**Day 310** **B Tier 10-a-day: Model Solutions**

## 1 Simple probability

A pot contains 6 black marbles, 7 white marbles and 4 blue marbles.
One is taken at random. Find the probability that it is blue.

Total = 6 + 7 + 4 = 17
P(blue) = 4 out of 17
Simplify the fraction

**Answer:** $\frac{4}{17}$

## 2 Angles in quadrilaterals

PQRS is a rhombus.
Angle SPQ = 78°.
(a) Write down the size of angle QRS.
(b) Work out the size of angle PQR.

(a) Opposite angles are equal, so angle QRS = 78°
(b) Angles next to each other add up to 180°
180 − 78 = 102
**Answer: (a) 78° (b) 102°**

## 3 Factors and multiples

(a) Write down all the factors of 72.
(b) Write down all the multiples of 5 between 26 and 41.

(a) Find pairs that multiply to make 72: 1 × 72, 2 × 36, 3 × 24, 4 × 18, 6 × 12, 8 × 9
(b) Count up in 5s: 30, 35, 40
**Answer: (a) 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72 (b) 30, 35, 40**

## 4 Gradient and intercept

A straight line has equation $y = -3x + 1$
(a) Write down the gradient of the line.
(b) Write down the equation of a line that is parallel to this line and passes through the point (0, 4).

(a) The line is in the form y = mx + c, so the gradient m is the number in front of x
(b) Parallel lines have the same gradient, −3
It crosses the y-axis at 4, so c = 4
**Answer: (a) −3 (b) $y = -3x + 4$**

## 5 Reflection

The diagram shows triangle ABC on a grid.
(a) Write down the coordinates of the image of C after a reflection in the line y = 1.
(b) Write down the coordinates of the image of B after a reflection in the x-axis.

(a) C is at (4, 4). Reflect in the line y = 1: (4, −2)
(b) B is at (1, 1). Reflect in the x-axis: (1, −1)
**Answer: (a) (4, −2) (b) (1, −1)**

## 6 Best buys

Pasta is sold in two sizes.
Small: 250 g for £1.05
Large: 500 g for £1.80
Which size is better value for money?
You must show your working.

Compare the cost of 500 g of each
Large: 1 × £1.80 = £1.80
Small: 2 × £1.05 = £2.10
The large is cheaper for the same amount
**Answer: The large size**

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## 7 LCM problems

Two buses leave a bus station at 11:45.
One bus leaves every 12 minutes.
The other bus leaves every 14 minutes.
At what time do both buses next leave together?

Multiples of 12: 12, 24, 36, 48, 60, 72, 84
Multiples of 14: 14, 28, 42, 56, 70, 84
The first common multiple is 84, so the LCM is 84 minutes
11:45 + 84 minutes = 13:09
**Answer: 13:09**

## 8 Iteration

Here is an iteration formula.

$x_{n+1} = 3 + \frac{20}{x_n}$

$x_0 = 5$

(a) Work out $x_1$
(b) Work out $x_2$. Give your answer correct to 3 decimal places. (Calculator)

(a) $x_1 = 3 + \frac{20}{5} = 3 + 4 = 7$

(b) $x_2 = 3 + \frac{20}{7} = 5.85714...$

$= 5.857$

**Answer: (a) 7 (b) 5.857**

## 9 Venn diagrams

The Venn diagram shows information about 26 pupils in Year 9.
One of them is chosen at random.
Find the probability that the person chose French or Spanish or both.

Inside the circles = 9 + 4 + 11 = 24
Total = 26
P = 24 out of 26
**Answer:** $\frac{12}{13}$

## 10 Volume of cones and pyramids

A cone has base radius 2 cm and vertical height 15 cm. (Calculator)

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

Work out the volume of the cone.
Give your answer correct to 1 decimal place.

Volume = $\frac{1}{3} \times \pi \times 2^2 \times 15$

$= 62.832...$

$= 62.8\ cm^3$ (1 d.p.)

**Answer: 62.8 cm$^3$**