Day 46 **B Tier 10-a-day: Model Solutions**

1 Mean

Here are the numbers of text messages received on some days.
5, 20, 24, 13, 6, 15, 25, 8
Work out the mean.

Add the values: 5 + 20 + 24 + 13 + 6 + 15 + 25 + 8 = 116
Divide by the number of values: 116 ÷ 8 = 14.5
Answer: 14.5 messages

2 Integer inequalities

n is an integer.
Write down all the values of n for which
$-3 \leq n \leq 0$

Both end values are included because of the ≤ signs
Answer: −3, −2, −1, 0

3 Ordering fractions

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

45%, 0.2, $\frac{3}{4}$, 0.4

Write each as a decimal:

45% = 0.45, 0.2 = 0.2, $\frac{3}{4}$ = 0.75, 0.4 = 0.4

Order: 0.2, 0.4, 45%, $\frac{3}{4}$

Answer: 0.2, 0.4, 45%, $\frac{3}{4}$

4 Distance, speed and time

A bus leaves at 10:45 am.
It travels 180 km at an average speed of 60 km/h.
At what time does it arrive?

Time = 180 ÷ 60 = 3 hours = 3 hours
10:45 am + 3 hours = 1:45 pm
Answer: 1:45 pm

5 Wages and overtime

Tom is paid £10 per hour for a 35 hour week. (Calculator)
Overtime is paid at double time.
In one week he works 7 hours of overtime.
Work out his total pay for that week.

Normal pay: 35 × £10 = £350
Overtime rate: £10 × 2 = £20 per hour
Overtime pay: 7 × £20 = £140
Total: £350 + £140 = £490
Answer: £490

6 Radius from area or circumference

The area of a circle is 40 cm^2. (Calculator)
Work out the radius of the circle.
Give your answer correct to 1 decimal place.

Area = πr^2, so $r^2 = 40 \div \pi = 12.732...$
$r = \sqrt{12.732} = 3.568...$
r = 3.6 cm (1 d.p.)
Answer: 3.6 cm

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7 Algebraic proof

Show that the sum of 5 consecutive whole numbers is always a multiple of 5.

Let the middle number be n. The numbers are $n - 2$, $n - 1$, n, $n + 1$, $n + 2$
Add them: the extra parts cancel, giving 5n
5n is a multiple of 5 because n is a whole number
Answer: 5n is a multiple of 5

8 Surface area of a cylinder

A drum has radius 5 cm and height 9 cm. (Calculator)
It is closed.
Work out the total outside surface area.
Give your answer correct to 1 decimal place.

Two circles: $2 \times \pi \times 5^2 = 50\pi$
Curved surface: $2 \times \pi \times 5 \times 9 = 90\pi$
Total = $50\pi + 90\pi = 140\pi$
= 439.8 cm^2 (1 d.p.)
Answer: 439.8 cm^2

9 Simultaneous equations problem

A cafe sells cakes and drinks. All cakes cost the same and all drinks cost the same.
1 cake and 1 drink cost £6.
2 cakes and 1 drink cost £8.
Work out the cost of one cake and the cost of one drink.

Let a = cost of one cake and b = cost of one drink
1a + 1b = 6 and 2a + 1b = 8
Subtract: $1a = 8 - 6 = 2$, so a = 2
Substitute: $1 \times 2 + 1b = 6$, so 1b = 4 and b = 4
Answer: One cake costs £2 and one drink costs £4

10 Growth in standard form

There are 5.8×10^6 cells in a sample.
The number doubles every day.
How many are there after 6 days?
Give your answer in standard form.

Each day multiply by 2, so multiply by $2^6 = 64$
$5.8 \times 10^6 \times 64 = 371.2 \times 10^6$
In standard form: 3.712×10^8
Answer: 3.712×10^8