ALGEBRA

RULES

Isolating the variable

The goal is to isolate the variable:

2a + 4 = 8

a = ?

Opposite operations

|  |  |  |
| --- | --- | --- |
| **Equation** | **Operation** | **Opposite operation** |
| X + 3 = 5 | Addition | Subtraction |
| X – 3 = 2 | Subtraction | Addition |
| 3x = 6 | Multiplication | Division |
| x/2 = 3 | Division | Multiplication |

Balancing equations

Whatever you do to one side of the equation, you must do to the other side. E.g. if you add 3 to the left-hand side of the equation, then you must add 3 to the right-hand side.

ADDITION

X + 20 = -15

// minus 20 from the left hand side in order to isolate x

// minus 20 from the right hand side

X = -15 – 20

X = -35

Y+(-12) = 15

Y = 15 – (-12) // remember, subtracting a negative is like adding a positive

Y = 27

Decimals

-5.5 + c = 10

C = 10 + 5.5

C = 15.5

Challenges

1. X + 38 = -20 (answer -58)
2. 62 = y + (-10) (answer 72)
3. -14.7 + s = -18.9 (answer -4.2)
4. a + (-1/2) = -3/4 (answer -1/4)
5. 29 + c – 8 (answer -22)

SUBTRACTION

X – 20 = 40

X = 60 // x = 40 + 20

S – (-10) = -25 // AKA s + 10 = -25

S = -25 – 10

S = -35

-5.8 = z – 2.5

Z = 2.5 – 5.8

Z = -3.3

Challenges

1. X – 130 = -220 (answer -90)
2. 67 = y – 97 (answer 164)
3. -0.8 = s – 1.4 (answer 0.6)
4. Y – (-22) = -32 (answer -54)
5. D – 30 – 5 = -15 (answer 20)

MULTIPLICATION

A coefficient is a number being multiplied by a variable:

3x = -9 // 3 is a coefficient

X = -9/3

X = -3

-25p = -100

P = -100 \* - 25 = 4

2/3h = 9

// times the reciprocal *- this is flipping the fraction round so 2/3 becomes 3/2*

h *= 9 \* 3/2*

h = 9/1 \* 3/2 // put whole number over 1 to turn in to fraction

h = 27/2 or 13.5

Challenges

1. -12x = 84 (answer -7)
2. 1/4s = -2 (answer -8)
3. -3/4 = 1/3x (answer -9/(+)4)
4. -0.8x = -3.2 (answer 4)
5. 0.25x = 85 (answer 340) // tip– times decimals to make them whole numbers (e.g. x10)

DIVISION

x/5 = -95

x = -95 \* 5

x = -475

y/-6 = -17/+4

y = -17/+4 \* -6

y = -17/+4 \* -6/+1

y = 102/4

y = 51/2 or 25.5

Challenges

1. x/4 = -14 (answer -56)
2. y/-1.2 = 6 (answer -7.2)
3. x/0.3 = 4.2 (answer 1.26)
4. -3/+5 = y/-3 (answer 9/5)
5. -1/+4 = x/-8 (answer 4/2 or 2/1 or 2)