Day 269 **B Tier 10-a-day: Model Solutions**

1 Money

Chloe buys 3 notebooks at 15p each and 4 magazines at 65p each.
She pays with a £20 note.
Work out how much change she gets.

3 × 15p = 45p
4 × 65p = £2.60
Total = 45p + £2.60 = £3.05
Change = £20 − £3.05 = £16.95
Answer: £16.95

2 Simplifying expressions

Simplify fully
(a) 9m × 7m
(b) 12cd ÷ 3c

(a) 9 × 7 = 63 and m × m = m^2
(b) Divide the numbers: 12 ÷ 3 = 4. The c cancels, leaving 4d
Answer: (a) 63m^2 (b) 4d

3 Sharing in a ratio

Leo and Callum share 156 cards in the ratio 6 : 7.
Work out how many Callum gets.

6 + 7 = 13 parts
1 part = 156 ÷ 13 = 12
Callum gets 7 × 12 = 84
Answer: 84

4 Where a line crosses the axes

A straight line has equation $y = -4x - 20$
(a) Write down the coordinates of the point where the line crosses the y-axis.
(b) Work out the coordinates of the point where the line crosses the x-axis.

(a) When x = 0, y = −20
(b) The line crosses the x-axis when y = 0: $-4x - 20 = 0$
$-4x = 20$
$x = -5$
Answer: (a) (0, −20) (b) (−5, 0)

5 Pythagoras' theorem

Calculate the length of b.
The diagram is not drawn accurately.

Use Pythagoras: $a^2 + b^2 = c^2$, where c is the longest side
$b^2 + 10^2 = 26^2$
$b^2 = 676 - 100 = 576$
$b = \sqrt{576} = 24$
Answer: b = 24 cm

Day 269 **B Tier 10-a-day: Model Solutions**

6 LCM problems

Two buses leave a bus station at 08:30.
One bus leaves every 6 minutes.
The other bus leaves every 15 minutes.
At what time do both buses next leave together?

Multiples of 6: 6, 12, 18, 24, 30
Multiples of 15: 15, 30
The first common multiple is 30, so the LCM is 30 minutes
08:30 + 30 minutes = 09:00
Answer: 09:00

7 Grouped frequency tables

The table shows the masses of some parcels.
(a) Write down the modal class.
(b) Work out an estimate for the mean.

(a) The highest frequency is 11
(b) Use the midpoint of each class: 10, 30, 50, 70, 90
Sum of midpoint × frequency = 10 × 11 + 30 × 8 + 50 × 5 + 70 × 9 + 90 × 7 = 1860
Total frequency = 40
Estimate = 1860 ÷ 40 = 46.5
Answer: (a) $0 < m \leq 20$ (b) 46.5

8 Compound percentages

A new van costs £30,000. (Calculator)
Its value falls by 6% each year.
Work out its value after 2 years.
Give your answer to the nearest pound.

Multiplier = 100% − 6% = 0.94
Value = 30000×0.94^2
= £26,508.00, which is £26,508 to the nearest pound
Answer: £26,508

9 Area of a triangle using sine

In triangle XYZ, XY = 10 m, YZ = 18 m and angle XYZ = 30°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 10 × 18 × sin 30°
= 45.000...
= 45.0 m^2 (1 d.p.)
Answer: 45.0 m^2

10 Quadratic equation problem

A rectangle has length (x + 2) cm and width (x − 1) cm.
The area of the rectangle is 28 cm^2.
(a) Show that $x^2 + x - 30 = 0$
(b) Hence work out the length of the rectangle.

(a) Area = length × width: $(x + 2)(x - 1) = 28$
Expand: $x^2 + x - 2 = 28$
Subtract 28 from both sides: $x^2 + x - 30 = 0$
(b) Factorise: $(x - 5)(x + 6) = 0$, so $x = 5$ or $x = -6$
A length cannot be negative, so x = 5. Length = 5 + 2 = 7
Answer: (b) 7 cm