Day 337 **B Tier 10-a-day: Model Solutions**

1 Simplifying ratios

Write the ratio 24 : 64 in its simplest form.

The highest common factor of 24 and 64 is 8
24 ÷ 8 = 3 and 64 ÷ 8 = 8
Answer: 3 : 8

2 Fractions in simplest form

Beth scores 12 out of 80 in a test.
Write her score as a fraction in its simplest form.

12 out of 80 is $\frac{12}{80}$

Divide top and bottom by 4: $\frac{3}{20}$

Answer: $\frac{3}{20}$

3 Missing value from a mean

After 5 tests, Tara's mean mark is 74.
After her next test, her mean mark is 76.
What mark did she get in her next test?

Total after 5 tests = 5 × 74 = 370
Total after 6 tests = 6 × 76 = 456
Next mark = 456 − 370 = 86
Answer: 86

4 Percentage as a fraction of

(a) Kofi scores 8 out of 250 in a quiz. Write this as a percentage.
(b) Write 30p as a percentage of £5.

(a) $\frac{8}{250}$ × 100 = 3.2%

(b) Change both to pence: 30p and 500p

$\frac{30}{500}$ × 100 = 6%

Answer: (a) 3.2% (b) 6%

5 Relative frequency

A spinner has coloured sections. It is spun 400 times and lands on green 320 times.
What is the relative frequency of green?
Give your answer as a decimal.

320 ÷ 400 = 0.8
Answer: 0.8

6 Expanding and simplifying

Expand and simplify 4(x − 6) + 6(x + 5)

Expand each bracket: 4x − 24 + 6x + 30
Collect like terms: 10x + 6
Answer: 10x + 6

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7 Trigonometry: finding an angle

Work out the size of angle x. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

We know the opposite (5 m) and the hypotenuse (13 m), so use sin

$\sin x = \frac{5}{13}$

$x = \sin^{-1}(\frac{5}{13}) = 22.620...$

$x = 22.6°$ (1 d.p.)

Answer: $x = 22.6°$

8 Simultaneous equations

Solve the simultaneous equations
$2x + 3y = 27$
$5x - 6y = 0$

Multiply the first equation by 2: $4x + 6y = 54$
The y terms have opposite signs, so add the equations: $9x = 54$
$x = 6$
Substitute $x = 6$ into the first equation: $3y = 27 - 12 = 15$
$y = 5$
Answer: $x = 6$, $y = 5$

9 Growth in standard form

There are 6.6×10^5 fish in a lake.
The number doubles every day.
How many are there after 5 days?
Give your answer in standard form.

Each day multiply by 2, so multiply by $2^5 = 32$
$6.6 \times 10^5 \times 32 = 211.2 \times 10^5$
In standard form: 2.112×10^7
Answer: 2.112×10^7

10 Volume of cones and pyramids

A cone has base radius 2 cm and vertical height 3 cm.

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Work out the volume of the cone.
Give your answer in terms of π.

Volume = $\frac{1}{3} \times \pi \times 2^2 \times 3$

$= \frac{1}{3} \times \pi \times 4 \times 3 = 4\pi$

Answer: 4π cm^3