Harder Writing Equations Practice #1

The solutions for some of these require the ability to solve quadratics and simultaneous equations, which are Year 11 skills.

*There is **no** point using "guess and check" or working backwards using only numerical techniques. Marks are not awarded for the answers, only correct techniques.*

Write equations and solve using algebraic methods. The solution is given for the first three, to help focus on the method, not just the answer.

1. If Ann is 5 years older than Clare and their combined age is 71, how old is Ann?
   (answer = 38)

2. What two consecutive numbers multiplied together give 702?
   (one answer = 26 and 27)

3. Find the rectangle that is twice as wide as it is high and which has an area of 338 cm^2.
   (answer = 13 cm by 26 cm)

4. Find four consecutive numbers that add up to 1018.

5. A woman had a pair of twins and then three years later a set of triplets. How old are the children now if their ages added together is 31?

6. Two maths exercise books and five ordinary exercise books cost $2.65. One maths and two ordinary cost $1.15. How much is a maths exercise book?

Answers: Harder Writing Equations Practice #1

The equations we are looking for are shown in bold. Other forms are acceptable, and obviously the letters chosen for the unknown(s) do not matter.

1. Let Ann = a years old and Clare = c. We are told $a + c = 71$ and $a = c + 5$ or $c = a - 5$

   so the equation we need to solve is: $\boldsymbol{a + (a - 5) = 71}$ $2a - 5 = 71$

   $2a = 76$ $x = 76 \div 2$ **Ann is 38 years old**

2. Call them x and y. We are told $x\,y = 702$ and since they are consecutive $y = x + 1$

   so the equation we need to solve is: $\boldsymbol{x\,(x + 1) = 702}$

   $x^2 + x = 702$ $x^2 + x - 702 = 0$ $(x + 27)(x - 26) = 0$

   The numbers are 26 and 27 (or $^-$26 and $^-$27)

3. Short side × long side = 338. Short side, x, is doubled to give long side = $2x$.

   So the equation we need to solve is: $\boldsymbol{x \times 2x = 338}$

   $2x^2 = 338$ $x^2 = 169$ $x = \pm\sqrt{169} = 13$ (or $^-$13)

   The rectangle is 13 by 26 (we can ignore negative lengths, as meaningless)

4. Make smallest = x, so the next ones are $x + 1$, $x + 2$, and $x + 3$

   $\boldsymbol{x + (x + 1) + (x + 2) + (x + 3) = 1018}$ $4x + 6 = 1018$ $4x = 1018 - 6$

   $x = 1012 \div 4$ **The numbers are 253, 254, 255 and 256**

5. Call the twins x, which makes the triplets each $x - 3$ years old.

   We are told that $\boldsymbol{2(x) + 3(x - 3) = 31}$ $2x + 3x - 9 = 31$ $5x = 31 + 9$

   $x = 40 \div 5 = 8$ **The twins are 8 and the triplets are 5**.

   (or triplets = x, then we get $2(x + 3) + 3x = 31$, which gives $x = 5$, and triplets = 8)

6. ① $\boldsymbol{2m + 5o = 2.65}$ **and** ② $\boldsymbol{m + 2o = 1.15}$

   Taking equation ② and doubling it gives us $2m + 4o = 2.3$

   Taking the new ② from ① gives us that $o = 2.65 - 2.3 = 0.35$

   $m + 2o = 1.15$ and since $o = 0.35$, $p = 0.45$ **A maths book costs $0.45**