Day 334 **B Tier 10-a-day: Model Solutions**

1 Arc length and sector area

The diagram shows a sector of a circle with radius 4 m and angle 30°. (Calculator)
Work out the area of the sector.
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Sector area = $\frac{30}{360} \times \pi \times 4^2$

= 4.189... = 4.2 m^2 (1 d.p.)

Answer: 4.2 m^2

2 Substitution

Work out the value of $9n - 8$ when $n = 2$

Replace n with 2: $9 \times 2 - 8$

$18 - 8 = 10$

Answer: 10

3 Types of number

Here is a list of numbers.
61, 86, 47, 98, 62, 53, 5, 97
From the list, write down
(a) a factor of 60
(b) a multiple of 7

(a) 5 ($60 \div 5 = 12$) divides exactly into 60
(b) 98 (7×14) is in the 7 times table

Answer: (a) 5 (b) 98

4 Circumference and area of a circle

The diagram shows a circle with radius 15 cm. (Calculator)
Work out the area of the circle.
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Area = $\pi \times \text{radius}^2$

$\pi \times 15^2 = 706.858...$

= 706.9 cm^2 (1 d.p.)

Answer: 706.9 cm^2

5 Equations with brackets

Solve $6(2x + 8) = 24$

Divide both sides by 6: $2x + 8 = 4$
Subtract 8 from both sides: $2x = -4$
Divide both sides by 2

Answer: $x = -2$

6 Ratio to fraction and percentage

The ratio of adults to children at a concert is 7 : 2.
What fraction of them are children?

Total parts = 7 + 2 = 9
children are 2 out of 9 parts

Answer: $\frac{2}{9}$

Day 334 **B Tier 10-a-day: Model Solutions**

7 Growth in standard form

There are 5.1×10^3 bacteria in a dish.
The number doubles every day.
How many are there after 4 days?
Give your answer in standard form.

Each day multiply by 2, so multiply by $2^4 = 16$

$5.1 \times 10^3 \times 16 = 81.6 \times 10^3$

In standard form: 8.16×10^4

Answer: 8.16×10^4

8 Tree diagrams

A bag contains 4 black socks and 2 white socks.
Amy takes one at random and does not replace it, then takes a second.
Work out the probability that the two are the same colour.

P(both black) = $\frac{2}{5}$

P(both white) = $\frac{1}{15}$

Add: $\frac{2}{5} + \frac{1}{15} = \frac{7}{15}$

Answer: $\frac{7}{15}$

9 Loci

A and B are two points 10 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 (5 cm from each point) at right angles to AB

Answer: The perpendicular bisector of AB

10 Tables of values for quadratics

Complete the table of values for $y = x^2 + 2x + 3$

$x = -2$: $y = (-2)^2 + 2 \times (-2) + 3 = 3$

$x = -1$: $y = (-1)^2 + 2 \times (-1) + 3 = 2$

$x = 1$: $y = 1^2 + 2 \times 1 + 3 = 6$

$x = 3$: $y = 3^2 + 2 \times 3 + 3 = 18$

Answer: $x = -2$: 3, $x = -1$: 2, $x = 1$: 6, $x = 3$: 18