Day 229 **B Tier 10-a-day: Model Solutions**

1 Proving a triangle is right-angled

A triangle has sides of length 6 m, 4 m and 3 m.
Is the triangle right-angled?
You must show your working.

The longest side is 6. Check whether $a^2 + b^2 = c^2$
$3^2 + 4^2 = 9 + 16 = 25$
$6^2 = 36$
These are not equal, so the triangle is not right-angled
Answer: No, $3^2 + 4^2 = 25$ but $6^2 = 36$

2 Laws of indices

Simplify fully
(a) $(3p^2)^3$
(b) $x^3 \times x^8$

(a) $3^3 = 27$ and the powers multiply: $2 \times 3 = 6$
(b) Add the powers: $3 + 8 = 11$
Answer: (a) $27p^6$ (b) x^{11}

3 Angles in quadrilaterals

WXYZ is a parallelogram.
Angle ZWX = 80°.
(a) Write down the size of angle XYZ.
(b) Work out the size of angle WXY.

(a) Opposite angles are equal, so angle XYZ = 80°
(b) Angles next to each other add up to 180°
180 − 80 = 100
Answer: (a) 80° (b) 100°

4 Ordering decimals

Write these numbers in order of size.
Start with the smallest number.
5.769, 5.7, 5.68, 5.75

Write each number to 3 decimal places:
5.769, 5.700, 5.680, 5.750
Now put them in order: 5.680, 5.700, 5.750, 5.769
Answer: 5.68, 5.7, 5.75, 5.769

5 Real-life graphs

A taxi firm charges a fixed amount plus a cost for each mile.
The graph shows the total cost.
(a) Write down the fixed charge.
(b) Work out the cost for each mile.

(a) The fixed charge is the cost when nothing has been used, where the line meets the vertical axis
(b) Take two points on the line, for example (0, 5) and (8, 29)
Cost for each mile = (29 − 5) ÷ 8 = 3
Answer: (a) £5 (b) £3

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6 Stem and leaf diagrams

The stem and leaf diagram shows 13 values.
(a) Find the median.
(b) Work out the range.

(a) 13 values, so the median is the 7th value
Reading in order: 10, 11, 12, 14, 19, 20, 22, 23, 32, 33, 35, 37, 39
Median = 22
(b) Range = 39 − 10 = 29
Answer: (a) 22 (b) 29

7 Mixed numbers

Work out $3\frac{1}{2} \times 1\frac{4}{5}$

Give your answer as a mixed number.

Write as improper fractions: $\frac{7}{2} \times \frac{9}{5}$

Multiply: $\frac{63}{10}$

As a mixed number: $6\frac{3}{10}$

Answer: $6\frac{3}{10}$

8 Circle theorems

A, B and C are points on a circle, centre O.
Angle AOB = 112°.
Work out the size of angle ACB, marked p.
Give a reason for your answer.
The diagram is not drawn accurately.

The angle at the centre is twice the angle at the circumference
p = 112 ÷ 2 = 56°
Answer: p = 56°

9 Rates

Electricity costs 12p per unit.
There is also a standing charge of £5.
Work out the total bill for 420 units.

Cost of units: 420 × 12p = 5040p = £50.40
Add the standing charge: £50.40 + £5 = £55.40
Answer: £55.40

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 40%. (Calculator)
Two weeks later it is reduced by a further 50% of the new price.
The final price is £150.
Work out the original price of the sofa.

Multipliers: 0.6 and 0.5
Overall multiplier = 0.6 × 0.5 = 0.3
Original price = £150 ÷ 0.3 = £500
Answer: £500