Day 268 **B Tier 10-a-day: Model Solutions**

1 Forming expressions

A pencil costs p pence.
A pen costs 20 pence more than a pencil.
(a) Write an expression, in terms of p, for the cost of a pen.
(b) Write an expression, in terms of p, for the total cost of 3 pencils and 3 pens. Give your answer in its simplest form.

(a) A pen costs 20p more than a pencil: p + 20
(b) 3 pencils cost 3p and 3 pens cost 3(p + 20)
3p + 3p + 60
Collect like terms: 6p + 60
Answer: (a) p + 20 (b) 6p + 60 pence

2 Estimation

Estimate the value of
2.2 × 2.16 + 0.393
Show your rounding to 1 significant figure.

Round each number to 1 significant figure: 2.2 → 2, 2.16 → 2, 0.393 → 0.4
Estimate = 2 × 2 + 0.4 = 4.4
Answer: 4.4

3 Probabilities adding to 1

The table shows the probabilities of a biased dice landing on each colour.
(a) Work out the value of x.
(b) The biased dice is used 200 times. How many times would you expect Green?

(a) Probabilities add up to 1
0.05 + 0.25 + 0.4 + x = 1
x = 1 − 0.7 = 0.3
(b) 0.25 × 200 = 50
Answer: (a) 0.3 (b) 50

4 Trigonometry: finding a side

Find the length of x. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Label the sides: x is the adjacent and 20 cm is the hypotenuse
We use cos (adjacent and hypotenuse)

$\cos 47° = \frac{x}{20}$

x = 20 × cos 47° = 13.640...
x = 13.6 cm (1 d.p.)
Answer: x = 13.6 cm

5 Substitution into formulae

$s = ut + \frac{1}{2}at^2$

Work out the value of s when u = 7, a = 6 and t = 4

$s = 7 \times 4 + \frac{1}{2} \times 6 \times 4^2$

$s = 28 + \frac{1}{2} \times 6 \times 16$

s = 28 + 48 = 76
Answer: s = 76

Day 268 **B Tier 10-a-day: Model Solutions**

6 Reading pie charts

The pie chart shows the favourite choices of 360 people.
The angle for Hockey is not shown.
Work out how many people chose Hockey.

Angle for Hockey = 360° − (90° + 140° + 70°) = 360° − 300° = 60°
60 ÷ 360 × 360 = 60
Answer: 60

7 Midpoint and length of a line

A is the point (3, 4) and B is the point (−5, 10).
(a) Work out the coordinates of the midpoint of AB.
(b) Work out the length of AB.

(a) Midpoint = (−2 ÷ 2, 14 ÷ 2) = (−1, 7)
(b) Horizontal distance = 8, vertical distance = 6
$AB^2 = 8^2 + 6^2 = 64 + 36 = 100$
$AB = \sqrt{100} = 10$
Answer: (a) (−1, 7) (b) 10

8 Growth in standard form

There are 3.9×10^4 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 $2^5 = 32$
$3.9 \times 10^4 \times 32 = 124.8 \times 10^4$
In standard form: 1.248×10^6
Answer: 1.248×10^6

9 Tables of values

Complete the table of values for y = x − 2

x = 0: y = 1 × 0 − 2 = −2
x = 1: y = 1 × 1 − 2 = −1
x = 3: y = 1 × 3 − 2 = 1
Answer: x = 0: −2, x = 1: −1, x = 3: 1

10 Reverse percentages

Farah's rent goes up by 35%. (Calculator)
The new rent is £54 a month.
Work out the rent before the increase.

The new rent is 100% + 35% = 135% of the old rent.
135% = £54, so 1% = £54 ÷ 135 = 40p
100% = 40p × 100 = £40
Answer: £40