

National 5 Mathematics

Similar Figures - Solutions - 2014-2019

Marks are indicated in brackets after each question number

2014 Paper 2 Question 5, (3)

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

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

$$\text{Volume of the larger jar} = 750 \times \left(\frac{24}{15}\right)^3 = 3,072 \text{ cm}^3$$

2015 Paper 2 Question 9, (4)

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

$$\text{Area Scale Factor} = (1.25)^2 = 1.5625$$

$$\text{Area of } PSR = 1.5625 \times 400 = 625 \text{ cm}^2$$

$$\text{Area of } PSTQ = 625 - 400 = 225 \text{ cm}^2$$

2016 Paper 2 Question 11, (3)

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

$$\text{Area scale factor} = 0.6^2 = 0.36$$

$$\text{Cost} = £13.75 \times 0.36 = £4.95$$

2017 Paper 1 Question 15, (3)

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

Set up as a 'reduction' to give

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

$$7x = 5(x + 2.6)$$

$$7x = 5x + 13$$

$$2x = 13, x = 6.5 \text{ cm}$$

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

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

$$\text{Volume Scale Factor} = 1.5^3 = 3.375$$

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

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

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

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

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

$$2.6 \times 16^3 = d^3$$

$$d^3 = 10,649.6$$

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

$$d = 22 \text{ cm}$$

2019 Paper 2 Question 12, (3)

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

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

$$\text{Area} = 2,750 \times 0.36 = 990 \text{ cm}^2$$

b) Area = $\frac{\text{angle}}{360} \times \pi r^2$

Let the angle $ACB = x$

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

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

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

$$x = 126.1^\circ$$