

Introduction to Algebra

Explore a range of ideas. Show your thinking; this is not a placement test.

Name: _____ Date: _____

01 Equivalent expressions

Simplify. Explain why the sign in front of the last bracket matters.

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

03 Comparing two models

Plan A rents equipment for \$7 plus \$3 per hour. Plan B costs \$1 plus \$5 per hour. At what whole number of hours do the plans cost the same? What is that cost?

05 Factoring and area

A rectangle has area $x^2 + 9x + 20$ square units. One side is $x + 4$ units, where $x > 0$. Find the other side.

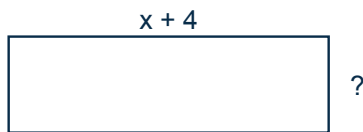


Diagram not to scale

02 Solving an equation

Solve for x , then check your answer in the original equation.

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

04 Linear relationships

A straight line passes through $(1, -1)$ and $(4, 5)$. Write its equation in the form $y = mx + b$. What is y when $x = 7$?

06 Reasoning with two conditions

Two positive integers have a sum of 13 and a product of 40. Find the integers and explain why there is only one pair, ignoring order.

Introduction to Algebra

Six worked solutions

01 Equivalent expressions

$4x - 23$

Distribute both factors: $6x - 15 - 2x - 8$.
Combine like terms to get $4x - 23$. The factor -2 multiplies both x and 4 .

02 Solving an equation

$x = 8$

Multiply both sides by 5: $3x - 4 = 20$. Add 4, then divide by 3: $x = 8$. Check: $(24 - 4) \div 5 = 4$.

03 Comparing two models

3 hours; \$16

Set $7 + 3h = 1 + 5h$. Then $6 = 2h$, so $h = 3$. Both plans cost \$16: $7 + 9 = 1 + 15$.

04 Linear relationships

$y = 2x - 3$; $y = 11$

As x increases by 3, y increases by 6, so $m = 2$. Using $(1, -1)$, $-1 = 2 + b$ gives $b = -3$. At $x = 7$, $y = 14 - 3 = 11$.

05 Factoring and area

$x + 5$ units

The numbers 4 and 5 have sum 9 and product 20. So $x^2 + 9x + 20 = (x + 4)(x + 5)$. Divide by $x + 4$ to get the other side, $x + 5$.

06 Reasoning with two conditions

5 and 8

Check factor pairs of 40: $(1, 40)$, $(2, 20)$, $(4, 10)$, and $(5, 8)$. Only $5 + 8$ equals 13. Equivalently, solve $t^2 - 13t + 40 = 0$.