Day 283 **B Tier 10-a-day: Model Solutions**

1 Rates

Kira types at 50 words per minute.
(a) How many words does Kira type in 12 minutes?
(b) How long does Kira take to type 1800 words?

(a) 50 × 12 = 600
(b) 1800 ÷ 50 = 36 minutes
Answer: (a) 600 words (b) 36 minutes

2 Trigonometry: finding an angle

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

We know the opposite (12 cm) and the adjacent (13 cm), so use tan

$\tan p = \frac{12}{13}$

$p = \tan^{-1}(\frac{12}{13}) = 42.709...$

p = 42.7° (1 d.p.)
Answer: p = 42.7°

3 Counting outcomes

A club has 4 members.
They choose a captain and a vice-captain from the members.
The two jobs must be done by different people.
How many different ways can the jobs be given out?

4 choices for the captain
3 choices left for the vice-captain
4 × 3 = 12
Answer: 12

4 Real-life graphs

A printing company charges a set-up fee plus a cost for each box of leaflets.
The graph shows the total cost.
(a) Write down the fixed charge.
(b) Work out the cost for each box.

(a) The fixed charge is the cost when nothing has been used, where the line meets the vertical axis
(b) Take two points on the line, for example (0, 6) and (6, 30)
Cost for each box = (30 − 6) ÷ 6 = 4
Answer: (a) £6 (b) £4

5 Wages and overtime

Kofi is paid £15.50 per hour for a 30 hour week. (Calculator)
Overtime is paid at time and a half.
In one week he works 4 hours of overtime.
Work out his total pay for that week.

Normal pay: 30 × £15.50 = £465
Overtime rate: £15.50 × 1.5 = £23.25 per hour
Overtime pay: 4 × £23.25 = £93
Total: £465 + £93 = £558
Answer: £558

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6 Ratio and changes

In a room, the ratio of small boxes to large boxes is 4 : 7.
There are 42 large boxes.
More small boxes join so that there are equal numbers of small boxes and large boxes.
How many small boxes join?

7 parts = 42, so 1 part = 6
Originally there are 4 × 6 = 24 small boxes
To equal 42, add 42 − 24 = 18
Answer: 18

7 Ordering fractions

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

80%, $\frac{3}{20}$, $\frac{3}{5}$, 82.5%

Write each as a decimal:

80% = 0.8, $\frac{3}{20}$ = 0.15, $\frac{3}{5}$ = 0.6, 82.5% = 0.825

Order: $\frac{3}{20}$, $\frac{3}{5}$, 80%, 82.5%

Answer: $\frac{3}{20}$, $\frac{3}{5}$, 80%, 82.5%

8 Equation of a line

A straight line has gradient 3 and passes through the point (5, 3).
Find the equation of the line.

The equation is y = 3x + c
Substitute x = 5 and y = 3: 3 = 3 × 5 + c
3 = 15 + c
c = 3 − 15 = −12
Answer: y = 3x − 12

9 Repeated percentage change

The price of a laptop is £400.
The price is first increased by 5%, then the new price is increased by 30%.
(a) Work out the final price.
(b) Work out the overall percentage increase in the price.

(a) Multipliers: 1.05 and 1.3
400 × 1.05 × 1.3 = £546
(b) Overall multiplier = 1.365
Overall increase = 36.5%
Answer: (a) £546 (b) 36.5% increase

10 Area of a triangle using sine

In triangle PQR, PQ = 15 cm, QR = 16 cm and angle PQR = 110°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 15 × 16 × sin 110°
= 112.763...
= 112.8 cm^2 (1 d.p.)
Answer: 112.8 cm^2