Day 189 **B Tier 10-a-day: Model Solutions**

1 Rounding

Write 2553.6262
(a) correct to 1 decimal place,
(b) correct to 2 significant figures.

(a) Look at the next digit after the first decimal place: 2
So 2553.6262 rounds to 2553.6
(b) The first significant figure is the first non-zero digit. Count 2 figures and look at the next digit.
2553.6262 rounds to 2600
Answer: (a) 2553.6 (b) 2600

2 Area of a triangle using sine

In triangle PQR, PQ = 17 m, QR = 9 m and angle PQR = 52°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 17 × 9 × sin 52°
= 60.283...
= 60.3 m^2 (1 d.p.)
Answer: 60.3 m^2

3 Cost formulae

A hire company charges £30 plus £10 for each day a van is hired.
(a) Work out the total cost for 6 days.
(b) The total cost is £130. Work out the number of days.

(a) 10 × 6 = 60, then 30 + 60 = 90
(b) Take off the fixed charge: 130 − 30 = 100
Divide by the cost for each: 100 ÷ 10 = 10
Answer: (a) £90 (b) 10

4 Congruent triangles

Triangle ABC has angles of 60° and 75°, and a side of 7 mm between them.
Triangle DEF has angles of 75° and 60°, and a side of 7 mm between them.
Are the two triangles congruent?
Give a reason for your answer.

Two pairs of equal angles, with the same side between them
So the triangles are congruent (ASA)
Answer: Yes, ASA (two angles and the included side)

5 Map scales

On a map, 1 cm represents 0.2 km.
A lake is 17.5 cm long on the map.
Work out the real length of the lake.

17.5 × 0.2 = 3.5
Answer: 3.5 km

6 Trigonometry: finding an angle

Work out the size of angle y. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

We know the opposite (10 m) and the adjacent (5 m), so use tan

$\tan y = \frac{10}{5}$

$y = \tan^{-1}(\frac{10}{5}) = 63.435...$

y = 63.4° (1 d.p.)
Answer: y = 63.4°

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7 Ordering standard form

Write these numbers in order of size.
Start with the smallest.
1.8×10^0, 150, 6.4×10^{-2}, 0.00049

Write each in standard form: 1.8×10^0, 1.5×10^2, 6.4×10^{-2}, 4.9×10^{-4}
Compare the powers of 10 first (the bigger the power, the bigger the number)
Order: 0.00049, 6.4×10^{-2}, 1.8×10^0, 150
Answer: 0.00049, 6.4×10^{-2}, 1.8×10^0, 150

8 Simultaneous equations

Solve the simultaneous equations
$x - 4y = -15$
$2x + 2y = 20$

Multiply the second equation by 2: $4x + 4y = 40$
The y terms have opposite signs, so add the equations: $5x = 25$
$x = 5$
Substitute $x = 5$ into the first equation: $-4y = -15 - 5 = -20$
$y = 5$
Answer: x = 5, y = 5

9 Probability of not happening

The probability that Dev wins a game of chess is 0.25.
Work out the probability that Dev does not win a game of chess.

Probabilities add up to 1
$1 - 0.25 = 0.75$
Answer: 0.75

10 Iteration

Here is an iteration formula.
$x_{n+1} = \sqrt{4x_n + 8}$
$x_0 = 2$
(a) Work out x_1
(b) Work out x_2. Give your answer correct to 3 decimal places. (Calculator)

(a) $x_1 = \sqrt{4 \times 2 + 8} = \sqrt{16} = 4$
(b) $x_2 = \sqrt{4 \times 4 + 8} = \sqrt{24} = 4.89898...$
$= 4.899$
Answer: (a) 4 (b) 4.899