Chapter 6

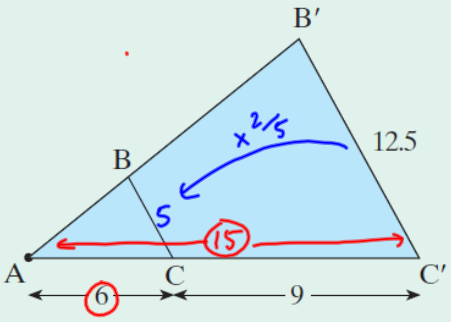
Geometry 2: Enlargements and Constructions

Section 6.1 Enlargements

PROJECT MATHS – STRAND 2
Text & Tests 4
LEAVING CERTIFICATE
HIGHER LEVEL

Example 1

In the given figure, AB′C′ is an enlargement of the triangle ABC where A is the centre of enlargement.



If $|AC| = 6$, $|CC'| = 9$ and $|B'C'| = 12.5$, find

(i) the scale factor of the enlargement $K = 15/6 = 5/2$

(ii) $|BC|$ $= 12.5(2/5) = 5$

(iii) the ratio $|AB| : |AB'|$.

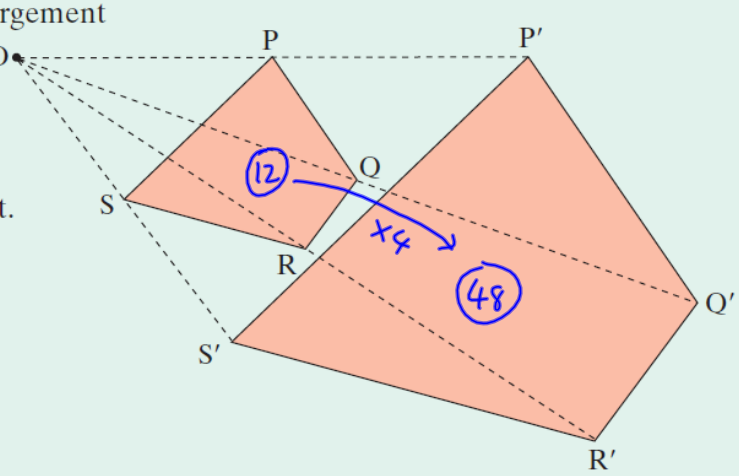
all sides in same ratio

$|AB| : |AB'| = 2 : 5$

When a figure is enlarged by a scale factor k, the area of the image figure is increased by a scale factor k^2.

Example 2

The figure P′Q′R′S′ is an enlargement of the figure PQRS. If the area of PQRS is 12 cm^2 and the area of P′Q′R′S = 48 cm^2, find the scale factor of the enlargement.

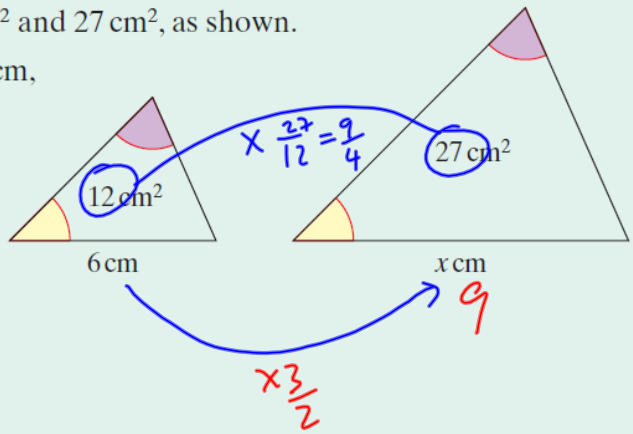


$K^2 = 4$

$K = 2$

Example 3

Two similar triangles have areas 12 cm^2 and 27 cm^2, as shown. If the base of the smaller triangle is 6 cm, find the base of the larger triangle.



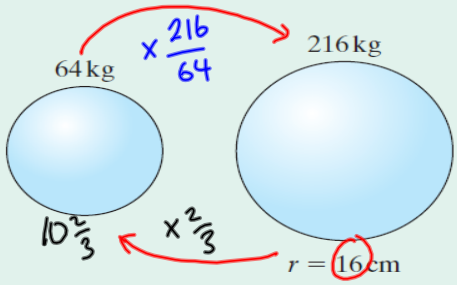
$K^2 = \frac{9}{4}$

$K = \sqrt{\frac{9}{4}} = \frac{3}{2}$

When a figure is enlarged by a scale factor k, the volume of the enlarged figure is increased by a scale factor k^3.

Example 4

Two similar spheres, made of the same material, have masses of 64 kg and 216 kg respectively.



If the radius of the larger sphere is 16 cm, find the radius of the smaller sphere.
[Take the ratio of masses to be the same as the ratio of volumes.]

Volume scale factor $= k^3 = \frac{216}{64} = \frac{27}{8}$

Scale factor $k = \frac{3}{2}$

Smaller Radius $= 16\left(\frac{2}{3}\right) = \frac{32}{3} = 10\frac{2}{3}$ cm

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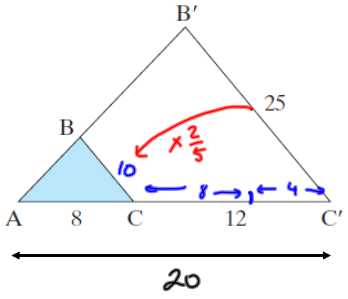
7. In the given figure, AB′C′ is an enlargement of the triangle ABC, where A is the centre of enlargement. If $|AC| = 8$, $|CC'| = 12$ and $|B'C'| = 25$, find
   (i) the scale factor of the enlargement
   (ii) $|BC|$ (iii) the ratio $|AB| : |AB'|$
   (iv) the area of the $\triangle AB'C'$ if the area of $\triangle ABC$ is 16 square units.



(i) $k = \frac{20}{8} = \frac{5}{2}$ [or 2.5]

(ii) $|BC| = 25\left(\frac{2}{5}\right) = 10$

(iii) $|AB| : |AB'|$
$8 : 20$
$2 : 5$

(iv) Area scale factor, $k^2 = \left(\frac{5}{2}\right)^2 = \frac{25}{4}$

$\triangle AB'C' = 16\left(\frac{25}{4}\right) = 100$ units^2

13 The Eiffel Tower is 300 m high.
A model of the Eiffel Tower is 15 cm high and its base area is 25.5 cm^2.
What is the base area of the actual tower?

$15cm = 0.15\ m$

Scale factor $k = \frac{300}{0.15} = 2000$

area scale factor $K^2 = (2000)^2 = 4,000,000$

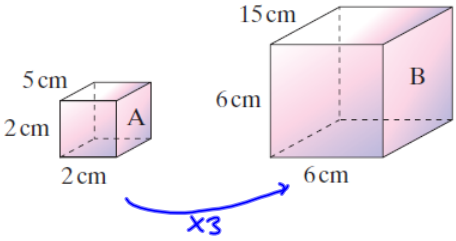
$1m^2 = 100 \times 100 = 10,000\ cm^2$

$1cm^2 = \frac{1}{10,000} = 0.0001\ m^2$

$25.5cm^2 = \frac{25.5}{10\,000} = 0.00255\ m^2$

Tower Base $= (0.00255)(4,000,000) = 10,200\ m^2$

16 In the given figure, box B is an enlargement of box A.
(i) Write down the value of k, the scale factor of the enlargement.
(ii) What is the relationship between k and the scale factor for volume?



(i) $K = 3$

$V = LBH$

(ii) Volume $A = (5)(2)(2) = 20$

Volume $B = (15)(6)(6) = 540$

Volume Scale factor is: $\frac{540}{20} = 27 = 3^3 = K^3$

$\Rightarrow$ Volume Scale factor is $K^3 = 27$