**Day 362** **B Tier 10-a-day: Model Solutions**

## 1 Continuing sequences

Here are the first four terms of a sequence.
1, 5, 25, 125
(a) Write down the next two terms.
(b) Describe the rule for continuing the sequence.

Each term is 5 times the term before: 5 ÷ 1 = 5
125 × 5 = 625 and 625 × 5 = 3125
**Answer: (a) 625, 3125 (b) Multiply by 5 each time**

## 2 Multiplying and dividing fractions

Work out
(a) $\frac{1}{2} \times \frac{1}{3}$
(b) $\frac{1}{8} \div \frac{2}{3}$
Give each answer in its simplest form.

(a) Multiply the tops and the bottoms: $\frac{1}{6}$

(b) Turn the second fraction upside down and multiply: $\frac{1}{8} \times \frac{3}{2} = \frac{3}{16} = \frac{3}{16}$

**Answer: (a) $\frac{1}{6}$ (b) $\frac{3}{16}$**

## 3 Area of 2D shapes

Find the area of the trapezium.
The diagram is not drawn accurately.

Area of a trapezium = ½ × (a + b) × h
½ × (10 + 6) × 4 = ½ × 16 × 4
= 32
**Answer: 32 cm$^2$**

## 4 Mode and median from a table

The table shows the pets owned by each student in a class.
(a) Write down the mode.
(b) Work out the median.

(a) The highest frequency is 8, for 0
(b) Total frequency = 26, so the median is the numbers 13 and 14 values
Running totals of frequency: 8, 10, 16, 22, 26
The median is 2
**Answer: (a) 0 (b) 2**

## 5 Exchange rates

The exchange rate is £1 = $1.3. (Calculator)
(a) Change £80 to dollars.
(b) Change $130 to pounds (£).

(a) Multiply by 1.3: 80 × 1.3 = $104
(b) Divide by 1.3: 130 ÷ 1.3 = £100
**Answer: (a) $104 (b) £100**

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## 6 Chords and the centre of a circle

A circle has centre O and radius 14 m. (Calculator)
AB is a chord and M is the midpoint of AB. OM is perpendicular to AB.
Work out the value of x. Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Triangle OMA has a right angle at M, and OA is the hypotenuse
$AM^2 = 14^2 - 12^2 = 196 - 144 = 52$
$AM = \sqrt{52} = 7.211...$
$x = 2 \times AM = 14.422...$
$x = 14.4$ m (1 d.p.)
**Answer: x = 14.4 m**

## 7 Changing the subject

Make x the subject of the formula
$y = mx + c$

Subtract c from both sides: $y - c = mx$
Divide both sides by m
**Answer:** $\mathbf{x = \frac{y - c}{m}}$

## 8 Direct proportion

F is directly proportional to m.
When m = 2, F = 16.
Find the value of F when m = 7.

$F = km$
$16 = k \times 2$, so $k = 16 \div 2 = 8$
$F = 8 \times 7 = 56$
**Answer: F = 56**

## 9 Laws of indices

Write each answer as a single power of 4.
(a) $4^8 \times 4^5$
(b) $4^{13} \div 4^5$

(a) Add the powers: 8 + 5 = 13
(b) Subtract the powers: 13 − 5 = 8
**Answer: (a)** $\mathbf{4^{13}}$ **(b)** $\mathbf{4^8}$

## 10 Ratio and changes

In a room, the ratio of boys to girls is 5 : 9.
There are 72 girls.
More boys join so that there are equal numbers of boys and girls.
How many boys join?

9 parts = 72, so 1 part = 8
Originally there are $5 \times 8 = 40$ boys
To equal 72, add 72 − 40 = 32
**Answer: 32**