**Day 279** **B Tier 10-a-day: Model Solutions**

## 1 Ordering fractions

Write these in order of size.
Start with the smallest.

$\frac{3}{10}$, 25%, 80%, $\frac{1}{5}$

Write each as a decimal:

$\frac{3}{10}$ = 0.3, 25% = 0.25, 80% = 0.8, $\frac{1}{5}$ = 0.2

Order: $\frac{1}{5}$, 25%, $\frac{3}{10}$, 80%

**Answer: $\frac{1}{5}$, 25%, $\frac{3}{10}$, 80%**

## 2 Term-to-term rules

The first term of a sequence is 1.
The term-to-term rule is: multiply by 3 and then add 5.
Work out the 4th term.

2nd term: 1 × 3 + 5 = 8
3rd term: 8 × 3 + 5 = 29
4th term: 29 × 3 + 5 = 92
**Answer: 92**

## 3 Missing value from a mean

After 4 tests, Tara's mean mark is 77.
After her next test, her mean mark is 80.
What mark did she get in her next test?

Total after 4 tests = 4 × 77 = 308
Total after 5 tests = 5 × 80 = 400
Next mark = 400 − 308 = 92
**Answer: 92**

## 4 Compound shapes with semicircles

A badge is made from a rectangle and a semicircle. (Calculator)
The rectangle is 28 cm wide and 20 cm high.
The diameter of the semicircle is 28 cm.
(a) Work out the area of the shape.
(b) Work out the perimeter of the shape.
Give each answer correct to 1 decimal place.

(a) Rectangle: 28 × 20 = 560
Semicircle: ½ × π × $14^2$ = 307.876...
Total = 867.9 $cm^2$
(b) Curved edge: ½ × π × 28 = 43.982...
Straight edges: 28 + 20 + 20 = 68
Total = 112.0 cm
**Answer: (a) 867.9 $cm^2$ (b) 112.0 cm**

## 5 Density

A piece of wood has a density of 0.6 $g/cm^3$ and a volume of 100 $cm^3$.
Work out its mass.

Mass = density × volume
0.6 × 100 = 60
**Answer: 60 g**

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## 6 Reverse percentages

Amir's rent goes up by 35%. (Calculator)
The new rent is £1080 a month.
Work out the rent before the increase.

The new rent is 100% + 35% = 135% of the old rent.
135% = £1080, so 1% = £1080 ÷ 135 = £8
100% = £8 × 100 = £800
**Answer: £800**

## 7 Venn diagrams

The Venn diagram shows information about 41 pupils in Year 9.
One of them is chosen at random.
Find the probability that the person chose both French and Spanish.

Number in both circles = 9
Total = 11 + 9 + 12 + 9 = 41
P = 9 out of 41
**Answer:** $\frac{9}{41}$

## 8 Trigonometry: finding an angle

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

We know the opposite (12 cm) and the adjacent (11 cm), so use tan

$\tan x = \frac{12}{11}$

$x = \tan^{-1}(\frac{12}{11}) = 47.490...$

x = 47.5° (1 d.p.)
**Answer: x = 47.5°**

## 9 Factorising

Factorise $a^2 + 7a$

Both terms have a as a factor
$a^2 \div a = a$ and $7a \div a = 7$
**Answer: a(a + 7)**

## 10 Compound areas

Two rectangles are joined to make a shape.
The first is 4 cm by 3 cm.
The second is 9 cm by 14 cm.
Work out the total area of the shape.

First rectangle: 4 × 3 = 12
Second rectangle: 9 × 14 = 126
12 + 126 = 138
**Answer: 138 cm$^2$**