



Forming and solving equations from context

Mana Maths

Te reo Māori terms



whārite

equation

Open in Te Aka

taurangi

variable

Open in Te Aka

kīanga

expression

Open in Te Aka

whakaoti

solve

Open in Te Aka

Forming and solving equations from context — Foundation

1. Ben is x years old. His father is three times Ben's age minus 5 years. If the father is 40, form an equation and solve it to find Ben's age.
2. A rectangular field has a length of $2x + 1$ and a width of x . If the perimeter is 32 m, form a simplified equation and find the width of the field.
3. Two cleaning companies charge the same. Company A charges a \$10 fee plus \$15 per hour, h . Company B charges a \$5 fee plus \$16 per hour. Form an equation and solve it to find the number of hours where the costs are equal.

- 4.** Sarah has x marbles. Tom has 8 more than Sarah. Together they have 20 marbles. Form an equation and find how many marbles Sarah has.
- 5.** A number n multiplied by 4 then added to 7 gives 31. Form an equation and solve for n .
- 6.** The sum of three consecutive integers is 45. If the smallest is x , form an equation and find the integers.
- 7.** A taxi charges \$3 per km plus a \$2 flagfall. If a ride costs \$17, form an equation and find the distance travelled.
- 8.** A rectangle's length is 5 cm more than its width w . If the perimeter is 34 cm, form an equation and find the width.
- 9.** Emma is twice as old as Liam. In 5 years, she will be 25. Form an equation and find Liam's current age.

10. A book costs \$8 more than a pen. If 2 books and 3 pens cost \$46, form an equation and find the cost of a pen.

11. The sum of a number and its double is 36. Form an equation and find the number.

12. A train travels at 80 km/h for t hours and covers 240 km. Form an equation and find the time taken.

13. A triangle has angles x , $2x$, and $3x$. Form an equation and find each angle.

14. A school has 120 students. There are 20 more girls than boys. If b is the number of boys, form an equation and find how many boys there are.

Forming and solving equations from context — Proficient

1. A shop sells pens for \$1.50 and pencils for \$0.80. Amy buys p pens and c pencils, spending \$9.40 in total. If she bought twice as many pencils as pens, form an equation and find how many pens she bought.
2. The area of a rectangle is 54 cm^2 . Its length is 3 cm more than twice its width w . Form an equation and find the dimensions.
3. A car rental company charges \$40 per day plus \$0.15 per km. A customer's bill is \$85 for one day. Form an equation and find how many km were driven.
4. The sum of two numbers is 45. Their difference is 15. Form two equations and find the numbers.
5. A fraction has numerator n and denominator $n + 4$. The fraction equals $\frac{2}{3}$. Form an equation and find the fraction.
6. A right-angled triangle has legs of length x and $x + 2$. The hypotenuse is 10 cm. Form an equation and find x .

- 7.** A concert ticket costs \$5 more for adults than for students. If 3 adult tickets and 5 student tickets cost \$155, form an equation and find the student ticket price.
- 8.** A pool is being filled at 200 L/h. After t hours, there are 1200 L in the pool. Form an equation and find how long it has been filling.
- 9.** The sum of the ages of a father and son is 50. In 10 years, the father will be twice as old as the son. Form equations and find their current ages.
- 10.** A number is multiplied by 5, then 12 is subtracted. The result is the same as adding 8 to twice the number. Form an equation and find the number.
- 11.** A rectangle's length is 7 cm longer than its width. If the perimeter is 46 cm, form an equation and find the area.
- 12.** A mixture contains x L of 20% juice and 5 L of 50% juice. The final mixture is 35% juice. Form an equation and find x .

Forming and solving equations from context — Excellence

1. A train leaves Station A at 60 km/h. Another leaves Station B, 200 km away, at 80 km/h toward Station A. Form an equation to find when they meet, and solve it.
2. A chemist mixes two acid solutions: one is 30% acid, the other is 50% acid. She wants 10 L of 42% acid. Form an equation and find how much of each she should use.
3. A rectangular garden is surrounded by a path 1 m wide. The garden itself is 5 m longer than it is wide. The total area (garden + path) is 120 m^2 . Form an equation and find the garden's dimensions.

4. The sum of the digits of a two-digit number is 11. Reversing the digits gives a number 27 less than the original. Form equations and find the original number.
5. A boat travels 24 km upstream in 3 hours and the same distance downstream in 2 hours. Form equations to find the boat's speed in still water and the current's speed.
6. A piece of wire 40 cm long is cut into two pieces. One piece is bent into a square, the other into an equilateral triangle. The total area enclosed is 31 cm^2 . Form equations and find the length of each piece.
7. A company's profit P (in \$) is given by $P = -2x^2 + 120x - 1000$, where x is units sold. Form an equation to find how many units must be sold to break even ($P = 0$), and solve it.
8. A cyclist and a runner start at the same point. The cyclist travels north at 20 km/h, the runner east at 12 km/h. After t hours, they are 52 km apart. Form an equation and find t .
9. A tank can be filled by Pipe A in 4 hours and by Pipe B in 6 hours. If both pipes are open, how long to fill the tank? Form an equation and solve.

10. The sum of three consecutive even integers is 102. Form an equation and find the integers. Then show that the product of the first and third is 16 less than the square of the middle one.

11. A right triangle has hypotenuse 13 cm. One leg is 7 cm shorter than the other. Form an equation and find the lengths of the legs.

12. A shop offers two payment plans for a \$1200 computer: Plan A: 20% deposit then 12 monthly payments of \$90. Plan B: No deposit, 24 monthly payments of \$60. Form equations to find after how many months the total paid is the same, and solve.

13. A number is such that when it is added to 5 and the sum is multiplied by 3, the result is the same as when the number is multiplied by 4 and then 7 is subtracted. Form an equation and find the number, then verify.

14. The perimeter of an isosceles triangle is 32 cm. Each equal side is 5 cm longer than the base. Form an equation and find the length of each side. Then find its area if the height to the base is 8 cm.

15. A mixture of nuts worth \$6/kg is made by mixing \$4/kg nuts with \$8/kg nuts. If 10 kg of mixture is needed, form an equation and find how much of each type is required.

16. A car's fuel efficiency is 12 km/L in the city and 16 km/L on the highway. On a trip of 240 km using 18 L of fuel, how many km were city driving? Form equations and solve.