Day 67 **B Tier 10-a-day: Model Solutions**

1 Pythagoras' theorem

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

Use Pythagoras: $a^2 + b^2 = c^2$
$p^2 = 6^2 + 13^2 = 36 + 169 = 205$
$p = \sqrt{205} = 14.318...$
p = 14.3 mm (1 d.p.)
Answer: p = 14.3 mm

2 Function notation

$g(x) = 4x^2 + 6$
(a) Work out g(3)
(b) Work out g(−3)

(a) $g(3) = 4 \times 3^2 + 6 = 42$
(b) $g(-3) = 4 \times (-3)^2 + 6 = 42$
Answer: (a) 42 (b) 42

3 HCF and LCM from prime factors

$A = 2^3 \times 5^3$
$B = 2 \times 3^3 \times 7$
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
(b) LCM: take the larger power of every prime: $2^3 \times 3^3 \times 5^3 \times 7$
Answer: (a) 2 (b) $2^3 \times 3^3 \times 5^3 \times 7$

4 Bearings

B is south-west of A.
(a) Write down the bearing of B from A.
(b) Work out the bearing of A from B.

(a) Bearings are measured clockwise from north: south-west is 225°
(b) The bearing is more than 180°, so subtract 180°: 225 − 180 = 45
Answer: (a) 225° (b) 045°

5 Perimeter expressions

A rectangle has length (5x + 3) cm and width (2x + 6) cm.
Write down an expression, in terms of x, for the perimeter of the rectangle.
Give your answer in its simplest form.

Perimeter = 2 × length + 2 × width
2(5x + 3) + 2(2x + 6) = 10x + 6 + 4x + 12
= 14x + 18
Answer: 14x + 18 cm

6 Angles in parallel lines

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

Angle y and the 121° angle are co-interior angles (C shape)
y = 180 − 121 = 59°
Co-interior angles add up to 180°
Answer: (a) y = 59° (b) Co-interior angles add up to 180°

Day 67 **B Tier 10-a-day: Model Solutions**

7 Average speed

A cyclist travels at 50 km/h for 1.5 hours and then at 60 km/h for 1 hour.
Work out its average speed for the whole journey.

Distance: 50 × 1.5 = 75 km and 60 × 1 = 60 km
Total distance = 135 km and total time = 2.5 hours
Average speed = 135 ÷ 2.5 = 54
Answer: 54 km/h

8 Error intervals

The number x is rounded to the nearest 10.
The result is 410.
Write down the error interval for x.

The rounding unit is 10, so x can be up to half of this, 5, either side of 410
Lower bound = 410 − 5 = 405 and upper bound = 410 + 5 = 415
Answer: $405 \leq x < 415$

9 Cumulative frequency

The cumulative frequency graph shows the times taken by 40 students to complete a puzzle.
(a) Use the graph to estimate the median.
(b) Work out an estimate for the interquartile range.

(a) Median is at 40 ÷ 2 = 20: read across from 20 on the vertical axis to the curve, then down: 26.5
(b) Lower quartile at 10: 21.5. Upper quartile at 30: 40
IQR = 40 − 21.5 = 18.5
Answer: (a) 26.5 minutes (b) 18.5 minutes

10 Venn diagram problems

32 viewers were asked.
21 of them watch drama and 16 of them watch comedy.
10 of them did both.
(a) How many did neither?
(b) One is chosen at random. Find the probability that they watch drama but do not watch comedy.

(a) Union = 21 + 16 − 10 = 27
Neither = 32 − 27 = 5
(b) Only watch drama = 21 − 10 = 11
P = 11 out of 32
Answer: (a) 5 (b) $\frac{11}{32}$