mother gave away is ℓ, how many laddus did she make?

Sol. Number of laddus gave away = ℓ
Number of laddus remaining = 5
Total number of laddus = (ℓ + 5)

10. Oranges are to be transferred from larger boxes into smaller boxes. When large box is emptied, the oranges from it fill two smaller boxes and still 10 oranges remain outside. If the number of oranges in a small box are taken to be x, what is the number of oranges in the largest box?

Sol. Number of oranges in one box = x
Number of boxes = 2
Therefore, total number of oranges in boxes = 2x
Remaining oranges = 10
Thus, number of oranges = 2x + 10

11. (a) Look at the following matchstick pattern of squares figure. The squares are not separate. Two neighbouring squares have a common matchstick. Observe the patterns and find the rule that gives the number of matchsticks in terms of the number of squares.
(Hint : If you remove the vertical stick at the end you will get a pattern of Cs.)

(i)  (ii) 

(iii)  (iv)  .....

(b) Figure gives a matchstick pattern of triangles. As in question 11 (a) above, find the general rule that gives the number of matchsticks in terms of the number of triangles.

(i)  (ii) 

(iii)  (iv) 

Sol. (a) (i)  4 matchsticks

(ii)  7 matchsticks

(iii)  10 matchsticks

(iv)  13 matchsticks

If we remove 1 from each then they make table of 3, i.e., 3, 6, 9, 12 ..... So, the required equation = 3x + 1. Where x is number of squares.

(b) (i)  3 matchsticks

(ii)  5 matchsticks

(iii)  7 matchsticks

(iv)  9 matchsticks

If we remove 1 from each then they make table of 2, i.e., 2, 4, 6, 8 .... So, the required equation = 2x + 1, where x is number of triangles.

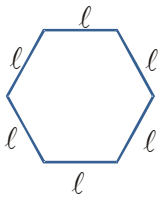
Deleted Exercise

1. The side of an equilateral triangle is shown by ℓ. Express the perimeter of the equilateral triangle using ℓ.

Sol. Side of an equilateral triangle = ℓ

Therefore, Perimeter of an equilateral triangle = 3 × side = 3 ℓ

2. The side of a regular hexagon figure is denoted by ℓ. Express the perimeter of the hexagon using ℓ.



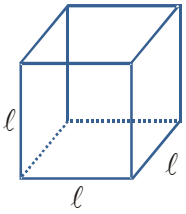
(Hint : A regular hexagon has all its six sides equal in length.)

Sol. Side of hexagon = ℓ

Therefore, Perimeter of Hexagon

= 6 × side = 6 ℓ

3. A cube is a three-dimensional figure as shown in figure. It has six faces and all of them are identical squares. The length of an edge of the cube is given by ℓ. Find the formula for the total length of the edges of a cube.

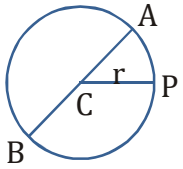


Sol. Length of one edge of cube = ℓ

Number of edges in a cube = 12

Therefore, total length = 12 × ℓ = 12ℓ

4. The diameter of a circle is a line which joins two points on the circle and also passes through the centre of the circle. (in the adjoining figure). AB is a diameter of the circle; C is its centre.) Express the diameter of the circle (d) in terms of its radius (r).



Sol. Since, length of diameter is double the length of radius.

Therefore, d = 2r

5. To find sum of three numbers 14, 27 and 13, we can have two ways

(a) We may first add 14 and 27 to get 41 and then add 13 to it to get the total sum 54,

or

(b) We may add 27 and 13 to get 40 and then add 14 to get the sum 54.

Thus, (14 + 27) + 13 = 14 + (27 + 13)

This can be done for any three numbers. This property is known as the associativity of addition of numbers. Express this property which we have already studied in the chapter on Whole Numbers, in a general way, by using variables a, b and c.

Sol. (a + b) + c = a + (b + c)

Deleted Exercise

1. Make up as many expressions with number (no variables) as you can from three numbers 5, 7 and 8. Every number should be used not more than once. Use only addition, subtraction and multiplication.

Sol. (a) $(8 \times 5) - 7$ (b) $(8 + 5) - 7$
(c) $(8 \times 7) - 5$ (d) $(8 + 7) - 5$
(e) $5 \times (7 + 8)$ (f) $5 + (7 + 8)$
(g) $5 + (8 - 7)$ (h) $5 - (7 + 8)$

2. Which out of the following are expressions with numbers only?
(a) $y + 3$ (b) $(7 \times 20) - 8z$
(c) $5(21 - 7) + 7 \times 2$ (d) 5
(e) $3x$ (f) $5 - 5n$
(g) $(7 \times 20) - (5 \times 10) - 45 + p$

Sol. (c) and (d)

3. Identify the operations (addition, subtraction, division, multiplication) in forming the following expressions and tell how the expressions have been formed.
(a) $z + 1, z - 1, y + 17, y - 17$
(b) $17y, \frac{y}{17}, 5z$
(c) $2y + 17, 2y - 17$
(d) $7m, -7m + 3, -7m - 3$

Sol. (a) $z + 1 \rightarrow$ Addition
$z - 1 \rightarrow$ Subtraction
$y + 17 \rightarrow$ Addition
$y - 17 \rightarrow$ Subtraction
(b) $17y \rightarrow$ Multiplication; $\frac{y}{17} \rightarrow$ Division;
$5z \rightarrow$ Multiplication
(c) $2y + 17 \rightarrow$ Multiplication and Addition
$2y - 17 \rightarrow$ Multiplication and Subtraction
(d) $7m \rightarrow$ Multiplication
$-7m + 3 \rightarrow$ Multiplication and Addition
$-7m - 3 \rightarrow$ Multiplication and Subtraction

4. Give expressions for the following cases.
(a) 7 added to p
(b) 7 subtracted from p
(c) p multiplied by 7
(d) p divided by 7
(e) 7 subtracted from $-m$
(f) $-p$ multiplied by 5
(g) $-p$ divided by 5
(h) p multiplied by -5

Sol. (a) $p + 7$ (b) $p - 7$ (c) $7p$ (d) $p/7$
(e) $-m - 7$ (f) $-5p$ (g) $\frac{-p}{5}$ (h) $-5p$

5. Give expressions in the following cases.
(a) 11 added to 2m
(b) 11 subtracted from 2m
(c) 5 times y to which 3 is added
(d) 5 times y from which 3 is subtracted
(e) y is multiplied by -8
(f) y is multiplied by -8 and then 5 is added to the result
(g) y is multiplied by 5 and then result is subtracted from 16
(h) y is multiplied by -5 and the result is added to 16

Sol. (a) $2m + 11$ (b) $2m - 11$
(c) $5y + 3$ (d) $5y - 3$
(e) $-8y$ (f) $-8y + 5$
(g) $16 - 5y$ (h) $-5y + 16$

6. (a) Form expressions using t and 4. Use not more than one number operation. Every expression must have t in it.
(b) Form expressions using y, 2 and 7. Every expression must have y in it. Use only two number operations. These should be different.

Sol. (a) $t + 4, t - 4, 4 - t, 4t, \frac{t}{4}, \frac{4}{t}$
(b) $2y + 7, 2y - 7, 7y + 2, 7y - 2$ and so on

Deleted Exercise

1. Answer the following:

(a) Take Sarita's present age to be y years

(i) What will be her age 5 years from now?

(ii) What was her age 3 years back?

(iii) Sarita's grandfather is 6 times her age. What is the age of her grandfather?

(iv) Grandmother is 2 years younger than grandfather. What is grandmother's age?

(v) Sarita's father's age is 5 years more than 3 times Sarita's age. What is her father's age?

(b) The length of a rectangular hall is 4 meters less than 3 times the breadth of the hall. What is the length, if the breadth is b meters.

(c) A rectangular box has height h cm. Its length is 5 times the height and breadth is 10 cm less than the length. Express the length and the breadth of the box in terms of the height.

(d) Meena, Beena and Leena are climbing the steps to the hilltop. Meena is at step s, Beena is 8 steps ahead and Leena 7 steps, behind. Where are Beena and Meena? The total number of steps to the hilltop is 10 less than 4 times what Meena has reached. Express the total number of steps using s.

(e) A bus travels at v km per hour. It is going from Daspur to Beespur. After the bus has travelled 5 hours, Beespur is still 20 km away. What is the distance from Daspur to Beespur? Express it using v.

Sol. (a) (i) y + 5 (ii) y – 3 (iii) 6y

(iv) 6y – 2 (v) 3y + 5

(b) Breadth = b metres and Length

= (3b – 4) metres

(c) Height of the box = h cm

Length of the boxes = 5 times the height = 5h cm

Breadth of the box = 10 cm less than length = (5h – 10) cm

(d) Meena's position = s

Beena's position=8 steps ahead = s + 8

Leena's position=7steps behind = s – 7

Total number of steps = 4s – 10

(e) Speed of the bus = v km/h

Distance travelled in 5 hours = 5v km

Remaining distance = 20 km

Therefore, total distance=(5v + 20)km

2. Change the following statements using expression into statements in ordinary language.

(For example, Given Salim scores r runs in a cricket match, Nalin scores (r + 15) runs. In ordinary language - Nalin scores 15 runs more than Salim.)

(a) A notebook costs Rs. p. A book costs Rs. 3p.

(b) Tony puts q marbles on the table. He has 8q marbles in his box.

(c) Our class has n students. The school has 20n students.

(d) Jaggu is z years old. His uncle is 4z years old and his aunt is (4z – 3) years old.

(e) In an arrangement of dots there are r rows. Each row contains 5 dots.

Sol. (a) A book costs 3 times the cost of a notebook.

(b) The number of marbles in box is 8 times the marbles on the table.

(c) Total number of students in the school is 20 times that in our class.

(d) Jaggu's uncle's age is 4 times the age of Jaggu. Jaggu's aunt is 3 years younger than his uncle.

(e) The total number of dots is 5 times the number of rows.

3. (a) Given Munnu's age to be x years, can you guess what (x – 2) may show?

(**Hint :** Think of Munnu's younger brother)

(b) Given Sara's age today to be y years. Think of her age in the future or in the past. What will the following expression indicate?

$y + 7, y - 3, y + 4\frac{1}{2}, y - 2\frac{1}{2}$.

(c) Given n students in the class like football, what may 2n show? What may $\frac{n}{2}$ show?

(**Hint :** Think of games other than football)

Sol. (a) Munnu's age = x years

His younger brother is 2 years younger than him.

His younger brother's age = (x – 2) years

(b) Her age in past = (y – 3), $\left(y - 2\frac{1}{2}\right)$

Her age in future = (y + 7), $\left(y + 4\frac{1}{2}\right)$

(c) Number of students liking hockey is twice the students liking football, i.e. 2n.

Number of students liking tennis is half the students liking football, i.e., $\frac{n}{2}$.

Deleted Exercise

1. State which of the following are equations (with a variable). Give reason for your answer. Identify the variable from the equations with a variable.

(a) $17 = x + 7$ (b) $(t - 7) > 5$

(c) $\frac{4}{2} = 2$ (d) $(7 \times 3) - 19 = 8$

(e) $5 \times 4 - 8 = 2x$ (f) $x - 2 = 0$

(g) $2m < 30$ (h) $2n + 1 = 11$

(i) $7 = (11 \times 5) - (12 \times 4)$

(j) $7 = (11 \times 2) + p$ (k) $20 = 5y$

(l) $\frac{3q}{2} < 5$ (m) $z + 12 > 24$

(n) $20 - (10 - 5) = 3 \times 5$

(o) $7 - x = 5$

Sol. (a) It is an equation of variable as both the sides are equal. The variable is x.

(b) It is not an equation as L.H.S. is greater than R.H.S.

(c) It is an equation with no variable.

(d) It is an equation with no variable. But it is a false equation.

(e) It is an equation of variable as both the sides are equal. The variable is x.

(f) It is an equation of variable x.

(g) It is not an equation as L.H.S. is less than R.H.S.

(h) It is an equation of variable as both the sides are equal. The variable is n.

(i) It is an equation with no variable as its both sides are equal.

(j) It is an equation of variable p.

(k) It is an equation of variable y.

(l) It is not an equation as L.H.S. is less than R.H.S.

(m) It is not an equation as L.H.S. is greater than R.H.S.

(n) It is an equation with no variable.

(o) It is an equation of variable x.

2. Complete the entries in the third column of the table.

S. No.	Equation	Value of variable	Equation satisfied yes/no
(a)	10 y = 80	y = 10	
(b)	10 y = 80	y = 8	
(c)	10 y = 80	y = 5	
(d)	4l = 20	l = 20	
(e)	4l = 20	l = 80	
(f)	4l = 20	l = 5	
(g)	b + 5 = 9	b = 5	
(h)	b + 5 = 9	b = 9	
(i)	b + 5 = 9	b = 4	
(j)	h – 8 = 5	h = 13	
(k)	h – 8 = 5	h = 8	
(l)	h – 8 = 5	h = 0	
(m)	p + 3 = 1	p = 3	
(n)	p + 3 = 1	p = 1	
(o)	p + 3 = 1	p = 0	
(p)	p + 3 = 1	p = –1	
(q)	p + 3 = 1	p = –2	

Sol.

S. No.	Equation	Value of Variable	Equation Satisfied Yes/No	Solution of L.H.S.
(a)	10 y = 80	y = 10	No	10 × 10 = 100
(b)	10 y = 80	y = 8	Yes	10 × 8 = 80
(c)	10 y = 80	y = 5	No	10 × 5 = 50
(d)	4l = 20	l = 20	No	4 × 20 = 80
(e)	4l = 20	l = 80	No	4 × 80 = 320
(f)	4l = 20	l = 5	Yes	4 × 5 = 20
(g)	b + 5 = 9	b = 5	No	5 + 5 = 10
(h)	b + 5 = 9	b = 9	No	9 + 5 = 14
(i)	b + 5 = 9	b = 4	Yes	4 + 5 = 9
(j)	h – 8 = 5	h = 13	Yes	13 – 8 = 5
(k)	h – 8 = 5	h = 8	No	8 – 8 = 0
(l)	h – 8 = 5	h = 0	No	0– 8 = – 8
(m)	p + 3 = 1	p = 3	No	3 + 3 = 6
(n)	p + 3 = 1	p = 1	No	1 + 3 = 4
(o)	p + 3 = 1	p = 0	No	0 + 3 = 3
(p)	p + 3 = 1	p = –1	No	–1 + 3 = 2
(q)	p + 3 = 1	p = –2	Yes	–2 + 3 = 1

3. Pick out the solution from the values given in the bracket next to each equation. Show that the other values do not satisfy the equation.

(a) 5m = 60 (10, 5, 12, 15)

(b) n + 12 = 20 (12, 8, 20, 0)

(c) p – 5 = 5 (0, 10, 5, –5)

(d) $\frac{q}{2} = 7$ (7, 2, 10, 14)

(e) r – 4 = 0 (4, – 4, 8, 0)

(f) x + 4 = 2 (– 2, 0, 2, 4)

Sol. (a) 5m = 60

Putting the given values in L.H.S.

for m = 10

5 × 10 = 50

∵ L.H.S. ≠ R.H.S.

∴ m = 10 is not the solution.

for m = 5

5 × 5 = 25

∵ L.H.S. ≠ R.H.S.

∴ m = 5 is not the solution.

for m = 12

∵5 × 12 = 60

L.H.S. = R.H.S.

∴ m = 12 is a solution.

for m = 15

5 × 15 = 75

L.H.S. ≠ R.H.S.

∴ m = 15 is not the solution.

(b) n +12 = 20

Putting the given values in L.H.S.

for n = 12

12 +12 = 24

∵ L.H.S. ≠ R.H.S.

∴ n = 12 is not the solution.

for n = 20

20 + 12 = 32

∵ L.H.S. ≠ R.H.S.

∴ n = 20 is not the solution.

for n = 8

8 + 12 = 20

∵ L.H.S. = R.H.S.

∴ n = 8 is a solution.

for n = 0

0 + 12 = 12

∴ n = 0 is not the solution.

(c) p – 5 = 5

Putting the given values in L.H.S,

for p = 0

0 – 5 = –5

∵ L.H.S. ≠ R.H.S.

∴ p = 0 is not the solution.

for p = 5

5 – 5 = 0

∵ L.H.S. ≠ R.H.S.

∴ p = 5 is not the solution.

for p = 10

10 – 5 = 5

∵ L.H.S. = R.H.S.

∴ p = 10 is a solution.

for p = –5

–5 – 5 = –10

∵ L.H.S. ≠ R.H.S.

∴ p = –5 is not the solution.

(d) $\frac{q}{2} = 7$

Putting the given values in L.H.S., **for q = 7**

$\frac{7}{2} \neq 7$

∵ L.H.S. ≠ R.H.S.

∴ q = 7 is not the solution.

for q = 10

$\frac{10}{2} = 5$

∵ L.H.S. ≠ R.H.S.

∴ q = 10 is not the solution.

for q = 2

$\frac{2}{2} = 1$

∵ L.H.S. ≠ R.H.S.

∴ q = 2 is not the solution.

for q = 14

$\frac{14}{2} = 7$

∵ L.H.S. = R.H.S.

∴ q = 14 is a solution.

(e) r – 4 = 0

Putting the given values in L.H.S.,

for r = 4

4 – 4 = 0

∵ L.H.S. = R.H.S.

∴ r = 4 is a solution.

for r = 8

8 – 4 = 4

∵ L.H.S. ≠ R.H.S.

∴ r = 8 is not the solution.

for r = –4

–4 – 4 = –8

∵ L.H.S ≠ R.H.S.

r = –4 is not the solution.

for r = 0

0 – 4 = –4

∵ L.H.S ≠ R.H.S.

r = 0 is not the solution.

(f) x + 4 = 2

Putting the given values in L.H.S.,

for x = –2

–2 + 4 = 2

∵ L.H.S = R.H.S.

∴ x = –2 is a solution.

for x = 2

2 + 4 = 6

∵ L.H.S ≠ R.H.S.

∴ x = 2 is not the solution.

for x = 0

0 + 4 = 4

∵ L.H.S ≠ R.H.S.

∴ x = 0 is not the solution.

for x = 4

4 + 4 = 8

∵ L.H.S ≠ R.H.S.

∴ x = 4 is not the solution.

4. (a) Complete the table and by inspection of the table find the solution to the equation m + 10 = 16.

m	m +10
1	-
2	-
3	-
4	-
5	-
6	-
7	-
8	-
9	-
10	-
-	-
-	-
-	-

(b) Complete the table and by inspection of the table, find the solution to the equation 5t = 35.

T	5t
3	-
4	-
5	-
6	-
7	-
8	-
9	-
10	-
11	-
-	-
-	-
-	-
-	-

(c) Complete the table and find the solution of the equation $z/3 = 4$ using the table.

Z	$\frac{z}{3}$
8	$2\frac{2}{3}$
9	3
10	$3\frac{1}{3}$
11	
12	
13	
14	
15	
16	
-	
-	-
-	-
-	-

(d) Complete the table and find the solution of the equation $m - 7 = 3$.

m	m – 7
5	-
6	-
7	-
8	-
9	-
10	-
11	-
12	-
13	-
-	-
-	-

Sol. (a)

m	m +10
1	11
2	12
3	13
4	14
5	15
6	16
7	17
8	18
9	19
10	20
11	21
12	22
13	23

$\because$ At m = 6, m + 10 = 16

$\therefore$ m = 6 is the solution.

(b)

t	5t
3	15
4	20
5	25
6	30
7	35
8	40
9	45
10	50
11	55
12	60
13	65
14	70
15	75
16	80

$\because$ At t = 7, 5t = 35

$\therefore$ t = 7 is the solution.

(c)

Z	$\frac{z}{3}$
8	$2\frac{2}{3}$
9	3
10	$3\frac{1}{3}$
11	$3\frac{2}{3}$
12	4
13	$4\frac{1}{3}$
14	$4\frac{2}{3}$
15	**5**
16	$5\frac{1}{3}$
17	$5\frac{2}{3}$
18	6
19	$6\frac{1}{3}$
20	$6\frac{2}{3}$

$\because$ At z = 12, $\frac{z}{3} = 4$

$\therefore$ z = 12 is the solution.

(d)

m	m – 7
5	–2
6	–1
7	0
8	1
9	2
10	3
11	4
12	5
13	6
14	7
15	8

$\because$ At m = 10, m – 7= 3

$\therefore$ m = 10 is the solution.

5. Solve the following riddles, you may yourself construct such riddles.

Who am I?

(i) Go around a square
Counting every corner
Thrice and no more !
Add the count to me
To get exactly thirty four !

(ii) For each day of the week
Make an upcount from me
If you make no mistake
You will get twenty three !

(iii) I am a special number
Take away from me a six !
A whole cricket team
You will still be able to fix !

(iv) Tell me who I am
I shall give a pretty clue !
You will get me back
If you take me out of twenty two !

Sol. (i) Let the required number be x.

Number of corners of the square = 4

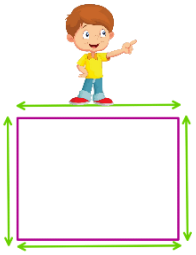
Number obtained on counting every corner thrice = 4 × 3 = 12

According to the question,

$x + 12 = 34 \Rightarrow x = 34 - 12 = 22$

Hence, I am 22.

(ii) Let the required number be x.



Number of days in a week = 7

According to the question,

$x + 7 = 23 \Rightarrow x = 23 - 7 = 16$

Hence, I am 16.

(iii) Let the required number be x.

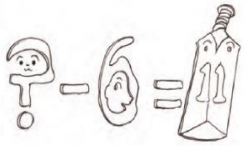
Number of players in a cricket team = 11

According to the question,

$x - 6 = 11$

$\Rightarrow x = 11 + 6$

$= 17$



Hence, I am 17.

(iv) Let the required number be x.

According to the question,

$22 - x = x \Rightarrow x + x = 22$

$\Rightarrow 2x = 22 \Rightarrow x = \frac{22}{2} = 11$

Hence, I am 11.