



Linear equations

- Forming more complex equations
- Choosing efficient methods to solve more complex equations
- Solving equations with unknowns on both sides

Keywords

You should know

explanation 1a

explanation 1b

1 Solve these equations.

Check each answer by substituting it into the equation.

a $8x = 40$

b $4z = 44$

c $9d = 63$

d $8x = 4$

e $5y = 3$

f $8p = 10$

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

h $\frac{m}{7} = 8$

i $\frac{g}{4} = -15$

j $\frac{k}{2} = \frac{1}{3}$

k $\frac{n}{4} = 1\frac{1}{2}$

l $\frac{r}{5} = 2.5$

2 Solve these equations.

Check each answer by substituting it into the equation.

a $3y - 2 = 7$

b $8y - 1 = 15$

c $5m + 2 = 13$

d $16 + 5a = 31$

e $4m - 3 = 7$

f $10p - 7 = 24$

g $8y + 15 = 7$

h $2b + 24 = 37$

i $\frac{y}{4} + 7 = 11$

j $\frac{p}{9} + 6 = 13$

k $\frac{y+7}{12} = 4$

l $7 + \frac{a}{5} = 4$

m $\frac{b}{3} - 4 = 1$

n $6 - 2t = 4$

o $3 - 4x = 15$

p $10 + \frac{y}{2} = 4$

3 Solve these equations.

Check each answer by substituting it into the equation.

a $\frac{3a+7}{5} = 2$

b $\frac{2a+4}{3} = 6$

c $\frac{4m-3}{7} = 2$

d $\frac{2y-5}{3} = 12$

e $4 = \frac{12}{n}$

f $8 = \frac{24}{m}$

g $\frac{1}{2} = \frac{8}{x}$

h $\frac{1}{3} = \frac{4}{y}$

explanation 2a

explanation 2b

4 Solve these equations. First expand the brackets.

a $5(x + 2) = 25$

b $2(z + 4) = 12$

c $3(c - 3) = 0$

d $12(d - 5) = 12$

e $4(n + 1) = 12$

f $3(m - 7) = -15$

g $6(g - 9) = -24$

h $4(x + 12) = -12$

i $6(2a - 3) = 30$

j $6(3m - 2) = 60$

k $6(5m + 7) = -18$

l $6(m - 2) + 5 = 17$

m $5(n + 8) - 2 = 23$

n $4(y - 7) + 2 = 12$

o $4(a + 2) = 9$

5 Solve these equations by using inverse operations.

a $5(y - 2) = 10$

b $4(b + 2) = 8$

c $6(m + 5) = 12$

d $3(2y - 7) = -15$

e $8(10 + 6a) = -16$

f $12(5y - 9) = 36$

6 Look at the equation $6(a - 10) = 24$.

a Solve the equation by expanding the brackets first.

b Solve the same equation by using inverse operations first.

c Which method did you like best?

d Solve the equation $6(a - 10) = -48$, using both methods.

e Which method did you like best?

explanation 3

7 Look at the equation $8 - 3x = 2x - 7$.

a What can you do to both sides of the equation so that the x term only appears on one side?

b Solve the equation to find the value of x .

8 Solve these equations.

a $3n + 4 = n + 12$

b $7 + 5m = 8m + 1$

c $8y + 17 = 4y + 19$

d $8 + 3p = 8p + 4$

e $25 - 2y = 6y + 5$

f $5 - 2b = 3b + 25$

g $7 + 3y = 5y - 2$

h $4m - 7 = 8m + 4$

i $9 - 3q = 5q + 1$

9 Solve these equations.

a $4(z - 6) = z - 18$

b $8(b + 9) = b + 93$

c $10(4 - c) = 4 - c$

d $2(a + 7) = a + 7$

e $4(y - 3) = 3 + 6y$

f $3(2 - x) = 24 - 7x$

10 Solve these equations.

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

b $5(2 - y) = 3(2 + y)$

c $5(6 + 2m) = 4(m - 3)$

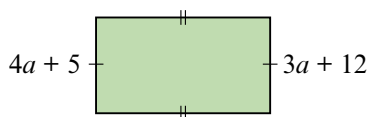
d $2(n + 3) = 6(n - 4)$

e $3(2t - 14) = 2(11 - t)$

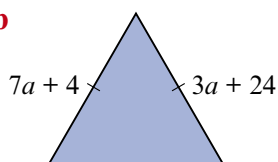
f $3(4 - 2n) = 2(7 - n)$

11 Write an equation for each of these shapes. Solve it to find the value of a .

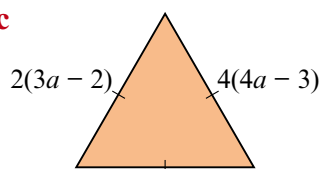
a



b



c



explanation 4

12 Write an equation for each sentence. Then solve the equation.

a A number is multiplied by 4 and then 3 is added. The result is the same as subtracting 9 from the number.

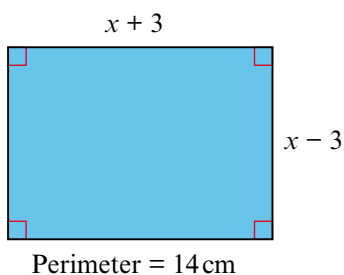
b Adding 12 to a number gives the same answer as multiplying it by 6 and adding 7.

c I am thinking of a number. When I increase it by 4 and double the answer, I get 20 more than the number.

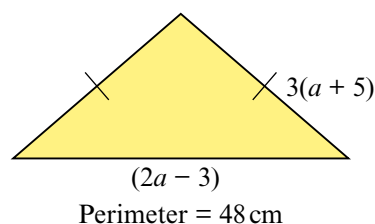
d What is the number where adding 7 to it gives the same answer as halving it and adding 5?

13 By forming equations and solving them, find the value of each unknown.

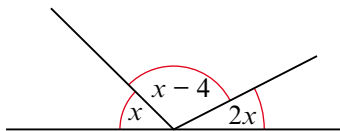
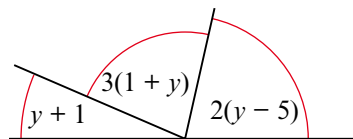
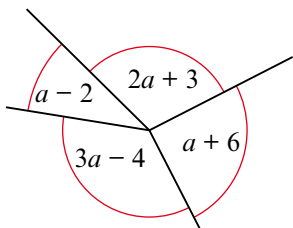
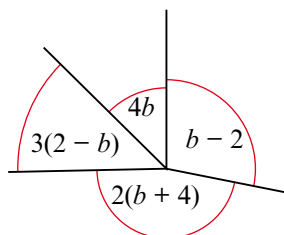
a



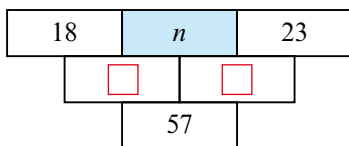
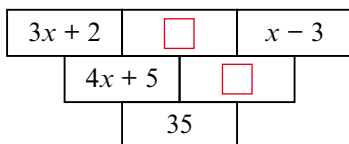
b



- 14** In each of these problems, use angle facts to form an equation. Solve it to find the unknown. The angles are measured in degrees.

a**b****c****d**

- 15** The number in each brick is found by adding the two numbers above it.

a Find the missing expressions.Write and solve an equation to find the number n in the shaded rectangle.**b** Find the missing expressions.Write and solve an equation to find the value of x .

- 16** In a race to Paris, one person travels by air, another by sea and a third by train.

The sea voyage takes 120 minutes longer than the train journey, and the air route takes 80 minutes less than the train journey.

If the total travelling time is 10 hours and 40 minutes, use algebra to find the time taken by each of the race participants.

