

Simultaneous Equations: Forming and Solving

1 Let line 2 Table 3 Two different facts? 4 Test 5 Solve 6 Sentence

ANSWERS

1

3 notebooks and 2 pens cost £5.40.
1 notebook and 2 pens cost £2.60.
Find the cost of each.

Let n = the cost of one notebook in pence

p = the cost of one pen in pence

notebooks pens pence

$$(1) \quad 3n + 2p = 540$$

$$(2) \quad n + 2p = 260$$

$$(1) - (2)$$

$$2n = 280$$

$$n = 140$$

$$(2) \quad 140 + 2p = 260$$

$$2p = 120$$

$$p = 60$$

Check in (1): $420 + 120 = 540$ ✓

Answer A notebook is £1.40, a pen 60p.

2

2 tins of beans and 3 jars of jam weigh 2040 g. 2 tins and 1 jar weigh 1240 g. Find the weight of each.

Let t = the weight of one tin in grams

j = the weight of one jar in grams

tins jars grams

$$(1) \quad 2t + 3j = 2040$$

$$(2) \quad 2t + j = 1240$$

$$(1) - (2)$$

$$2j = 800$$

$$j = 400$$

$$(2) \quad 2t + 400 = 1240$$

$$2t = 840$$

$$t = 420$$

Check in (1): $840 + 1200 = 2040$ ✓

Answer A tin is 420 g, a jar 400 g.

3

9 people pay £41 at a museum. Adults pay £5 and children £4. How many adults and children are there?

Let a = the number of adults

c = the number of children

adults children total

$$(1) \quad a + c = 9$$

$$(2) \quad 5a + 4c = 41$$

$$(1) \times 4$$

$$(3) \quad 4a + 4c = 36$$

$$(2) - (3)$$

$$a = 5$$

$$(1) \quad 5 + c = 9$$

$$c = 4$$

Check in (2): $25 + 16 = 41$ ✓

Answer 5 adults and 4 children.

4

3 trucks and 5 vans carry 395 crates. 1 truck and 2 vans carry 140 crates. How many crates does each one carry?

Let t = the crates on one truck

v = the crates in one van

trucks vans crates

$$(1) \quad 3t + 5v = 395$$

$$(2) \quad t + 2v = 140$$

$$(2) \times 3$$

$$(3) \quad 3t + 6v = 420$$

$$(3) - (1)$$

$$v = 25$$

$$(2) \quad t + 50 = 140$$

$$t = 90$$

Check in (1): $270 + 125 = 395$ ✓

Answer A truck carries 90, a van 25.

5

A jacket costs £18 more than a shirt. Together they cost £62. Find the cost of each.

Let j = the cost of the jacket in pounds

s = the cost of the shirt in pounds

jacket shirt £

$$(1) \quad j - s = 18$$

$$(2) \quad j + s = 62$$

$$(1) + (2)$$

$$2j = 80$$

$$j = 40$$

$$(2) \quad 40 + s = 62$$

$$s = 22$$

Check in (1): $40 - 22 = 18$ ✓

Answer The jacket is £40, the shirt £22.

6

A car park has 4 times as many car spaces as van spaces. It has 150 spaces in all. How many of each are there?

Let c = the number of car spaces

v = the number of van spaces

cars vans spaces

$$(1) \quad c = 4v$$

$$(2) \quad c + v = 150$$

$$\text{Substitute (1) into (2)}$$

$$4v + v = 150$$

$$5v = 150$$

$$v = 30$$

$$(1) \quad c = 4 \times 30$$

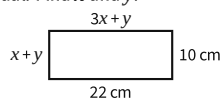
$$c = 120$$

Check in (2): $120 + 30 = 150$ ✓

Answer 120 for cars and 30 for vans.

7

The opposite sides of this rectangle are equal. Find x and y .



$$(1) \quad 3x + y = 22$$

$$(2) \quad x + y = 10$$

$$(1) - (2)$$

$$2x = 12$$

$$x = 6$$

$$(2) \quad 6 + y = 10$$

$$y = 4$$

Check in (1): $18 + 4 = 22$ ✓

Answer $x = 6$ and $y = 4$

8

3 jars of honey and 2 boxes of tea weigh 1.6 kg. 1 jar and 1 box weigh 650 g. Find the weight of each.

Let h = the weight of one jar in grams

t = the weight of one box in grams

honey tea grams

$$(1) \quad 3h + 2t = 1600$$

$$(2) \quad h + t = 650$$

$$(2) \times 2$$

$$(3) \quad 2h + 2t = 1300$$

$$(1) - (3)$$

$$h = 300$$

$$(2) \quad 300 + t = 650$$

$$t = 350$$

Check in (1): $900 + 700 = 1600$ ✓

Answer A jar is 300 g, a box 350 g.

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further practice

ANSWERS

9

Twice the first of two numbers plus the second is 17. The first number is 1 more than the second. Find the two numbers.

Let a = the first, b = the second

$$(1) \quad 2a + b = 17$$

$$(2) \quad a - b = 1$$

$$(1) + (2)$$

$$3a = 18$$

$$a = 6$$

$$(2) \quad 6 - b = 1$$

$$-b = -5$$

$$b = 5$$

Answer 6 and 5

10

A plumber charges a call out fee and then the same amount for each hour. A 2 hour job costs £110. A 5 hour job costs £215. Find the call out fee and the cost of an hour.

Let f = fee, h = an hour (£)

$$(1) \quad f + 5h = 215$$

$$(2) \quad f + 2h = 110$$

$$(1) - (2)$$

$$3h = 105$$

$$h = 35$$

$$(2) \quad f + 70 = 110$$

$$f = 40$$

Answer call out £40, an hour £35

11

A rectangle is 3 times as long as it is wide. Its perimeter is 64 cm. Find its length and its width.

Let a = length, b = width (cm)

$$a = 3b, 2a + 2b = 64$$

$$6b + 2b = 64, 8b = 64, b = 8, a = 24$$

Answer 24 cm long, 8 cm wide

12

A minibus carries 12 people and a taxi carries 4. In all, 7 vehicles carry 52 people, with every seat full. How many minibuses and how many taxis are there?

Let m = minibuses, t = taxis

$$(1) \quad m + t = 7$$

$$(2) \quad 12m + 4t = 52$$

$$(1) \times 4$$

$$(3) \quad 4m + 4t = 28$$

$$(2) - (3)$$

$$8m = 24$$

$$m = 3$$

$$(1) \quad 3 + t = 7$$

$$t = 4$$

Answer 3 minibuses and 4 taxis

13

A family of 7 pays £44 for tickets. An adult ticket costs £8 and a child ticket £5. Ria's working:

Let a = number of adults, c = number of children.

$$a + c = 7 \quad 5a + 8c = 44$$

$$5a + 5c = 35, \text{ so } 3c = 9, c = 3, a = 4.$$

"There were 4 adults and 3 children."

Find Ria's mistake and give the right answer. What check would have caught it?

She swapped the prices: $8a + 5c = 44$.

Test: $4 \times £8 + 3 \times £5 = £47$, not £44.

Answer 3 adults and 4 children

14

3 big and 4 small boxes hold 230 books. 5 big and 3 small boxes hold 310 books. How many books does each size of box hold?

Let b = big, s = small (books)

$$(1) \quad 3b + 4s = 230$$

$$(2) \quad 5b + 3s = 310$$

$$(1) \times 5$$

$$(3) \quad 15b + 20s = 1150$$

$$(2) \times 3$$

$$(4) \quad 15b + 9s = 930$$

$$(3) - (4)$$

$$11s = 220$$

$$s = 20$$

$$(1) \quad 3b + 80 = 230$$

$$3b = 150$$

$$b = 50$$

Answer big 50 books, small 20

15

Write a story that gives the equations $a + c = 8$ and $5a + 3c = 34$. Then solve them and answer in a sentence.

For example: 8 people pay £34.

Adults pay £5, children £3.

There are 5 adults and 3 children.

Answer $a = 5, c = 3$

16

Sam reads: "8 people pay £45 for tickets. An adult ticket costs £7 and a child ticket £4." Explain why this cannot be true.

$$a + c = 8, 7a + 4c = 45. (1) \times 4:$$

$$4a + 4c = 32, \text{ so } 3a = 13.$$

You cannot have $4\frac{1}{3}$ adults.

Answer $4\frac{1}{3}$ adults: not whole