Examples

GRADE 8

REVISION: SUBSTITUTION

EXAMPLE 1

Determine the value of the following expressions:

1.1) $8 + b \ \ if \ b = 10$

1.2) $5x \ \ if \ x = 4$

1.3) $15 - 3x \ \ if \ x = -3$

1.4) $\frac{x}{6} + 2 \ \ if \ x = 12$

1.5) $\frac{7m+3n}{m} if \ m = 2$ and $n = -3$

SOLVING EQUATIONS BY INSPECTION

EXAMPLE 2

Two expressions are listed below. Complete the table for the given values of x by making use of substitution.

x	-3	-2	-1	0	1	2	3	4
$2x + 1$								
$x + 2$								

Now use your table to find out for which of the given values of x will it be true, that the left-hand side of the equation is equal to the right-hand side.

$$2x + 1 = x + 2$$

EXAMPLE 3



Six expressions are listed in the table below. Complete the table for the given values of x.

x	-3	-2	-1	0	1	2	3	4
$2x+3$		-1	1	3	5	7	9	11
$x+4$	1		3	4	5	6	7	8
$9-x$	12	11		9	8	7	6	5
$3x-2$	-11	-8	-5		1	4	7	10
$10x-7$	-37	-27	-17	-7		13	23	33
$5x+3$	-12	-7	-2	3	8		18	23
$10-3x$	19	16	13	10	7	4		-2

Now use your table to find out for which of the given values of x will it be true that the left-hand side of the equation is equal to the right-hand side.

3.1 $2x+3=5x+3$

3.2 $5x+3=9-x$

3.3 $10x-7=5x+3$

3.4 $3x-2=x+4$

3.5 $9-x=2x+3$

INTRODUCTION TO LINEAR EQUATIONS

EXAMPLE 4

Can you help me determine what numbers are hiding behind the blocks?

1) $\square + 5 = 8$

2) $4 + \square = 6$

3) $2 \times \square = 10$

4) $\square - 2 = 13$

5) $\square \div 2 = 7$

6) $9 \div \square = 9$

7) $\frac{\square}{4} = 4$

8) $3 \times \square + 5 = 14$

9) $\square \times 2 = 0$

10) $\frac{7}{\square} = 1$

SOLVING EQUATIONS USING ADDITIVE AND MULTIPLICATIVE INVERSES

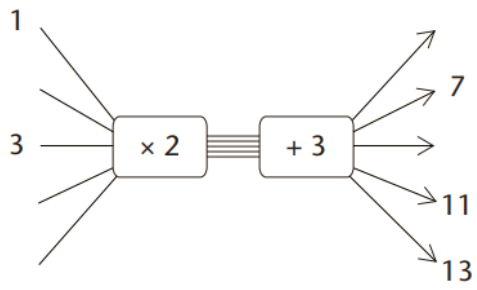
EXAMPLE 5

5.1 In each case find the value of x:

(a) $x \xrightarrow{+7} 10$

(b) $x \xrightarrow{\times 2} \xrightarrow{+3} 13$

5.2 Copy and complete the flow diagrams. Fill in all the missing numbers:



EXAMPLE 6

Solve the equations below. You may do this by using the inverse operations. You may write a flow diagram to help you to see the operations

$2x + 5 = 23$

LINEAR EQUATIONS BY INSPECTION

EXAMPLE 7

Let's think together and solve for x.

7.1) $x - 5 = 11$

7.2) $x + 10 = 35$

7.3) $2x - 5 = 11$

7.4) $\frac{x}{4} + 3 = 9$

SOLVING ALGEBRAIC EQUATIONS



EXAMPLE 8

Solve for x:

$5x + 6 = 3x - 8$

EXAMPLE 9

Solve for x:

$-7x - 5 = 2x - 13$

EXAMPLE 10

Solve for x:

$4x + 1 = -2x + 19$

SETTING UP EQUATIONS

EXAMPLE 11

Let's set up an equation that has 5 as the solution.

Start by writing the solution.

Add 3 to both sides.

Multiply both sides by 5.

EXAMPLE 12



Let's set up an equation that has 7 as the solution.

Start by writing the solution.

Add 12 to both sides.

Multiply both sides by 4

EXAMPLE 13



Let's set up an equation that has 10 as the solution.

Start by writing the solution

Multiply both sides by 3

Subtract 6 to both side

EXAMPLE 14



Consider this situation:

You need to hire a car. The car rental company charges a flat rate of R600 and then R5 for every kilometer you drive.

a) How much will it cost you to drive 10km?

b) How many kilometers can you drive if you can only afford to spend a R1000?

c) Hence, write an equation for (b) where x represents the number of kilometers traveled.



EXAMPLE 15

Ben and Thabo decide to do some calculations with a certain number. Ben multiplies the number by 5 and adds 12. Thabo gets the same answer as Ben when he multiplies the number by 9 and subtracts 16. What is the number they worked with?

Let the number be x.

LINEAR EQUATIONS WITH BRACKETS

EXAMPLE 16

Solve for x

$4(x-3) = 5 - 5(x-2)$

EXAMPLE 17

Solve for x

$x(x-8) + 16 = x(x-7)$

Important to remember

- $If\ 2x = 0$
  $x = \frac{0}{2}$
  $x = 0$

- $If\ x + 1 = x + 1$
  $x - x = 1 - 1$
  $0 = 0$
  $\therefore x \in R$

Always true

Never true

- $If\ x + 1 = x + 2$
  $x - x = 2 - 1$
  $0 = 1$
  $\therefore$ *no solution for* x

EXAMPLE 18

The length of a rectangle is 5 units more than the width. The width of the rectangle is $x + 2$. Determine the value of x if the perimeter of this rectangle is equal to 58cm.

ALGERBAIC EQUATIONS WITH FRACTIONS



EXAMPLE 19

Solve for x

$$\frac{5x}{3} = 2x - 8$$

EXAMPLE 20

Solve for x

$$\frac{6x}{5} = x + 10$$

WORD SUMS

LET'S RECAP OUR LANGUAGE AGAIN QUICKLY

Product	$\times$
Sum	$+$
Difference	$-$
Divide/ quotient	$\div$

Create an equation for each of the following questions and then solve the equation

EXAMPLE 21

Find a number, such that, when you multiply it by 4 and then subtract 8, you get an answer of 32. **(Let the number be x)**

EXAMPLE 22

I am thinking of a number and add 5 to it. I multiply this number by 2 and then subtract 3. I find that the answer is 3 times the number I thought of first. **(Let the number be x)**

EQUATIONS WITH EXPONENTS

EXAMPLE 23



Solve for x:

23.1) $3^x = 3^2$

23.2) $3^x = 9$

23.3) $3^x = 1$

23.4) $2^x + 1 = 17$

23.5) $5.8^x = 5$

23.6) $4^{3x} = 32$

23.7) $2^x . 2^{x+2} = 16$