Day 104 **B Tier 10-a-day: Model Solutions**

1 Mean

Here are the number of minutes Tara waited for a bus.
8, 15, 6, 11, 15, 14
Work out the mean.

Add the values: 8 + 15 + 6 + 11 + 15 + 14 = 69
Divide by the number of values: 69 ÷ 6 = 11.5
Answer: 11.5 minutes

2 Types of number

Here is a list of numbers.
44, 92, 25, 20, 91, 18, 47, 80
From the list, write down
(a) a factor of 60
(b) a square number

(a) 20 (60 ÷ 20 = 3) divides exactly into 60
(b) 25 (5 × 5) is a whole number multiplied by itself
Answer: (a) 20 (b) 25

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 40 times. How many times would you expect B?

(a) Probabilities add up to 1
0.4 + 0.25 + 0.2 + x = 1
x = 1 − 0.85 = 0.15
(b) 0.25 × 40 = 10
Answer: (a) 0.15 (b) 10

4 Equations with fractions

Solve $\frac{5x}{3} + 1 = 11$

Subtract 1 from both sides: $\frac{5x}{3} = 10$
Multiply both sides by 3: 5x = 30
Divide both sides by 5
Answer: x = 6

5 Pressure

A block exerts a force of 40 N and causes a pressure of 8 N/m^2.
Work out the area in contact with the ground.

Area = force ÷ pressure
40 ÷ 8 = 5
Answer: 5 m^2

6 HCF and LCM from prime factors

$A = 2^2 \times 5$
$B = 2^3 \times 7^2$
Write down, as a product of prime factors,
(a) the HCF of A and B
(b) the LCM of A and B

(a) HCF: take the smaller power of each prime that is in both: 2^2
(b) LCM: take the larger power of every prime: $2^3 \times 5 \times 7^2$
Answer: (a) 2^2 (b) $2^3 \times 5 \times 7^2$

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7 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 opposite and 8 cm is the hypotenuse
We use sin (opposite and hypotenuse)

$\sin 31° = \frac{x}{8}$

$x = 8 \times \sin 31° = 4.120...$
$x = 4.1$ cm (1 d.p.)
Answer: x = 4.1 cm

8 Simultaneous equations problem

A shop sells pens and pencils. All pens cost the same and all pencils cost the same.
4 pens and 1 pencil cost 335p.
2 pens and 1 pencil cost 175p.
Work out the cost of one pen and the cost of one pencil.

Let a = cost of one pen and b = cost of one pencil
$4a + 1b = 335$ and $2a + 1b = 175$
Subtract: $2a = 335 - 175 = 160$, so $a = 80$
Substitute: $4 \times 80 + 1b = 335$, so $1b = 15$ and $b = 15$
Answer: One pen costs 80p and one pencil costs 15p

9 Volume of cones and pyramids

A cone has base radius 8 m and vertical height 10 m. (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 = $\frac{1}{3} \times \pi \times 8^2 \times 10$

$= 670.206...$
$= 670.2$ m^3 (1 d.p.)
Answer: 670.2 m^3

10 Comparing fractions and percentages

Mohammed has $\frac{1}{2}$ of £28.

Uma has 35% of £240.
Who has more money? You must show your working.

Mohammed: $28 \div 4 \times 2 = £14$
Uma: $240 \div 100 \times 35 = £84$
£84 is more than £14, so Uma has more
Answer: Uma