Day 167 **B Tier 10-a-day: Model Solutions**

1 Integer inequalities

x is an integer.
Write down the smallest value of x for which x > 5.4

The integers above 5.4 are 6, 7 ...
Answer: 6

2 Simple probability

A pot contains 9 black pens and 3 blue pens.
One is taken at random. Find the probability that it is not black.

Total = 9 + 3 = 12
Not black: 12 − 9 = 3
Simplify the fraction
Answer: $\frac{1}{4}$

3 Decimal calculations

Work out
(a) 5.1 × 0.7
(b) 0.32 × 3

(a) 51 × 7 = 357
There are 2 decimal places in total, so the answer is 3.57
(b) 32 × 3 = 96, then divide by 100: 0.96
Answer: (a) 3.57 (b) 0.96

4 Angles in parallel lines

In the diagram, KL is parallel to MN.
(a) Work out the size of angle q.
(b) Give a reason for your answer.
The diagram is not drawn accurately.

Angle q and the 111° angle are corresponding angles (F shape)
q = 111°
Corresponding angles are equal
Answer: (a) q = 111° (b) Corresponding angles are equal

5 Significant figures

Work out the value of this expression. (Calculator)

$$\frac{3.3 + 3.3}{7.8 \times 8}$$

Give your answer correct to 3 significant figures.

Use a calculator: the full display is 0.105769...
Round to 3 significant figures: 0.106
Answer: 0.106

6 Angles and algebra

The angles of a triangle are x°, 4x° and (4x + 18)°.
Work out the size of the largest angle.

Angles in a triangle add up to 180°
9x + 18 = 180
9x = 162, so x = 18
The angles are 18°, 72°, 90°
Answer: 90°

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7 Volume of cones and pyramids

A cone has base radius 9 cm and vertical height 9 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 = $\frac{1}{3} \times \pi \times 9^2 \times 9$

= 763.407...

= 763.4 cm^3 (1 d.p.)

Answer: 763.4 cm^3

8 Percentage increase and decrease

A coat costs £200. In a sale the price is reduced by 10%.
(a) Work out the new price.
(b) A car is worth £2500. Its value goes down by 10% in a year. Work out its new value.

(a) The multiplier is 0.9, so new price = £200 × 0.9 = £180
(b) The multiplier is 0.9, so new value = £2500 × 0.9 = £2250
Answer: (a) £180 (b) £2250

9 Quadratic graphs

The diagram shows the graph of
$y = -x^2 - 6x - 5$
(a) Write down the solutions of $-x^2 - 6x - 5 = 0$
(b) Write down the coordinates of the maximum point of the graph.

(a) The solutions are where the graph crosses the x-axis
(b) The highest point of the curve is halfway between the two solutions, at $x = -3$
Answer: (a) $x = -5$ and $x = -1$ (b) $(-3, 4)$

10 Frequency trees

There are 300 bus passengers.
$\frac{3}{10}$ of them are adults and the rest are children.
$\frac{2}{5}$ of the adults and $\frac{1}{5}$ of the children have a pass.
One person is chosen at random. Work out the probability that they have a pass.

adults: $\frac{3}{10} \times 300 = 90$ and children: $300 - 90 = 210$

adults who have a pass: $\frac{2}{5} \times 90 = 36$

children who have a pass: $\frac{1}{5} \times 210 = 42$

P = (36 + 42) out of 300

Answer: $\frac{13}{50}$