Day 347 **B Tier 10-a-day: Model Solutions**

1 Ordering decimals

Write these numbers in order of size.
Start with the smallest number.
0.78, 0.66, 0.7, 0.774

Write each number to 3 decimal places:
0.780, 0.660, 0.700, 0.774
Now put them in order: 0.660, 0.700, 0.774, 0.780
Answer: 0.66, 0.7, 0.774, 0.78

2 Ratio, one part known

The ratio of cats to dogs among the pets at a rescue centre is 3 : 2.
There are 14 dogs.
How many cats are there?

2 parts = 14 dogs
1 part = 14 ÷ 2 = 7
cats: 3 × 7 = 21
Answer: 21

3 Tables of values

Complete the table of values for $y = -4x + 5$

$x = 0$: $y = -4 \times 0 + 5 = 5$
$x = 1$: $y = -4 \times 1 + 5 = 1$
$x = 2$: $y = -4 \times 2 + 5 = -3$
Answer: x = 0: 5, x = 1: 1, x = 2: −3

4 Multiplying and dividing fractions

Work out
(a) $\frac{3}{5} \times \frac{1}{3}$
(b) $\frac{2}{9} \div \frac{2}{3}$
Give each answer in its simplest form.

(a) Multiply the tops and the bottoms: $\frac{3}{15} = \frac{1}{5}$

(b) Turn the second fraction upside down and multiply: $\frac{2}{9} \times \frac{3}{2} = \frac{6}{18} = \frac{1}{3}$

Answer: (a) $\frac{1}{5}$ (b) $\frac{1}{3}$

5 Trigonometry: finding a side

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

Label the sides: x is the adjacent and 13 m is the hypotenuse
We use cos (adjacent and hypotenuse)

$\cos 58° = \frac{x}{13}$
$x = 13 \times \cos 58° = 6.889...$
$x = 6.9$ m (1 d.p.)
Answer: x = 6.9 m

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6 Growth and decay

A new car is worth £15,000. (Calculator)
Each year its value falls by 25% of its value at the start of that year.
Work out the value of the car after 2 years.

Multiplier = 1 − 25 ÷ 100 = 0.75
Value = $15{,}000 \times 0.75^2$
= £8,437.50
Answer: £8,437.50

7 Forming and solving equations

A triangle has sides of length x cm, (x + 1) cm and (2x − 2) cm.
The perimeter of the triangle is 27 cm.
(a) Work out the value of x.
(b) Work out the length of the longest side.

(a) x + (x + 1) + (2x − 2) = 27
4x − 1 = 27
4x = 28, so x = 7
(b) The sides are 7 cm, 8 cm and 12 cm
Answer: (a) x = 7 (b) 12 cm

8 Negative and zero indices

Work out
(a) 5^{-2}
(b) $3^0 + \sqrt{64}$

(a) A negative power means the reciprocal: $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

(b) Anything to the power 0 is 1, so $3^0 = 1$
$\sqrt{64} = 8$, so 1 + 8 = 9
Answer: (a) $\frac{1}{25}$ (b) 9

9 Tree diagrams

A bag contains 2 green beads and 4 yellow beads.
Gita takes one at random and does not replace it, then takes a second.
Work out the probability that both are green.

P(first green) = $\frac{1}{3}$

P(second green) = $\frac{1}{5}$

P(both green) = $\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$

Answer: $\frac{1}{15}$

10 Perimeter with algebra

A rectangle has length (4x + 5) m and width (3x + 3) m.
The perimeter of the rectangle is 114 m.
(a) Work out the value of x.
(b) Work out the area of the rectangle.

(a) 2(4x + 5) + 2(3x + 3) = 114
14x + 16 = 114
14x = 98
x = 7
(b) Length = 33, width = 24, area = 33 × 24 = 792
Answer: (a) x = 7 (b) 792 m^2