GCSE 7+ Session 1 Solutions
Independent Practice
Fluency with indices and surds

KING'S MATHS SCHOOL

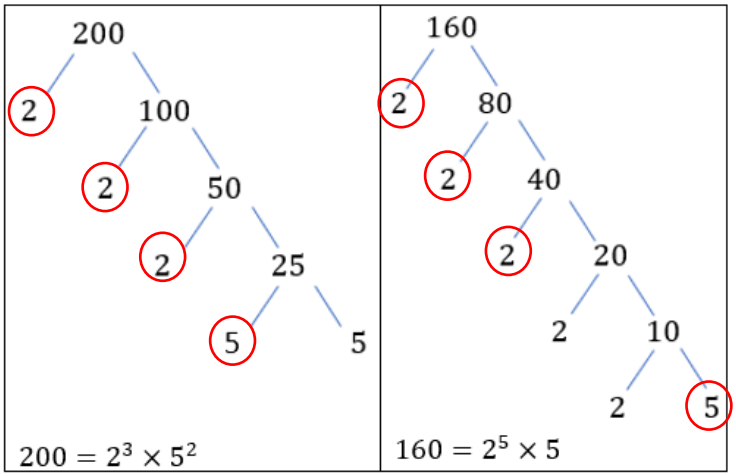
Revise, refresh, recall *the core knowledge and skills:*

1)

a) $100 \times 5^{-2} = 100 \times \frac{1}{5^2} = \frac{100}{25} = 4$

b) $\sqrt{2^{10}} = (2^{10})^{\frac{1}{2}} = 2^5$

c) First work out the prime factorisation of 160 and 200.



Highest Common Factor (HCF)
The prime factors they have in common $= 2^3 \times 5 = 40$

Lowest Common Multiple (LCM)

$$\text{LCM} = \frac{200 \times 160}{\text{HCF}}$$

$$= \frac{200 \times 160}{40} = 800.$$

2)

a) $\left(3\sqrt{5}\right)^2 = 3^2\left(\sqrt{5}\right)^2 = 9 \times 5 = 45$

b) $3\left(2+\sqrt{5}\right) - 2\left(5-3\sqrt{5}\right) = 6 + 3\sqrt{5} - 10 + 6\sqrt{5} = 9\sqrt{5} - 4$

c) $\left(7-3\sqrt{5}\right)^2 = \left(7-3\sqrt{5}\right)\left(7-3\sqrt{5}\right)$

$= 7^2 - 21\sqrt{5} - 21\sqrt{5} + \left(3\sqrt{5}\right)^2$

$= 49 - 42\sqrt{5} + 45$

$= 94 - 42\sqrt{5}$

d) $\sqrt{12} = \sqrt{4 \times 3} = \sqrt{4}\sqrt{3} = 2\sqrt{3}$

e) $\sqrt{18} + \sqrt{50} = \sqrt{9}\sqrt{2} + \sqrt{25}\sqrt{2} = 3\sqrt{2} + 5\sqrt{2} = 8\sqrt{2}$

Alternatively, HCF of 18 and 50 is 2, so factorise with $\sqrt{2}$, to get:

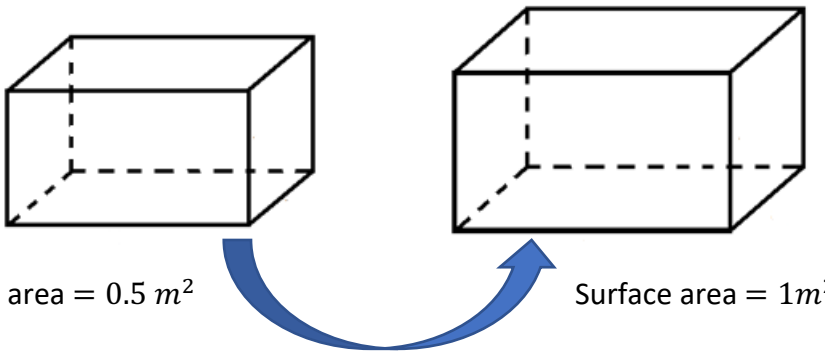
$\sqrt{18} + \sqrt{50} = \sqrt{2}\left(\sqrt{9} + \sqrt{25}\right) = \sqrt{2}(3+5) = 8\sqrt{2}.$

f) Given $\frac{12}{\sqrt{3}}$, rationalise the denominator by multiplying the numerator and denominator by $\sqrt{3}$.

$$\frac{12}{\sqrt{3}} = \frac{12\sqrt{3}}{(\sqrt{3})^2} = \frac{12\sqrt{3}}{3} = 4\sqrt{3}.$$

3) Using the fact that

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



Surface area $= 0.5\ m^2$ Surface area $= 1m^2$

Area Scale Factor $= \times 2$

Therefore Length Scale Factor $= \times \sqrt{2}$

Height: $\sqrt{800}$ cm

Height $= \sqrt{2} \times \sqrt{800}$

$= \sqrt{1600} = 40$ cm

Answer: The height of the larger box is 40 cm.