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

1 HCF and LCM from prime factors

$A = 2^3 \times 7^2$

$B = 2^3 \times 5^2 \times 7$

Write down, as a product of prime factors,

(a) the HCF of A and B

(b) the LCM of A and B

(a) HCF: take the smaller power of each prime that is in both: $2^3 \times 7$

(b) LCM: take the larger power of every prime: $2^3 \times 5^2 \times 7^2$

Answer: (a) $2^3 \times 7$ (b) $2^3 \times 5^2 \times 7^2$

2 Forming expressions

Leah is n years old.

Leah's sister is 4 years older.

Leah's father is 3 times as old as Leah.

(a) Write an expression, in terms of n, for the age of Leah's sister.

(b) Write an expression, in terms of n, for the sum of the ages of all three people. Give your answer in its simplest form.

(a) Leah's sister is 4 years older: n + 4

(b) Leah's father is 3n

Sum = n + (n + 4) + 3n

Collect like terms: 5n + 4

Answer: (a) n + 4 (b) 5n + 4

3 Pie charts

In a survey, 5 people chose water.

There were 90 people in the survey altogether.

The results are shown in a pie chart. Work out the angle for water.

Fraction = 5 out of 90

Angle = 5 ÷ 90 × 360° = 20°

Answer: 20°

4 Fractions of amounts

Amir has £225.

They spends $\frac{2}{3}$ of the money on a book.

They then spends $\frac{2}{3}$ of the money left on a drink.

How much money is left?

Book: £225 ÷ 3 × 2 = £150

Left: £225 − £150 = £75

Drink: £75 ÷ 3 × 2 = £50

Money left: £75 − £50 = £25

Answer: £25

5 Angles and algebra

The angles of a triangle are x°, 2x° and (2x + 15)°.

Work out the size of the largest angle.

Angles in a triangle add up to 180°

5x + 15 = 180

5x = 165, so x = 33

The angles are 33°, 66°, 81°

Answer: 81°

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

6 Circle theorems

A, B and C are points on a circle.
AB is a diameter of the circle.
Angle CAB = 53°.
Work out the size of angle x.
Give a reason for each step of your working.
The diagram is not drawn accurately.

Angle ACB = 90° (the angle in a semicircle is a right angle)
x = 180 − 90 − 53 = 37°
(angles in a triangle add up to 180°)
Answer: x = 37°

7 Negative and zero indices

Work out
(a) 3^{-2}
(b) $2^0 + \sqrt{100}$

(a) A negative power means the reciprocal: $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$

(b) Anything to the power 0 is 1, so $2^0 = 1$
$\sqrt{100} = 10$, so 1 + 10 = 11
Answer: (a) $\frac{1}{9}$ (b) 11

8 Substitution into formulae

$y = 2x^2 + 5x - 4$
Work out the value of y when x = 4

$y = 2 \times 4^2 + 5 \times 4 + (-4)$
$y = 32 + 20 + (-4) = 48$
Answer: y = 48

9 Surface area of a cylinder

A tin has radius 6 m and height 7 m.
It is closed.
Work out the total outside surface area.
Give your answer in terms of π.

Two circles: $2 \times \pi \times 6^2 = 72\pi$
Curved surface: $2 \times \pi \times 6 \times 7 = 84\pi$
Total = $72\pi + 84\pi = 156\pi$
Answer: 156π m^2

10 Average speed

A cyclist travels at 30 km/h for 1 hour and then at 60 km/h for 2 hours.
Work out its average speed for the whole journey.

Distance: 30 × 1 = 30 km and 60 × 2 = 120 km
Total distance = 150 km and total time = 3 hours
Average speed = 150 ÷ 3 = 50
Answer: 50 km/h