**National 5 Mathematics**

**Similar Figures - Solutions**

Marks are indicated in brackets after each question number

**2014 Paper 2 Question 5, (3)**

Linear scale factor $= \frac{24}{15}$

Volume scale factor $= (\frac{24}{15})^3$

Volume of the larger jar $= 750 \; x \; (\frac{24}{15})^3 = 3,072 \; cm^3$.

**2015 Paper 2 Question 9, (4)**

Linear Scale Factor $= \frac{30}{24} = 1.25$.

Area Scale Factor $= (1.25)^2 = 1.5625$.

Area of $PSR = 1.5625 \; x \; 400 = 625 \; cm^2$.

Area of $PSTQ = 625 - 400 = 225 \; cm^2$.

**2016 Paper 2 Question 11, (3)**

Linear scale factor $= \frac{60}{100} = 0.6$.

Area scale factor $= 0.6^2 = 0.36$.

Cost $= £13.75 \; x \; 0.36 = £4.95$.

**2017 Paper 1 Question 15, (3)**

Linear scale factor $= \frac{5}{7}$

Set up as a 'reduction' to give

$$x = \frac{5}{7} \cdot (x + 2.6)$$

$7x = 5(x + 2.6)$

$7x = 5x + 13$

$2x = 13$

$x = 6.5 \, cm.$

**2018 Paper 2 Question 18, (3) (2)**

**a)** Linear Scale Factor $= \frac{24}{16} = 1.5$.

Volume Scale Factor $= 1.5^3 = 3.375$.

$$\frac{1125}{576} = 1.96$$

Since $1.96 \neq 3.375$ the two cartons are not mathematically similar.

**b)** Volume Scale Factor $= \frac{1500}{576} = 2.6$

$2.6 = (\frac{d}{16})^3$

$2.6 = \frac{d^3}{16^3}$

$2.6 \, x \, 16^3 = d^3$

$d^3 = 10,649.6$

$d = \sqrt[3]{10,649.6}$

$d = 22$ cm.

**2019 Paper 2 Question 12, (3)**

**a)** Linear Scale Factor $= \frac{30}{50}$

Area Scale Factor $= (\frac{30}{50})^2 = 0.36$

Area $= 2,750 \, x \, 0.36 = 990 \, cm^2$

**b)** Area $= \frac{angle}{360} \; x \; \pi r^2$

Let the angle $ACB = x$

$2,750 = \frac{x}{360} x \; \pi \; x \; 50^2$

$2,750 = \frac{2,500\pi x}{360}$

$x = \frac{2,750 \; x \; 360}{2,500\pi}$

$x = 126.1°.$

**2024 Paper 1 Question 14, (3)**

$LSF = \frac{3}{7}$

$AB = \frac{3}{7} \times 10.5 = \frac{31.5}{7} = 4.5$

$BD = AD - AB = 10.5 - 4.5 = 6cm$

**2025 Paper 2 Question 11, (3)**

$LSF = \frac{31.5}{14} = 2.25$

$ASF = LSF^2 = 2.25^2 = 5.0625$

Area $= 24 \times 5.0625 = 121.5 \; cm^2$