Day 361 **B Tier 10-a-day: Model Solutions**

1 Solving equations

Solve $x - 20 = 5$

Add 20 to both sides

Answer: x = 25

2 Bar charts

The bar chart shows some information.

(a) How many more were there for Pear than for Grape?

(b) Work out the total of all five bars.

(a) Pear: 25, Grape: 5

$25 - 5 = 20$

(b) $15 + 15 + 10 + 5 + 25 = 70$

Answer: (a) 20 (b) 70

3 Adding fractions

Work out

(a) $\frac{4}{5} + \frac{5}{9}$

(b) $\frac{3}{4} - \frac{1}{10}$

Give each answer in its simplest form.

(a) Common denominator 45: $\frac{36}{45} + \frac{25}{45} = \frac{61}{45}$

(b) Common denominator 20: $\frac{15}{20} - \frac{2}{20} = \frac{13}{20}$

Answer: (a) $1\frac{16}{45}$ (b) $\frac{13}{20}$

4 Equations with unknowns on both sides

Solve $3n + 7 = 2n + 6$

Subtract 2n from both sides: $n + 7 = 6$

Subtract 7 from both sides: $1n = -1$

Divide both sides by 1

Answer: n = −1

5 Significant figures

Work out the value of this expression. (Calculator)

$$\frac{6.4 + 2.5}{6.8 \times 9.7}$$

Give your answer correct to 3 significant figures.

Use a calculator: the full display is 0.13493...

Round to 3 significant figures: 0.135

Answer: 0.135

6 Probabilities adding to 1

The table shows the probabilities of a spinner landing on each colour.

(a) Work out the value of x.

(b) The spinner is used 200 times. How many times would you expect C?

(a) Probabilities add up to 1

$0.25 + 0.2 + 0.2 + x = 1$

$x = 1 - 0.65 = 0.35$

(b) $0.2 \times 200 = 40$

Answer: (a) 0.35 (b) 40

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7 Trigonometry in isosceles triangles

Triangle ABC is isosceles with AB = AC = 20 cm. (Calculator)
The base BC = 18 cm.
Work out the size of angle ABC.
Give your answer correct to 1 decimal place.

Split the triangle into two right-angled triangles. Half the base = 18 ÷ 2 = 9

$\cos B = \frac{9}{20}$

Angle ABC = $\cos^{-1}(\frac{9}{20})$ = 63.256...

= 63.3° (1 d.p.)

Answer: 63.3°

8 Percentage as a fraction of

(a) Zara scores 146 out of 400 in a test. Write this as a percentage.
(b) Write £1.25 as a percentage of £2.

(a) $\frac{146}{400} \times 100 = 36.5\%$

(b) Change both to pence: 125p and 200p

$\frac{125}{200} \times 100 = 62.5\%$

Answer: (a) 36.5% (b) 62.5%

9 Trial and improvement

The equation $x^3 - 2x = 12$ has a solution between 2 and 3. (Calculator)
Use trial and improvement to find this solution.
Give your answer correct to 1 decimal place.

x = 2.5: $2.5^3 - 2 \times 2.5 = 10.625$ (too small)
x = 2.7: $2.7^3 - 2 \times 2.7 = 14.283$ (too big)
x = 2.6: $2.6^3 - 2 \times 2.6 = 12.376$ (too big)
x = 2.55: value = 11.481 (too small), so the solution is above 2.55
So x = 2.6 to 1 decimal place
Answer: x = 2.6

10 Trigonometry in context

A ladder 8 m long leans against a vertical wall. (Calculator)
The foot of the ladder is 5.1 m from the wall on horizontal ground.
Work out the angle between the ladder and the ground.
Give your answer correct to 1 decimal place.

The ladder is the hypotenuse and the distance from the wall is the adjacent side

$\cos \theta = \frac{5.1}{8}$

$\theta = \cos^{-1}(\frac{5.1}{8})$ = 50.394...

θ = 50.4° (1 d.p.)

Answer: 50.4°