Day 292 **B Tier 10-a-day: Model Solutions**

1 Bar charts

The bar chart shows some information.
(a) Write down the mode.
(b) What fraction of the total is Judo? Give your answer in its simplest form.

(a) The tallest bar is Judo
(b) Total = 4 + 10 + 8 + 2 + 8 = 32
Judo = 10, so the fraction is 10 out of 32

Answer: (a) Judo (b) $\frac{5}{16}$

2 Expanding and simplifying

Expand and simplify 6(x − 2) + 2(x + 2)

Expand each bracket: 6x − 12 + 2x + 4
Collect like terms: 8x − 8
Answer: 8x − 8

3 Percentage as a fraction of

(a) Uma scores 9 out of 20 in a test. Write this as a percentage.
(b) Write 90p as a percentage of £10.

(a) $\frac{9}{20} \times 100 = 45\%$

(b) Change both to pence: 90p and 1000p
$\frac{90}{1000} \times 100 = 9\%$
Answer: (a) 45% (b) 9%

4 Circumference and area of a circle

The diagram shows a circle with diameter 21 m. (Calculator)
Work out the area of the circle.
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Area = $\pi \times \text{radius}^2$
Radius = 21 ÷ 2 = 10.5
$\pi \times 10.5^2 = 346.361...$
$= 346.4\ \text{m}^2$ (1 d.p.)
Answer: 346.4 m^2

5 Harder linear equations

Solve 4(x − 2) = 2(x + 1)

Expand the brackets: 4x − 8 = 2x + 2
Subtract 2x from both sides: 2x − 8 = 2
Subtract −8 from both sides: 2x = 10
Divide both sides by 2
Answer: x = 5

6 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 40%. (Calculator)
Two weeks later it is reduced by a further 20% of the new price.
The final price is £36.
Work out the original price of the sofa.

Multipliers: 0.6 and 0.8
Overall multiplier = 0.6 × 0.8 = 0.48
Original price = £36 ÷ 0.48 = £75
Answer: £75

Day 292 **B Tier 10-a-day: Model Solutions**

7 Compound interest

£4,000 is invested for 3 years at 10% compound interest per year. (Calculator)
Work out the total interest earned.

Multiplier = 1.1

Value after 3 years = $4{,}000 \times 1.1^3$ = £5,324
Interest = £5,324 − £4,000 = £1,324
Answer: £1,324

8 Area of a triangle using sine

In triangle PQR, PQ = 8 cm, QR = 5 cm and angle PQR = 52°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 8 × 5 × sin 52°
= 15.760...
= 15.8 cm^2 (1 d.p.)
Answer: 15.8 cm^2

9 Fraction problems

A fuel tank is $\frac{1}{5}$ full.

24 litres of fuel are added.

The fuel tank is now $\frac{1}{2}$ full.

Work out the capacity of the fuel tank.

Fraction added = $\frac{1}{2} - \frac{1}{5} = \frac{3}{10}$

$\frac{3}{10}$ of the capacity = 24 litres

$\frac{1}{10}$ of the capacity = 24 ÷ 3 = 8 litres
Whole capacity = 8 × 10 = 80 litres
Answer: 80 litres

10 Iteration

Here is an iteration formula.

$x_{n+1} = 1 + \frac{25}{x_n}$

$x_0 = 5$

(a) Work out x_1

(b) Work out x_2. Give your answer correct to 3 decimal places. (Calculator)

(a) $x_1 = 1 + \frac{25}{5} = 1 + 5 = 6$

(b) $x_2 = 1 + \frac{25}{6} = 5.16667...$
= 5.167
Answer: (a) 6 (b) 5.167