Day 248 **B Tier 10-a-day: Model Solutions**

1 Grouped frequency tables

The table shows the times taken by some students to complete a task.
(a) Write down the modal class.
(b) Work out an estimate for the mean.

(a) The highest frequency is 8
(b) Use the midpoint of each class: 2.5, 7.5, 12.5, 17.5, 22.5
Sum of midpoint × frequency = 2.5 × 6 + 7.5 × 3 + 12.5 × 4 + 17.5 × 8 + 22.5 × 4 = 317.5
Total frequency = 25
Estimate = 317.5 ÷ 25 = 12.7
Answer: (a) $15 < t \leq 20$ (b) 12.7

2 Angles on a line and round a point

The diagram shows 2 angles on a straight line.
Work out the value of c.
The diagram is not drawn accurately.

Angles on a straight line add up to 180°
(c + 30) + (c + 70) = 180
2c + 100 = 180
2c = 80
c = 80 ÷ 2 = 40
Answer: c = 40°

3 Collecting like terms

Simplify 5p + 7q + 3p + 8q

Collect the p terms: 5p + 3p = 8p
Collect the q terms: 7q + 8q = 15q
Answer: 8p + 15q

4 Ordering fractions

Write these in order of size.
Start with the smallest.
60%, 45%, 92%, $\frac{2}{5}$

Write each as a decimal:
60% = 0.6, 45% = 0.45, 92% = 0.92, $\frac{2}{5}$ = 0.4
Order: $\frac{2}{5}$, 45%, 60%, 92%
Answer: $\frac{2}{5}$, 45%, 60%, 92%

5 Inverse proportion

12 machines take 2 hours to make a batch of parts.
All the machines work at the same rate.
How long would it take 6 machines?

The total work stays the same: 12 × 2 = 24 machines-hours
With 6 machines: 24 ÷ 6 = 4 hours
Answer: 4 hours

6 Fractions in simplest form

What fraction of 1 hour is 40 minutes?
Give your answer in its simplest form.

1 hour = 60 minutes
$\frac{40}{60} = \frac{2}{3}$
Answer: $\frac{2}{3}$

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7 Harder linear equations

Solve $5(x - 5) = 3(x - 3)$

Expand the brackets: $5x - 25 = 3x - 9$
Subtract 3x from both sides: $2x - 25 = -9$
Subtract -25 from both sides: $2x = 16$
Divide both sides by 2
Answer: x = 8

8 Time

(a) Write 2.6 hours in hours and minutes.
(b) Write 2 hours 30 minutes as a decimal number of hours.

(a) 0.6 hours = 0.6 × 60 = 36 minutes
(b) 30 ÷ 60 = 0.5 hours
Answer: (a) 2 hours 36 minutes (b) 2.5 hours

9 Trigonometry in isosceles triangles

Triangle XYZ is isosceles with XY = XZ = 8 m. (Calculator)
The base YZ = 8 m.
Work out the size of angle XYZ.
Give your answer correct to 1 decimal place.

Split the triangle into two right-angled triangles. Half the base = 8 ÷ 2 = 4

$\cos Y = \frac{4}{8}$

Angle XYZ = $\cos^{-1}(\frac{4}{8})$ = 60.000...

= 60.0° (1 d.p.)
Answer: 60.0°

10 Volume of cones and pyramids

A square-based pyramid has base side 9 cm and vertical height 12 cm.

Volume of a pyramid = $\frac{1}{3}$ × base area × height

Work out the volume of the pyramid.

Base area = 9 × 9 = 81

Volume = $\frac{1}{3}$ × 81 × 12 = 324

Answer: 324 cm^3