Day 353 **B Tier 10-a-day: Model Solutions**

1 Probabilities adding to 1

The table shows the probabilities of a spinner landing on each colour.
(a) Work out the value of x.
(b) The spinner is used 40 times. How many times would you expect Black?

(a) Probabilities add up to 1
0.3 + 0.05 + 0.35 + x = 1
x = 1 − 0.7 = 0.3
(b) 0.35 × 40 = 14
Answer: (a) 0.3 (b) 14

2 Integer inequalities

x is an integer.
Write down the greatest value of x for which x < 3.7

The integers below 3.7 are ... 2, 3
Answer: 3

3 Speed unit conversion

A motorbike travels at 162 km/h.
Work out its speed in metres per second.

162 km = 162,000 m
1 hour = 3600 seconds
162,000 ÷ 3600 = 45 m/s
Answer: 45 m/s

4 Angles in triangles

A right-angled triangle has one angle of 24°.
Work out the size of the other acute angle.

Angles in a triangle add up to 180°
180 − 90 − 24 = 66
Answer: 66°

5 Fractions and decimals

(a) Write $\frac{19}{50}$ as a decimal.

(b) Write $\frac{2}{9}$ as a recurring decimal.

For part (b), write down the first 8 decimal places and say which digits repeat.

(a) 19 ÷ 50 = 0.38
(b) 2 ÷ 9: use short division, adding zeros
2 ÷ 9 = 0.22222222...
The digit 2 repeats
Answer: (a) 0.38 (b) 0.22222222... (2 repeats)

6 Circle theorems

A, B, C and D are points on a circle.
Angle ACB = 56°.
Work out the size of angle ADB, marked p.
Give a reason for your answer.
The diagram is not drawn accurately.

Angles in the same segment are equal
p = 56°
Answer: p = 56°

Day 353 **B Tier 10-a-day: Model Solutions**

7 Standard form calculations

Work out $(3.2 \times 10^6) + (6 \times 10^6)$
Give your answer in standard form.

The powers of 10 are the same, so add the numbers: 3.2 + 6 = 9.2
9.2×10^6
Answer: 9.2×10^6

8 Substitution with negative numbers

Work out the value of $x^2 + 2x$ when $x = -3$

$x^2 = (-3)^2 = 9$ (a negative squared is positive)
$2x = 2 \times (-3) = -6$
$9 - 6 = 3$
Answer: 3

9 LCM problems

Two lights flash at 08:30.
One light flashes every 20 minutes.
The other light flashes every 6 minutes.
At what time do both lights next flash together?

Multiples of 20: 20, 40, 60
Multiples of 6: 6, 12, 18, 24, 30, 36, 42, 48, 54, 60
The first common multiple is 60, so the LCM is 60 minutes
08:30 + 60 minutes = 09:30
Answer: 09:30

10 Chords and the centre of a circle

A circle has centre O and radius 10 cm.
AB is a chord and M is the midpoint of AB. OM is perpendicular to AB.
Work out the value of x.
The diagram is not drawn accurately.

AM = 12 ÷ 2 = 6
Triangle OMA has a right angle at M, and OA is the hypotenuse
$x^2 = 10^2 - 6^2 = 100 - 36 = 64$
$x = \sqrt{64} = 8$
Answer: x = 8 cm