

Solving Equations: Quick Questions

Mini whiteboard questions, with solutions

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One step equations

True or false?

The solution of $x + 6 = 10$ is $x = 16$

True or false?

The solution of $x + 6 = 10$ is $x = 16$

False. $16 + 6 = 22$, not 10.

$$x + 6 = 10$$

$$x = 4 \quad \text{subtract 6 from both sides}$$

10	
x	6

True or false?

$$4x = 20, \text{ so } x = 5$$

True or false?

$$4x = 20, \text{ so } x = 5$$

True. $4x$ means $4 \times x$, so we divide both sides by 4.

Check: $4 \times 5 = 20$

20			
x	x	x	x

True or false?

To solve $x - 3 = 9$ we subtract 3 from both sides

True or false?

To solve $x - 3 = 9$ we subtract 3 from both sides

False. The inverse of subtracting 3 is adding 3.

$$x - 3 = 9$$

$$x = 12 \quad \text{add 3 to both sides}$$

x	
9	3

True or false?

The solution of $\frac{x}{2} = 8$ is $x = 4$

True or false?

The solution of $\frac{x}{2} = 8$ is $x = 4$

False. $\frac{x}{2}$ means $x \div 2$, and $4 \div 2 = 2$, not 8.
 $\frac{x}{2} = 8$

$x = 16$ multiply both sides by 2

x	
8	8

True or false?

The solution of $15 = x + 9$ is $x = 6$

True or false?

The solution of $15 = x + 9$ is $x = 6$

True. The unknown can be on either side of the equals sign.

$$15 = x + 9$$

$$6 = x \quad \text{subtract 9 from both sides}$$

$6 = x$ is the same as $x = 6$.

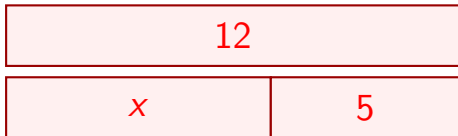
Solve $x + 5 = 12$

Solve $x + 5 = 12$

$$x + 5 = 12$$

$$x = 7$$

subtract 5 from both sides



Solve $x - 4 = 11$

Solve $x - 4 = 11$

$$x - 4 = 11$$

$$x = 15$$

add 4 to both sides

x	
11	4

Solve $3x = 21$

Solve $3x = 21$

$$3x = 21$$

$$x = 7$$

divide both sides by 3

21		
x	x	x

Solve $\frac{x}{5} = 6$

Solve $\frac{x}{5} = 6$

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

$$x = 30$$
 multiply both sides by 5

x				
6	6	6	6	6

Solve $x + 13 = 8$

Solve $x + 13 = 8$

$$x + 13 = 8$$

$$x = -5 \quad \text{subtract 13 from both sides}$$

$$\text{Check: } -5 + 13 = 8$$

Solve $5x = 8$

Solve $5x = 8$

$$5x = 8$$

$$x = \frac{8}{5} = 1.6$$

divide both sides by 5

The solution does not have to be a whole number.

Solve $-3x = 18$

Solve $-3x = 18$

$$-3x = 18$$

$$x = -6 \quad \text{divide both sides by } -3$$

$$\text{Check: } -3 \times (-6) = 18$$

Solve $\frac{x}{4} = -7$

Solve $\frac{x}{4} = -7$

$$\frac{x}{4} = -7$$

$$x = -28 \quad \text{multiply both sides by 4}$$

$$\text{Check: } -28 \div 4 = -7$$

Solve $12 - x = 5$

Solve $12 - x = 5$

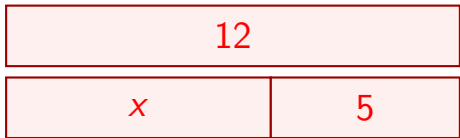
$$12 - x = 5$$

$$12 = 5 + x$$

add x to both sides

$$7 = x$$

subtract 5 from both sides



6 identical notebooks cost £8.40 in total.

Write an equation for the cost, £ c , of one notebook,
and solve it.

6 identical notebooks cost £8.40 in total.

Write an equation for the cost, £ c , of one notebook,
and solve it.

$$6c = 8.40$$

$$c = 1.40 \quad \text{divide by 6}$$

One notebook costs £1.40.



Equations of the form $ax + b = c$

True or false?

$$2x + 5 = 17 \text{ gives } 2x = 12, \text{ so } x = 10$$

True or false?

$$2x + 5 = 17 \text{ gives } 2x = 12, \text{ so } x = 10$$

False. $2x$ means $2 \times x$, so we divide by 2, not subtract 2.

$$2x + 5 = 17$$

$$2x = 12 \quad \text{subtract 5 from both sides}$$

$$x = 6 \quad \text{divide both sides by 2}$$

$$\text{Check: } 2 \times 6 + 5 = 17$$

True or false?

$3x - 4 = 11$ and $3x = 15$ have the same solution

True or false?

$3x - 4 = 11$ and $3x = 15$ have the same solution

True. Adding 4 to both sides of $3x - 4 = 11$ gives $3x = 15$.
Doing the same to both sides keeps them equal,
so the solution does not change.

$$3x - 4 = 11$$

$$3x = 15 \quad \text{add 4 to both sides}$$

$$x = 5 \quad \text{divide both sides by 3}$$

$$\text{Check: } 3 \times 5 - 4 = 11 \text{ and } 3 \times 5 = 15$$

True or false?

Dividing both sides of $4x + 3 = 23$ by 4 gives

$$x + 3 = \frac{23}{4}$$

True or false?

Dividing both sides of $4x + 3 = 23$ by 4 gives

$$x + 3 = \frac{23}{4}$$

False. Every term is divided by 4, including the 3:

$$x + \frac{3}{4} = \frac{23}{4}$$

It is simpler to subtract 3 first: $4x = 20$, so $x = 5$.

True or false?

The solution of $5x + 2 = 2$ is $x = 0$

True or false?

The solution of $5x + 2 = 2$ is $x = 0$

True.

$$5x + 2 = 2$$

$$5x = 0 \quad \text{subtract 2 from both sides}$$

$$x = 0 \quad \text{divide both sides by 5}$$

$$\text{Check: } 5 \times 0 + 2 = 2$$

True or false?

The solution of an equation is always a whole number

True or false?

The solution of an equation is always a whole number

False. For example,

$$2x + 1 = 4$$

$$2x = 3$$

subtract 1 from both sides

$$x = 1.5$$

divide both sides by 2

Solve $2x + 3 = 11$

Solve $2x + 3 = 11$

$$2x + 3 = 11$$

$$2x = 8$$

subtract 3 from both sides

$$x = 4$$

divide both sides by 2

11		
x	x	3

Solve $3x + 5 = 26$

Solve $3x + 5 = 26$

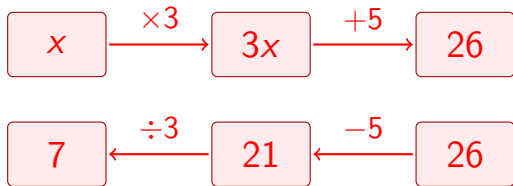
$$3x + 5 = 26$$

$$3x = 21$$

$$x = 7$$

subtract 5

divide by 3



Solve $4x - 7 = 25$

Solve $4x - 7 = 25$

$$4x - 7 = 25$$

$$4x = 32 \quad \text{add 7 to both sides}$$

$$x = 8 \quad \text{divide both sides by 4}$$

$$\text{Check: } 4 \times 8 - 7 = 25$$

Solve $23 = 5x + 8$

Solve $23 = 5x + 8$

$$23 = 5x + 8$$

$$15 = 5x$$

subtract 8 from both sides

$$3 = x$$

divide both sides by 5

The solution is $x = 3$.

Solve $5x + 9 = 4$

Solve $5x + 9 = 4$

$$5x + 9 = 4$$

$$5x = -5 \quad \text{subtract 9 from both sides}$$

$$x = -1 \quad \text{divide both sides by 5}$$

$$\text{Check: } 5 \times (-1) + 9 = 4$$

Solve $6x - 1 = 14$

Solve $6x - 1 = 14$

$$6x - 1 = 14$$

$$6x = 15$$

add 1 to both sides

$$x = \frac{15}{6} = 2.5$$

divide both sides by 6

Solve $10 - 2x = 4$

Solve $10 - 2x = 4$

Adding $2x$ to both sides makes the x term positive.

$$10 - 2x = 4$$

$$10 = 4 + 2x$$

add $2x$ to both sides

$$6 = 2x$$

subtract 4 from both sides

$$3 = x$$

divide both sides by 2

Solve $8x + 13 = 7$

Solve $8x + 13 = 7$

$$8x + 13 = 7$$

$$8x = -6$$

subtract 13 from both sides

$$x = -\frac{6}{8} = -0.75$$

divide both sides by 8

$$\text{Check: } 8 \times (-0.75) + 13 = -6 + 13 = 7$$

Solve $0.4x + 1 = 3$

Solve $0.4x + 1 = 3$

$$0.4x + 1 = 3$$

$$0.4x = 2$$

subtract 1 from both sides

$$x = \frac{2}{0.4} = \frac{20}{4} = 5$$

divide both sides by 0.4

A taxi charges £3, plus £2 for every mile.

A journey costs £19.

How many miles long is the journey?

A taxi charges £3, plus £2 for every mile.

A journey costs £19.

How many miles long is the journey?

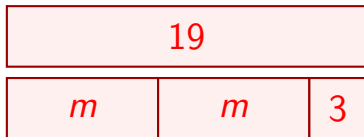
We write m for the length of the journey in miles.

$$2m + 3 = 19$$

$$2m = 16 \quad \text{subtract 3}$$

$$m = 8 \quad \text{divide by 2}$$

The journey is 8 miles long.



Equations of the form $\frac{x}{a} + b = c$

True or false?

To solve $\frac{x}{3} + 2 = 5$, we subtract 2
before we multiply by 3

True or false?

To solve $\frac{x}{3} + 2 = 5$, we subtract 2
before we multiply by 3

True. x is divided by 3 and then 2 is added, so the inverse operations are done in the reverse order.

$$\frac{x}{3} + 2 = 5$$

$$\frac{x}{3} = 3 \quad \text{subtract 2 from both sides}$$

$$x = 9 \quad \text{multiply both sides by 3}$$

True or false?

Multiplying both sides of $\frac{x}{4} + 1 = 6$ by 4 gives
 $x + 1 = 24$

True or false?

Multiplying both sides of $\frac{x}{4} + 1 = 6$ by 4 gives
 $x + 1 = 24$

False. Every term is multiplied by 4, including the 1.

$$\frac{x}{4} + 1 = 6$$

$$x + 4 = 24$$

multiply every term by 4

$$x = 20$$

subtract 4 from both sides

True or false?

The solution of $\frac{x}{5} - 2 = 3$ is $x = 5$

True or false?

The solution of $\frac{x}{5} - 2 = 3$ is $x = 5$

False. 5 is the value of $\frac{x}{5}$, not of x .

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

$$\frac{x}{5} = 5$$

add 2 to both sides

$$x = 25$$

multiply both sides by 5

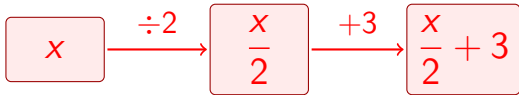
True or false?

$\frac{x}{2} + 3$ means divide x by 2, then add 3

True or false?

$\frac{x}{2} + 3$ means divide x by 2, then add 3

True. The fraction bar is only under the x , so the division comes first.



$\frac{x+3}{2}$ would mean add 3 first, then divide by 2.

True or false?

$\frac{x}{6} + 4 = 1$ has no solution,
because 1 is less than 4

True or false?

$\frac{x}{6} + 4 = 1$ has no solution,
because 1 is less than 4

False. The solution is a negative number.

$$\frac{x}{6} + 4 = 1$$

$$\frac{x}{6} = -3 \quad \text{subtract 4 from both sides}$$

$$x = -18 \quad \text{multiply both sides by 6}$$

Solve $\frac{x}{2} + 3 = 7$

Solve $\frac{x}{2} + 3 = 7$

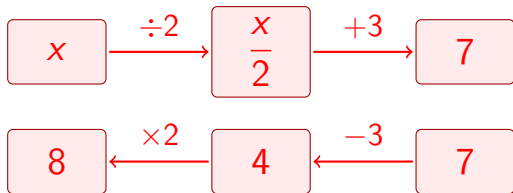
$$\frac{x}{2} + 3 = 7$$

$$\frac{x}{2} = 4$$

$$x = 8$$

subtract 3

multiply by 2



Solve $\frac{x}{4} + 5 = 8$

Solve $\frac{x}{4} + 5 = 8$

$$\frac{x}{4} + 5 = 8$$

$$\frac{x}{4} = 3$$

subtract 5 from both sides

$$x = 12$$

multiply both sides by 4



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

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

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

$$\frac{x}{3} = 7$$

add 2 to both sides

$$x = 21$$

multiply both sides by 3

Solve $10 = \frac{x}{3} + 4$

Solve $10 = \frac{x}{3} + 4$

$$10 = \frac{x}{3} + 4$$

$$6 = \frac{x}{3}$$

subtract 4 from both sides

$$18 = x$$

multiply both sides by 3

Solve $\frac{x}{2} + 9 = 4$

Solve $\frac{x}{2} + 9 = 4$

$$\frac{x}{2} + 9 = 4$$

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

subtract 9 from both sides

$$x = -10$$

multiply both sides by 2

Solve $\frac{x}{4} - 1.5 = 2$

Solve $\frac{x}{4} - 1.5 = 2$

$$\frac{x}{4} - 1.5 = 2$$

$$\frac{x}{4} = 3.5$$

add 1.5 to both sides

$$x = 14$$

multiply both sides by 4

Solve $\frac{2x}{5} + 1 = 7$

Solve $\frac{2x}{5} + 1 = 7$

$$\frac{2x}{5} + 1 = 7$$

$$\frac{2x}{5} = 6$$

subtract 1 from both sides

$$2x = 30$$

multiply both sides by 5

$$x = 15$$

divide both sides by 2

Solve $\frac{2x}{3} + 5 = 1$

Solve $\frac{2x}{3} + 5 = 1$

$$\frac{2x}{3} + 5 = 1$$

$$\frac{2x}{3} = -4$$

subtract 5 from both sides

$$2x = -12$$

multiply both sides by 3

$$x = -6$$

divide both sides by 2

Solve $6 - \frac{x}{3} = 2$

Solve $6 - \frac{x}{3} = 2$

$$6 - \frac{x}{3} = 2$$

$$6 = 2 + \frac{x}{3}$$

add $\frac{x}{3}$ to both sides

$$4 = \frac{x}{3}$$

subtract 2 from both sides

$$12 = x$$

multiply both sides by 3

Four friends share the cost of a meal equally.

Each friend also pays £3 for a drink.

Each friend pays £17 in total.

How much did the meal cost?

Four friends share the cost of a meal equally.

Each friend also pays £3 for a drink.

Each friend pays £17 in total.

How much did the meal cost?

We write £ m for the cost of the meal.

$$\frac{m}{4} + 3 = 17$$

$$\frac{m}{4} = 14 \quad \text{subtract 3}$$

$$m = 56 \quad \text{multiply by 4}$$

The meal cost £56.

m			
14	14	14	14

Equations with the unknown on both sides

True or false?

To solve $5x + 2 = 3x + 10$,
we can subtract $3x$ from both sides

True or false?

To solve $5x + 2 = 3x + 10$,
we can subtract $3x$ from both sides

True. This leaves the x terms on one side only.

$$5x + 2 = 3x + 10$$

$$2x + 2 = 10$$

$$2x = 8$$

$$x = 4$$

subtract $3x$ from both sides

subtract 2 from both sides

divide both sides by 2

True or false?

Solving $4x + 1 = 2x + 7$, the first step gives

$$6x + 1 = 7$$

True or false?

Solving $4x + 1 = 2x + 7$, the first step gives

$$6x + 1 = 7$$

False. $6x + 1 = 7$ comes from adding $2x$ on the left but subtracting $2x$ on the right.

We must do the same to both sides.

$$4x + 1 = 2x + 7$$

$$2x + 1 = 7$$

subtract $2x$ from both sides

$$2x = 6$$

subtract 1 from both sides

$$x = 3$$

divide both sides by 2

True or false?

$3x + 5 = 3x + 8$ has no solution

True or false?

$3x + 5 = 3x + 8$ has no solution

True. Subtracting $3x$ from both sides gives $5 = 8$.

$5 = 8$ is never true, so no value of x works.

True or false?

Solving $7x - 3 = 2x + 12$ gives $5x = 9$

True or false?

Solving $7x - 3 = 2x + 12$ gives $5x = 9$

False. Subtracting $2x$ from both sides gives $5x - 3 = 12$.
The inverse of subtracting 3 is adding 3, so $5x = 15$, not 9.

$$7x - 3 = 2x + 12$$

$$5x - 3 = 12$$

$$5x = 15$$

$$x = 3$$

subtract $2x$ from both sides

add 3 to both sides

divide both sides by 5

True or false?

In $2x + 9 = 6x + 1$ the x terms must be collected
on the left-hand side

True or false?

In $2x + 9 = 6x + 1$ the x terms must be collected on the left-hand side

False. Collecting them on the right, where there are more, keeps the x term positive.

$$2x + 9 = 6x + 1$$

$$9 = 4x + 1$$

subtract $2x$ from both sides

$$8 = 4x$$

subtract 1 from both sides

$$2 = x$$

divide both sides by 4

Solve $5x + 3 = 2x + 15$

Solve $5x + 3 = 2x + 15$

$$5x + 3 = 2x + 15$$

$$3x + 3 = 15$$

subtract $2x$ from both sides

$$3x = 12$$

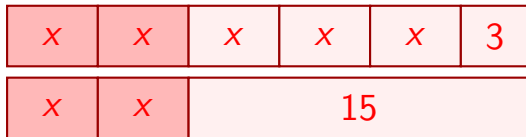
subtract 3 from both sides

$$x = 4$$

divide both sides by 3

The two bars are the same length.

We subtract the shaded $2x$ from both bars.



Solve $6x + 1 = 4x + 13$

Solve $6x + 1 = 4x + 13$

$$6x + 1 = 4x + 13$$

$$2x + 1 = 13$$

$$2x = 12$$

$$x = 6$$

subtract $4x$ from both sides

subtract 1 from both sides

divide both sides by 2

Solve $7x - 2 = 3x + 10$

Solve $7x - 2 = 3x + 10$

$$7x - 2 = 3x + 10$$

$$4x - 2 = 10$$

$$4x = 12$$

$$x = 3$$

subtract $3x$ from both sides

add 2 to both sides

divide both sides by 4

Solve $4x + 9 = x - 3$

Solve $4x + 9 = x - 3$

$$4x + 9 = x - 3$$

$$3x + 9 = -3$$

$$3x = -12$$

$$x = -4$$

subtract x from both sides

subtract 9 from both sides

divide both sides by 3

Solve $2x + 17 = 5x + 2$

Solve $2x + 17 = 5x + 2$

There are more x terms on the right, so we collect them there.

$$2x + 17 = 5x + 2$$

$$17 = 3x + 2$$

subtract $2x$ from both sides

$$15 = 3x$$

subtract 2 from both sides

$$5 = x$$

divide both sides by 3

Solve $5x - 4 = 2x + 7$

Solve $5x - 4 = 2x + 7$

$$5x - 4 = 2x + 7$$

$$3x - 4 = 7$$

subtract $2x$ from both sides

$$3x = 11$$

add 4 to both sides

$$x = \frac{11}{3} = 3\frac{2}{3}$$

divide both sides by 3

Solve $14 - x = 3x - 2$

Solve $14 - x = 3x - 2$

$$14 - x = 3x - 2$$

$$14 = 4x - 2$$

add x to both sides

$$16 = 4x$$

add 2 to both sides

$$4 = x$$

divide both sides by 4

Solve $3(x + 2) = x + 18$

Solve $3(x + 2) = x + 18$

$$3(x + 2) = x + 18$$

$$3x + 6 = x + 18$$

expand the bracket

$$2x + 6 = 18$$

subtract x from both sides

$$2x = 12$$

subtract 6 from both sides

$$x = 6$$

divide both sides by 2

Solve $4(2x - 1) = 3(x + 2)$

Solve $4(2x - 1) = 3(x + 2)$

$$4(2x - 1) = 3(x + 2)$$

$$8x - 4 = 3x + 6$$

expand the brackets

$$5x - 4 = 6$$

subtract $3x$ from both sides

$$5x = 10$$

add 4 to both sides

$$x = 2$$

divide both sides by 5

Ali has £40 and saves £5 a week.
Bea has £16 and saves £8 a week.
After how many weeks will they
have the same amount?

Ali has £40 and saves £5 a week.

Bea has £16 and saves £8 a week.

After how many weeks will they
have the same amount?

We write w for the number of weeks.

$$40 + 5w = 16 + 8w$$

$$24 + 5w = 8w$$

subtract 16 from both sides

$$24 = 3w$$

subtract $5w$ from both sides

$$8 = w$$

divide both sides by 3

After 8 weeks they both have £80.

Equations of the form $\frac{x+a}{b} = c$

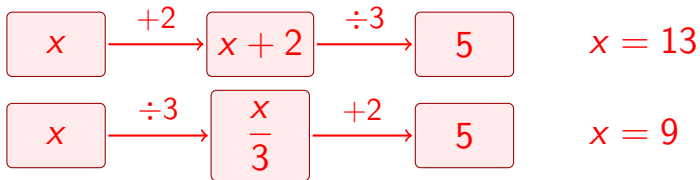
True or false?

$\frac{x+2}{3} = 5$ and $\frac{x}{3} + 2 = 5$ have the same solution

True or false?

$\frac{x+2}{3} = 5$ and $\frac{x}{3} + 2 = 5$ have the same solution

False. The operations are done in a different order.



True or false?

To solve $\frac{x + 4}{2} = 7$, we can start by
multiplying both sides by 2

True or false?

To solve $\frac{x+4}{2} = 7$, we can start by
multiplying both sides by 2

True. The whole of $x + 4$ is divided by 2,
so we multiply both sides by 2 first.

$$\frac{x+4}{2} = 7$$

$$x + 4 = 14$$

$$x = 10$$

multiply both sides by 2

subtract 4 from both sides

True or false?

The solution of $\frac{x-1}{4} = 3$ is $x = 16$

True or false?

The solution of $\frac{x-1}{4} = 3$ is $x = 16$

False. 16 comes from adding 1 before multiplying by 4, which is the wrong order.

$$\frac{x-1}{4} = 3$$

$$x-1 = 12 \quad \text{multiply both sides by 4}$$

$$x = 13 \quad \text{add 1 to both sides}$$

Check: $(13-1) \div 4 = 3$, but $(16-1) \div 4 = 3.75$

True or false?

$$\frac{x+6}{3} = 4 \text{ simplifies to } x+2=4$$

True or false?

$$\frac{x+6}{3} = 4 \text{ simplifies to } x+2 = 4$$

False. The 3 divides the whole of $x+6$, not only the 6.

$$\frac{x+6}{3} = 4$$

$$x+6 = 12 \quad \text{multiply both sides by 3}$$

$$x = 6 \quad \text{subtract 6 from both sides}$$

$$\text{Check: } \frac{6+6}{3} = 4, \text{ but } x=2 \text{ gives } \frac{2+6}{3} = \frac{8}{3}$$

True or false?

The solution of $\frac{2x + 1}{5} = 3$ is $x = 7$

True or false?

The solution of $\frac{2x + 1}{5} = 3$ is $x = 7$

True. Check: $\frac{2 \times 7 + 1}{5} = \frac{15}{5} = 3$

$$\frac{2x + 1}{5} = 3$$

$$2x + 1 = 15$$

$$2x = 14$$

$$x = 7$$

multiply both sides by 5

subtract 1 from both sides

divide both sides by 2

Solve $\frac{x + 3}{2} = 5$

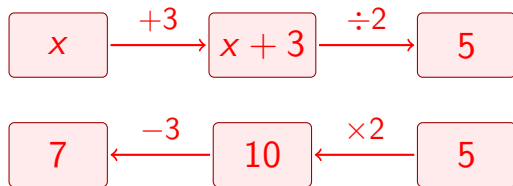
Solve $\frac{x + 3}{2} = 5$

$$\frac{x + 3}{2} = 5$$

$$x + 3 = 10$$

$$x = 7$$

multiply by 2
subtract 3



Solve $\frac{x - 4}{3} = 2$

Solve $\frac{x - 4}{3} = 2$

$$\frac{x - 4}{3} = 2$$

$$x - 4 = 6$$

$$x = 10$$

multiply both sides by 3

add 4 to both sides

Solve $\frac{x + 1}{4} = 3$

Solve $\frac{x + 1}{4} = 3$

$$\frac{x + 1}{4} = 3$$

$$x + 1 = 12$$

$$x = 11$$

multiply both sides by 4

subtract 1 from both sides

Solve $\frac{x + 8}{5} = 1$

Solve $\frac{x + 8}{5} = 1$

$$\frac{x + 8}{5} = 1$$

$$x + 8 = 5$$

$$x = -3$$

multiply both sides by 5

subtract 8 from both sides

Solve $6 = \frac{x - 2}{3}$

Solve $6 = \frac{x - 2}{3}$

$$6 = \frac{x - 2}{3}$$

$$18 = x - 2$$

$$20 = x$$

multiply both sides by 3

add 2 to both sides

Solve $\frac{2x + 3}{5} = 3$

Solve $\frac{2x + 3}{5} = 3$

$$\frac{2x + 3}{5} = 3$$

$$2x + 3 = 15$$

$$2x = 12$$

$$x = 6$$

multiply both sides by 5

subtract 3 from both sides

divide both sides by 2

Solve $\frac{3x - 1}{4} = 5$

Solve $\frac{3x - 1}{4} = 5$

$$\frac{3x - 1}{4} = 5$$

$$3x - 1 = 20$$

multiply both sides by 4

$$3x = 21$$

add 1 to both sides

$$x = 7$$

divide both sides by 3

Solve $\frac{3x + 7}{2} = -4$

Solve $\frac{3x + 7}{2} = -4$

$$\frac{3x + 7}{2} = -4$$

$$3x + 7 = -8$$

$$3x = -15$$

$$x = -5$$

multiply both sides by 2

subtract 7 from both sides

divide both sides by 3

Solve $\frac{5x + 2}{3} = x + 2$

Solve $\frac{5x + 2}{3} = x + 2$

The whole of the right-hand side is multiplied by 3,
so we write it in brackets.

$$\frac{5x + 2}{3} = x + 2$$

$$5x + 2 = 3(x + 2)$$

multiply both sides by 3

$$5x + 2 = 3x + 6$$

expand the bracket

$$2x = 4$$

subtract $3x$ and 2 from both sides

$$x = 2$$

divide both sides by 2

The mean of the three numbers x , 7 and 10 is 9.

Find x .

The mean of the three numbers x , 7 and 10 is 9.

Find x .

The mean is the total divided by how many numbers there are.

$$\frac{x + 7 + 10}{3} = 9$$

$$\frac{x + 17}{3} = 9$$

collect like terms

$$x + 17 = 27$$

multiply both sides by 3

$$x = 10$$

subtract 17 from both sides

Constructing and solving equations

True or false?

“I think of a number, double it and add 5. The answer is 17.”

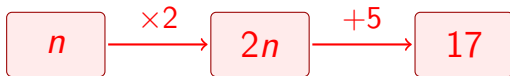
This gives the equation $2(n + 5) = 17$

True or false?

“I think of a number, double it and add 5. The answer is 17.”

This gives the equation $2(n + 5) = 17$

False. The number is doubled first, so the equation is
 $2n + 5 = 17$.

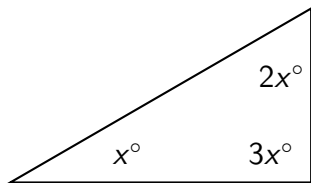


$2(n + 5)$ would mean add 5 first, then double. Solving
 $2n + 5 = 17$ gives $n = 6$.

True or false?

The angles in this triangle give the equation

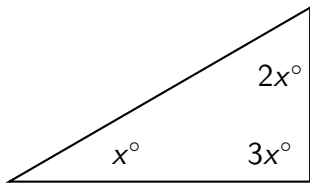
$$x + 2x + 3x = 180$$



True or false?

The angles in this triangle give the equation

$$x + 2x + 3x = 180$$



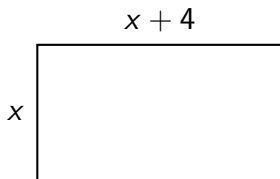
True. The angles in a triangle add up to 180° .

$6x = 180$, so $x = 30$ and the angles are 30° , 60° and 90° .

True or false?

The perimeter of this rectangle is 28 cm,

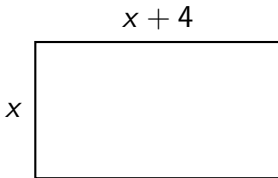
$$\text{so } x + 4 + x = 28$$



True or false?

The perimeter of this rectangle is 28 cm,

$$\text{so } x + 4 + x = 28$$



False. The perimeter is the total length of all four sides.

$$(x + 4) + x + (x + 4) + x = 28, \text{ so } 4x + 8 = 28 \text{ and } x = 5.$$

True or false?

Three consecutive integers add up to 48.

If the smallest is n , then $n + (n + 1) + (n + 2) = 48$

True or false?

Three consecutive integers add up to 48.

If the smallest is n , then $n + (n + 1) + (n + 2) = 48$

True. Each integer is 1 more than the one before.

$3n + 3 = 48$, so $3n = 45$ and $n = 15$.

The integers are 15, 16 and 17.

True or false?

Jo is 3 years older than Ken.

If Ken is k years old, then Jo is $3k$ years old

True or false?

Jo is 3 years older than Ken.

If Ken is k years old, then Jo is $3k$ years old

False. $3k$ means $3 \times k$, which is three times Ken's age.

Jo is 3 years older, so Jo is $k + 3$ years old.

I think of a number, multiply it by 3 and subtract 4.
The answer is 20. What is my number?

I think of a number, multiply it by 3 and subtract 4.

The answer is 20. What is my number?

We write n for my number.

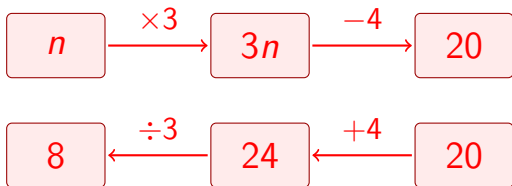
$$3n - 4 = 20$$

$$3n = 24$$

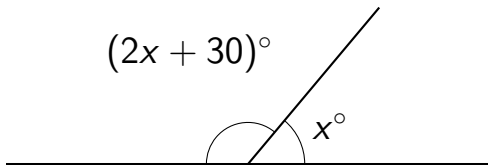
$$n = 8$$

add 4

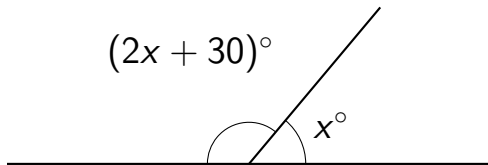
divide by 3



Find the value of x



Find the value of x



Angles on a straight line add up to 180° .

$$x + 2x + 30 = 180$$

$$3x + 30 = 180$$

collect like terms

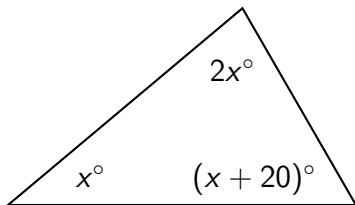
$$3x = 150$$

subtract 30 from both sides

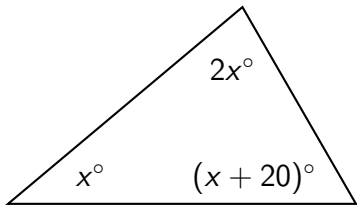
$$x = 50$$

divide both sides by 3

Find the value of x



Find the value of x



The angles in a triangle add up to 180° .

$$x + (x + 20) + 2x = 180$$

$$4x + 20 = 180$$

$$4x = 160$$

$$x = 40$$

collect like terms

subtract 20 from both sides

divide both sides by 4

Amir is 4 years older than Beth.

The sum of their ages is 30.

How old is Beth?

Amir is 4 years older than Beth.

The sum of their ages is 30.

How old is Beth?

We write b for Beth's age in years, so Amir is $b + 4$ years old.

$$b + (b + 4) = 30$$

$$2b + 4 = 30$$

collect like terms

$$2b = 26$$

subtract 4

$$b = 13$$

divide by 2

Beth is 13 years old.

30		
b	b	4

The sum of three consecutive odd numbers is 75.
Find the three numbers.

The sum of three consecutive odd numbers is 75.

Find the three numbers.

We write n for the smallest number. Consecutive odd numbers differ by 2, so the others are $n + 2$ and $n + 4$.

$$n + (n + 2) + (n + 4) = 75$$

$$3n + 6 = 75$$

collect like terms

$$3n = 69$$

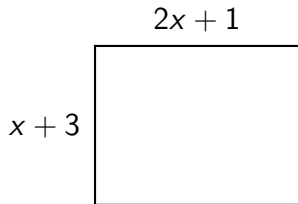
subtract 6 from both sides

$$n = 23$$

divide both sides by 3

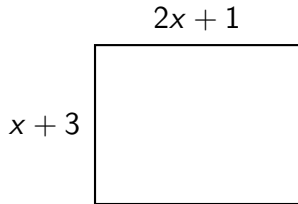
The numbers are 23, 25 and 27.

The perimeter of this
rectangle is 32 cm.
Find the value of x .



The perimeter of this rectangle is 32 cm.

Find the value of x .



$$2(2x + 1) + 2(x + 3) = 32$$

$$4x + 2 + 2x + 6 = 32$$

$$6x + 8 = 32$$

$$6x = 24$$

$$x = 4$$

expand the brackets

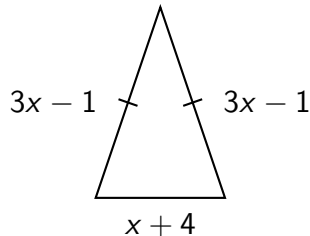
collect like terms

subtract 8 from both sides

divide both sides by 6

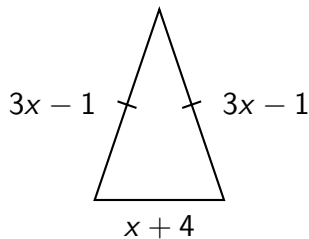
The perimeter of this
isosceles triangle is 37 cm.

Find the value of x .



The perimeter of this isosceles triangle is 37 cm.

Find the value of x .



The perimeter is the total of all three sides.

$$2(3x - 1) + (x + 4) = 37$$

$$7x + 2 = 37$$

$$7x = 35$$

$$x = 5$$

expand and collect like terms

subtract 2 from both sides

divide both sides by 7

I think of a number. Multiplying it by 5 and subtracting 3 gives the same answer as doubling it and adding 12. What is my number?

I think of a number. Multiplying it by 5 and subtracting 3 gives the same answer as doubling it and adding 12. What is my number?

We write n for my number.

$$5n - 3 = 2n + 12$$

$$3n - 3 = 12$$

subtract $2n$ from both sides

$$3n = 15$$

add 3 to both sides

$$n = 5$$

divide both sides by 3

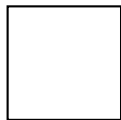
$$\text{Check: } 5 \times 5 - 3 = 22 \text{ and } 2 \times 5 + 12 = 22$$

A square has sides of length $x + 2$.

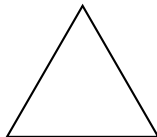
An equilateral triangle has sides
of length $2x - 1$.

They have the same perimeter.

Find the value of x .



$x + 2$



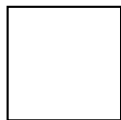
$2x - 1$

A square has sides of length $x + 2$.

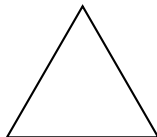
An equilateral triangle has sides
of length $2x - 1$.

They have the same perimeter.

Find the value of x .



$x + 2$



$2x - 1$

$$4(x + 2) = 3(2x - 1)$$

$$4x + 8 = 6x - 3$$

$$8 = 2x - 3$$

$$11 = 2x$$

$$5.5 = x$$

expand the brackets

subtract $4x$ from both sides

add 3 to both sides

divide both sides by 2

Write an equation with the unknown on both sides
whose solution is $x = 3$

Write an equation with the unknown on both sides
whose solution is $x = 3$

There are many answers. For example, when $x = 3$, $5x = 15$
and $2x + 9 = 15$, so

$$5x = 2x + 9$$

Check any answer by substituting $x = 3$ into both sides: the
two sides must be equal.

Equations with the unknown in the denominator

True or false?

The solution of $\frac{12}{x} = 3$ is $x = 36$

True or false?

The solution of $\frac{12}{x} = 3$ is $x = 36$

False. $\frac{12}{36} = \frac{1}{3}$, not 3.

$$\frac{12}{x} = 3$$

$$12 = 3x \quad \text{multiply both sides by } x$$

$$4 = x \quad \text{divide both sides by 3}$$

True or false?

To solve $\frac{20}{x} = 5$, we can start by
multiplying both sides by x

True or false?

To solve $\frac{20}{x} = 5$, we can start by
multiplying both sides by x

True. This removes x from the denominator.

$$\frac{20}{x} = 5$$

$$20 = 5x \quad \text{multiply both sides by } x$$

$$4 = x \quad \text{divide both sides by 5}$$

True or false?

$\frac{6}{x} = 2$ and $\frac{x}{6} = 2$ have the same solution

True or false?

$\frac{6}{x} = 2$ and $\frac{x}{6} = 2$ have the same solution

False.

$$\frac{6}{x} = 2 \text{ gives } 6 = 2x, \text{ so } x = 3.$$

$$\frac{x}{6} = 2 \text{ gives } x = 12.$$

True or false?

The solution of $\frac{10}{x} = 4$ is $x = 2.5$

True or false?

The solution of $\frac{10}{x} = 4$ is $x = 2.5$

True. Check: $10 \div 2.5 = 4$

The solution is not 0.4 or 40, because $10 \div 0.4 = 25$ and $10 \div 40 = 0.25$.

$$\frac{10}{x} = 4$$

$$10 = 4x$$

multiply both sides by x

$$2.5 = x$$

divide both sides by 4

True or false?

The solution of $\frac{5}{x} = 0$ is $x = 0$

True or false?

The solution of $\frac{5}{x} = 0$ is $x = 0$

False. Dividing by 0 is not defined, so x cannot be 0.
Multiplying both sides by x gives $5 = 0$, which is never true.
The equation has no solution.

Solve $\frac{15}{x} = 5$

Solve $\frac{15}{x} = 5$

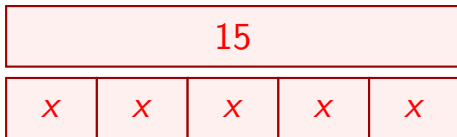
$$\frac{15}{x} = 5$$

$$15 = 5x$$

multiply both sides by x

$$3 = x$$

divide both sides by 5



Solve $\frac{35}{x} = 7$

Solve $\frac{35}{x} = 7$

$$\frac{35}{x} = 7$$

$$35 = 7x$$

multiply both sides by x

$$5 = x$$

divide both sides by 7

Solve $\frac{18}{x} = 4$

Solve $\frac{18}{x} = 4$

$$\frac{18}{x} = 4$$

$$18 = 4x$$

multiply both sides by x

$$4.5 = x$$

divide both sides by 4

Solve $\frac{8}{x} = -2$

Solve $\frac{8}{x} = -2$

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

$$8 = -2x$$

multiply both sides by x

$$-4 = x$$

divide both sides by -2

Check: $8 \div (-4) = -2$

Solve $\frac{12}{x} + 1 = 5$

Solve $\frac{12}{x} + 1 = 5$

$$\frac{12}{x} + 1 = 5$$

$$\frac{12}{x} = 4$$

subtract 1 from both sides

$$12 = 4x$$

multiply both sides by x

$$3 = x$$

divide both sides by 4

Solve $\frac{20}{x} - 3 = 1$

Solve $\frac{20}{x} - 3 = 1$

$$\frac{20}{x} - 3 = 1$$

$$\frac{20}{x} = 4$$

add 3 to both sides

$$20 = 4x$$

multiply both sides by x

$$5 = x$$

divide both sides by 4

Solve $\frac{30}{x+1} = 6$

Solve $\frac{30}{x+1} = 6$

$$\frac{30}{x+1} = 6$$

$$30 = 6(x+1)$$

multiply both sides by $(x+1)$

$$5 = x+1$$

divide both sides by 6

$$4 = x$$

subtract 1 from both sides

Solve $\frac{21}{2x + 1} = 3$

Solve $\frac{21}{2x + 1} = 3$

$$\frac{21}{2x + 1} = 3$$

$$21 = 3(2x + 1)$$

multiply both sides by $(2x + 1)$

$$7 = 2x + 1$$

divide both sides by 3

$$6 = 2x$$

subtract 1 from both sides

$$3 = x$$

divide both sides by 2

Solve $\frac{6}{x} = \frac{3}{4}$

Solve $\frac{6}{x} = \frac{3}{4}$

$$\frac{6}{x} = \frac{3}{4}$$

$$24 = 3x$$

multiply both sides by 4x

$$8 = x$$

divide both sides by 3

Check: $\frac{6}{8} = \frac{3}{4}$

A train travels 240 km at an average speed of 80 km/h.

Use $\text{speed} = \frac{\text{distance}}{\text{time}}$ to write an equation for the time,
 t hours, and solve it.

A train travels 240 km at an average speed of 80 km/h.

Use $\text{speed} = \frac{\text{distance}}{\text{time}}$ to write an equation for the time,
 t hours, and solve it.

$$\frac{240}{t} = 80$$

$$240 = 80t \quad \text{multiply both sides by } t$$

$$3 = t \quad \text{divide both sides by 80}$$

The journey takes 3 hours.

Equations with algebraic fractions

True or false?

To solve $\frac{x}{2} + \frac{x}{3} = 5$ we can multiply every term by 6

True or false?

To solve $\frac{x}{2} + \frac{x}{3} = 5$ we can multiply every term by 6

True. 6 is a common multiple of 2 and 3,
so multiplying by 6 clears both fractions.

$$\frac{x}{2} + \frac{x}{3} = 5$$

$$3x + 2x = 30$$

multiply every term by 6

$$5x = 30$$

collect like terms

$$x = 6$$

divide both sides by 5

True or false?

Multiplying $\frac{x}{4} + 1 = \frac{x}{2}$ by 4 gives $x + 1 = 2x$

True or false?

Multiplying $\frac{x}{4} + 1 = \frac{x}{2}$ by 4 gives $x + 1 = 2x$

False. Every term is multiplied by 4, including the 1.

$$\frac{x}{4} + 1 = \frac{x}{2}$$

$$x + 4 = 2x$$

$$4 = x$$

multiply every term by 4

subtract x from both sides

True or false?

$$\frac{x+1}{2} = \frac{x+4}{3} \text{ gives } 3(x+1) = 2(x+4)$$

True or false?

$$\frac{x+1}{2} = \frac{x+4}{3} \text{ gives } 3(x+1) = 2(x+4)$$

True. Multiplying both sides by 6 clears both fractions.

$$3(x+1) = 2(x+4)$$

$$3x + 3 = 2x + 8$$

$$x = 5$$

expand the brackets

subtract $2x$ and 3 from both sides

True or false?

Multiplying $\frac{x}{3} - \frac{x-2}{4} = 1$ by 12 gives

$$4x - 3x - 6 = 12$$

True or false?

Multiplying $\frac{x}{3} - \frac{x-2}{4} = 1$ by 12 gives

$$4x - 3x - 6 = 12$$

False. The minus sign applies to the whole of $3(x-2)$, so
 $-3 \times (-2) = +6$.

$$4x - 3(x-2) = 12$$

$$4x - 3x + 6 = 12$$

expand the bracket

$$x = 6$$

collect like terms and subtract 6

True or false?

The solution of $\frac{2}{x} = \frac{3}{x+1}$ is $x = 2$

True or false?

The solution of $\frac{2}{x} = \frac{3}{x+1}$ is $x = 2$

True. Check: $\frac{2}{2} = 1$ and $\frac{3}{2+1} = 1$

$2(x+1) = 3x$ multiply both sides by $x(x+1)$

$2x + 2 = 3x$ expand the bracket

$2 = x$ subtract $2x$ from both sides

Solve $\frac{x}{2} + \frac{x}{4} = 6$

Solve $\frac{x}{2} + \frac{x}{4} = 6$

$$\frac{x}{2} + \frac{x}{4} = 6$$

$$2x + x = 24$$

$$3x = 24$$

$$x = 8$$

multiply every term by 4

collect like terms

divide both sides by 3

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

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

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

$$5x - 2x = 30$$

multiply every term by 10

$$3x = 30$$

collect like terms

$$x = 10$$

divide both sides by 3

Solve $\frac{x + 2}{3} = \frac{x - 1}{2}$

Solve $\frac{x + 2}{3} = \frac{x - 1}{2}$

$$\frac{x + 2}{3} = \frac{x - 1}{2}$$

$$2(x + 2) = 3(x - 1)$$

$$2x + 4 = 3x - 3$$

$$7 = x$$

multiply both sides by 6

expand the brackets

subtract 2x and add 3

Solve $\frac{x+1}{2} + \frac{x+3}{4} = 5$

Solve $\frac{x+1}{2} + \frac{x+3}{4} = 5$

$$\frac{x+1}{2} + \frac{x+3}{4} = 5$$

$$2(x+1) + (x+3) = 20$$

$$3x + 5 = 20$$

$$3x = 15$$

$$x = 5$$

multiply every term by 4

expand and collect like terms

subtract 5 from both sides

divide both sides by 3

Solve $\frac{2x + 2}{3} - \frac{x - 1}{4} = 3$

Solve $\frac{2x + 2}{3} - \frac{x - 1}{4} = 3$

The minus sign applies to the whole of $3(x - 1)$.

$$4(2x + 2) - 3(x - 1) = 36$$

multiply every term by 12

$$8x + 8 - 3x + 3 = 36$$

expand the brackets

$$5x + 11 = 36$$

collect like terms

$$5x = 25$$

subtract 11 from both sides

$$x = 5$$

divide both sides by 5

Solve $\frac{4}{x} + \frac{1}{2x} = 3$

Solve $\frac{4}{x} + \frac{1}{2x} = 3$

$$\frac{4}{x} + \frac{1}{2x} = 3$$

$$8 + 1 = 6x$$

multiply every term by $2x$

$$9 = 6x$$

collect like terms

$$1.5 = x$$

divide both sides by 6

Solve $\frac{3}{x+1} = \frac{2}{x-1}$

Solve $\frac{3}{x+1} = \frac{2}{x-1}$

$$\frac{3}{x+1} = \frac{2}{x-1}$$

$$3(x-1) = 2(x+1)$$

$$3x - 3 = 2x + 2$$

$$x = 5$$

multiply both sides by $(x+1)(x-1)$

expand the brackets

subtract $2x$ and add 3

Check: $\frac{3}{6} = \frac{1}{2}$ and $\frac{2}{4} = \frac{1}{2}$

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

$$\text{Solve } x + \frac{6}{x} = 5$$

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

$$x^2 + 6 = 5x$$

multiply every term by x

$$x^2 - 5x + 6 = 0$$

subtract $5x$ from both sides

$$(x - 2)(x - 3) = 0$$

factorise

$$x = 2 \text{ or } x = 3$$

Solve $\frac{6}{x} - \frac{6}{x+1} = 1$

$$\text{Solve } \frac{6}{x} - \frac{6}{x+1} = 1$$

$$6(x+1) - 6x = x(x+1)$$

multiply every term by $x(x+1)$

$$6 = x^2 + x$$

expand and collect like terms

$$0 = x^2 + x - 6$$

subtract 6 from both sides

$$0 = (x+3)(x-2)$$

factorise

$$x = -3 \text{ or } x = 2$$

Write an equation with two algebraic fractions
whose solution is $x = 4$

Write an equation with two algebraic fractions
whose solution is $x = 4$

There are many answers. We choose the fractions,
then work out the right-hand side using $x = 4$. For example,

$$\frac{x+2}{3} + \frac{x}{2} = 4$$

$$\text{Check: } \frac{4+2}{3} + \frac{4}{2} = 2 + 2 = 4$$

Simultaneous equations

True or false?

$x = 3, y = 2$ is the solution of
 $x + y = 5$ and $x - y = 1$

True or false?

$x = 3, y = 2$ is the solution of
 $x + y = 5$ and $x - y = 1$

True. The values fit both equations:

$$3 + 2 = 5 \text{ and } 3 - 2 = 1$$

True or false?

$x = 4, y = 1$ is the solution of
 $x + y = 5$ and $2x + y = 7$

True or false?

$x = 4, y = 1$ is the solution of
 $x + y = 5$ and $2x + y = 7$

False. The values fit the first equation,
but $2 \times 4 + 1 = 9$, not 7.

The solution has to fit both equations. It is $x = 2, y = 3$:

$$2 + 3 = 5 \text{ and } 2 \times 2 + 3 = 7$$

True or false?

To eliminate y from

$$3x + 2y = 16 \text{ and } x + 2y = 8$$

we add the equations

True or false?

To eliminate y from

$$3x + 2y = 16 \text{ and } x + 2y = 8$$

we add the equations

False. Both y terms are $+2y$, so we subtract.

$$(1) \qquad 3x + 2y = 16$$

$$(2) \qquad x + 2y = 8$$

$$(1) - (2) \qquad 2x = 8$$

$x = 4$, and then $4 + 2y = 8$ gives $y = 2$.

True or false?

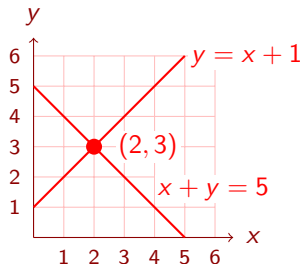
The solution of a pair of linear simultaneous equations is given by the point where their graphs cross

True or false?

The solution of a pair of linear simultaneous equations is given by the point where their graphs cross

True. The point $(2, 3)$ is on both lines, so $x = 2$, $y = 3$ fits both equations.

$$2 + 3 = 5 \text{ and } 3 = 2 + 1$$



True or false?

To eliminate x from

$$2x + 3y = 12 \text{ and } x + y = 5$$

we can multiply the second equation by 2

True or false?

To eliminate x from

$$2x + 3y = 12 \text{ and } x + y = 5$$

we can multiply the second equation by 2

True. This makes the x terms the same.

$$(1) \qquad 2x + 3y = 12$$

$$(2) \times 2 \qquad 2x + 2y = 10$$

$$(1) - (2) \times 2 \qquad y = 2$$

$$\text{Then } x + 2 = 5 \text{ gives } x = 3.$$

Solve

$$x + y = 10$$

$$x - y = 4$$

Solve

$$x + y = 10$$

$$x - y = 4$$

$$(1) \quad x + y = 10$$

$$(2) \quad x - y = 4$$

$$(1) + (2) \quad 2x = 14$$

$x = 7$, and then $7 + y = 10$ gives $y = 3$.

Solve

$$2x + y = 11$$

$$x + y = 7$$

Solve

$$2x + y = 11$$

$$x + y = 7$$

$$(1) \qquad 2x + y = 11$$

$$(2) \qquad x + y = 7$$

$$(1) - (2) \qquad x = 4$$

Then $4 + y = 7$ gives $y = 3$.

Solve

$$3x + 2y = 13$$

$$x - 2y = -1$$

Solve

$$3x + 2y = 13$$

$$x - 2y = -1$$

The y terms have opposite signs, so we add.

$$(1) \qquad 3x + 2y = 13$$

$$(2) \qquad x - 2y = -1$$

$$(1) + (2) \qquad 4x = 12$$

$x = 3$, and then $9 + 2y = 13$ gives $y = 2$.

Solve

$$5x + 2y = 24$$

$$3x + 2y = 16$$

Solve

$$5x + 2y = 24$$

$$3x + 2y = 16$$

The y terms are the same, so we subtract.

$$(1) \qquad 5x + 2y = 24$$

$$(2) \qquad 3x + 2y = 16$$

$$(1) - (2) \qquad 2x = 8$$

$x = 4$, and then $20 + 2y = 24$ gives $y = 2$.

Solve

$$y = 2x + 1$$

$$x + y = 7$$

Solve

$$y = 2x + 1$$

$$x + y = 7$$

We substitute $y = 2x + 1$
into the second equation.

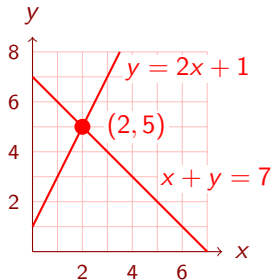
$$x + (2x + 1) = 7$$

$$3x + 1 = 7 \quad \text{collect like terms}$$

$$3x = 6 \quad \text{subtract 1}$$

$$x = 2 \quad \text{divide by 3}$$

$$\text{Then } y = 2 \times 2 + 1 = 5.$$



Solve

$$2x + 3y = 13$$

$$x + y = 5$$

Solve

$$2x + 3y = 13$$

$$x + y = 5$$

$$(1) \qquad 2x + 3y = 13$$

$$(2) \times 2 \qquad 2x + 2y = 10$$

$$(1) - (2) \times 2 \qquad y = 3$$

Then $x + 3 = 5$ gives $x = 2$.

Solve

$$3x + 2y = 17$$

$$2x - y = 9$$

Solve

$$3x + 2y = 17$$

$$2x - y = 9$$

$$(1) \qquad 3x + 2y = 17$$

$$(2) \times 2 \qquad 4x - 2y = 18$$

$$(1) + (2) \times 2 \qquad 7x = 35$$

$x = 5$, and then $10 - y = 9$ gives $y = 1$.

Solve

$$3x + 4y = 25$$

$$2x + 3y = 18$$

Solve

$$3x + 4y = 25$$

$$2x + 3y = 18$$

$$(1) \times 2 \qquad 6x + 8y = 50$$

$$(2) \times 3 \qquad 6x + 9y = 54$$

$$(2) \times 3 - (1) \times 2 \qquad y = 4$$

Then $3x + 16 = 25$ gives $x = 3$.

2 coffees and 3 teas cost £9.10.

1 coffee and 2 teas cost £5.20.

Find the cost of one coffee and the cost of one tea.

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1 coffee and 2 teas cost £5.20.

Find the cost of one coffee and the cost of one tea.

We work in pence, and write c for the cost of one coffee and t for the cost of one tea.

$$(1) \qquad 2c + 3t = 910$$

$$(2) \qquad c + 2t = 520$$

$$(2) \times 2 \qquad 2c + 4t = 1040$$

$$(2) \times 2 - (1) \qquad t = 130$$

Then $c + 260 = 520$ gives $c = 260$. A coffee costs £2.60 and a tea costs £1.30.

Write a pair of simultaneous equations
whose solution is $x = 4$, $y = -1$

Write a pair of simultaneous equations
whose solution is $x = 4$, $y = -1$

There are many answers. We choose the left-hand sides,
then work out the right-hand sides using $x = 4$ and $y = -1$.

For example,

$$x + y = 3$$

$$2x - y = 9$$

Check: $4 + (-1) = 3$ and $2 \times 4 - (-1) = 9$