Day 188 **B Tier 10-a-day: Model Solutions**

1 Unitary method

7 apples cost £5.60.
(a) Work out the cost of 5 apples.
(b) How many apples can be bought for £2.40?

(a) 1 apple costs £5.60 ÷ 7 = 80p
5 × 80p = £4
(b) £2.40 ÷ 80p = 3
Answer: (a) £4 (b) 3

2 Types of number

Here is a list of numbers.
69, 54, 62, 88, 41, 70, 31, 67
From the list, write down
(a) a multiple of 7
(b) an odd number that is not prime

(a) 70 (7 × 10) is in the 7 times table
(b) 69 is odd but has more than two factors
Answer: (a) 70 (b) 69

3 Cost formulae

A photographer charges £22 plus £7 for each hour of a wedding.
(a) Work out the total cost for 7 hours.
(b) The total cost is £127. Work out the number of hours.

(a) 7 × 7 = 49, then 22 + 49 = 71
(b) Take off the fixed charge: 127 − 22 = 105
Divide by the cost for each: 105 ÷ 7 = 15
Answer: (a) £71 (b) 15

4 LCM problems

Two buses leave a bus station at 11:00.
One bus leaves every 30 minutes.
The other bus leaves every 9 minutes.
At what time do both buses next leave together?

Multiples of 30: 30, 60, 90
Multiples of 9: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90
The first common multiple is 90, so the LCM is 90 minutes
11:00 + 90 minutes = 12:30
Answer: 12:30

5 Stem and leaf diagrams

The stem and leaf diagram shows 12 values.
(a) Find the median.
(b) Work out the range.

(a) 12 values, so the median is the mean of the 6th and 7th values
Reading in order: 25, 28, 30, 33, 35, 36, 41, 42, 43, 47, 48, 49
Median = 38.5
(b) Range = 49 − 25 = 24
Answer: (a) 38.5 (b) 24

Day 188 **B Tier 10-a-day: Model Solutions**

6 Negative and zero indices

Work out

(a) 4^{-2}

(b) $11^0 + \sqrt{4}$

(a) A negative power means the reciprocal: $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

(b) Anything to the power 0 is 1, so $11^0 = 1$

$\sqrt{4} = 2$, so $1 + 2 = 3$

Answer: (a) $\frac{1}{16}$ (b) 3

7 Proving a triangle is right-angled

A triangle has sides of length 26 mm, 24 mm and 7 mm.
Is the triangle right-angled?
You must show your working.

The longest side is 26. Check whether $a^2 + b^2 = c^2$

$7^2 + 24^2 = 49 + 576 = 625$

$26^2 = 676$

These are not equal, so the triangle is not right-angled

Answer: No, $7^2 + 24^2 = 625$ but $26^2 = 676$

8 Substitution into formulae

Here is a formula.
$P = 2l + 2w$
Work out the value of P when l = 6 and w = 3

$P = 2 \times 6 + 2 \times 3$

$P = 18$

Answer: P = 18

9 Area of a triangle using sine

In triangle PQR, PQ = 7 cm, QR = 20 cm and angle PQR = 130°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C

Area = ½ × 7 × 20 × sin 130°

= 53.623...

= 53.6 cm^2 (1 d.p.)

Answer: 53.6 cm^2

10 Simultaneous equations problem

A takeaway sells burgers and portions of chips.
1 burger and 3 portions of chips cost £6.
2 burgers and 3 portions of chips cost £9.
Work out the cost of one burger and the cost of one portion of chips.

Let a = cost of one burger and b = cost of one portion of chips

1a + 3b = 6 and 2a + 3b = 9

Subtract: 1a = 9 − 6 = 3, so a = 3

Substitute: 1 × 3 + 3b = 6, so 3b = 3 and b = 1

Answer: One burger costs £3 and one portion of chips costs £1