Day 82 **B Tier 10-a-day: Model Solutions**

1 Negative numbers

The temperature on a mountain at 6 am is −8°C.
(a) The temperature rises by 8°C. Work out the new temperature.
(b) The highest temperature one day was 11°C and the lowest was −7°C. Work out the difference.

(a) −8 + 8 = 0
(b) Difference = 11 − (−7) = 11 + 7 = 18
Answer: (a) 0°C (b) 18°C

2 Angles in parallel lines

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

Angle b and the 78° angle are corresponding angles (F shape)
b = 78°
Corresponding angles are equal
Answer: (a) b = 78° (b) Corresponding angles are equal

3 Ratio to fraction and percentage

The ratio of red to blue counters in a bag is 7 : 5.
What fraction of them are red?

Total parts = 7 + 5 = 12
red are 7 out of 12 parts
Answer: $\frac{7}{12}$

4 Changing the subject

Make h the subject of the formula
V = lwh

Divide both sides by lw
Answer: h = $\frac{V}{lw}$

5 Loci

A and B are two points 20 cm apart.
A point P is always the same distance from A and from B.
Describe the locus of the point P.

Points equal distances from A and B lie on the perpendicular bisector of AB
It passes through the midpoint of AB (10 cm from each point) at right angles to AB
Answer: The perpendicular bisector of AB

6 Decimal calculations

Work out
(a) 8.5 × 0.2
(b) 0.4 × 5

(a) 85 × 2 = 170
There are 2 decimal places in total, so the answer is 1.7
(b) 40 × 5 = 200, then divide by 100: 2
Answer: (a) 1.7 (b) 2

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7 Equation of a line

A straight line has gradient 5 and passes through the point $(-2, 8)$.
Find the equation of the line.

The equation is $y = 5x + c$
Substitute $x = -2$ and $y = 8$: $8 = 5 \times (-2) + c$
$8 = -10 + c$
$c = 8 - (-10) = 18$
Answer: $y = 5x + 18$

8 Fraction problems

A water tank is $\frac{1}{5}$ full.

33 litres of water are added.

The water tank is now $\frac{1}{2}$ full.

Work out the capacity of the water tank.

Fraction added = $\frac{1}{2} - \frac{1}{5} = \frac{3}{10}$

$\frac{3}{10}$ of the capacity = 33 litres

$\frac{1}{10}$ of the capacity = $33 \div 3 = 11$ litres
Whole capacity = $11 \times 10 = 110$ litres
Answer: 110 litres

9 Chords and the centre of a circle

A circle has centre O and radius 10 m.
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.

Triangle OMA has a right angle at M, and OA is the hypotenuse
$AM^2 = 10^2 - 6^2 = 100 - 36 = 64$
$AM = \sqrt{64} = 8$
$x = 2 \times AM = 16$
Answer: $x = 16$ m

10 Combining ratios

In a bag of counters, the ratio of red to blue is 4 : 3.
The ratio of blue to yellow is 5 : 6.
Write down the ratio red : blue : yellow.

Make the blue part the same in both ratios: lowest common multiple of 3 and 5 is 15
red : blue = 20 : 15
blue : yellow = 15 : 18
red : blue : yellow = 20 : 15 : 18
Answer: 20 : 15 : 18