## Geometry (Q 4, Paper 2)

## 2011

4. (a) In the diagram, the line $l$ passes through the point $A$ and is parallel to $B C$.
(i) Find $x$.
(ii) Find $y$.

(b) Prove that the sum of the lengths of any two sides of a triangle is greater than that of the third side.
(c) The triangle $O R S$ is the image of the triangle $O P Q$ under an enlargement of centre $O$. $|O Q|=6,|Q S|=9$ and $|R S|=6$.

(i) Find the scale factor of the enlargement.
(ii) Find $|P Q|$.
(iii) Given that the area of the triangle $O P Q$ is 7.2 square units, find the area of the triangle ORS.
(iv) Find the area of the quadrilateral $P R S Q$.
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Solution
4(a)(i)
x }=4\mp@subsup{2}{}{\circ}\mathrm{ [Alternate angle]
4(a) (ii)
y'}+4\mp@subsup{2}{}{\circ}+7\mp@subsup{6}{}{\circ}=18\mp@subsup{0}{}{\circ}\quad\mathrm{ [Three angles in a triangle add up to 180}\mp@subsup{}{}{\circ}\mathrm{ .]
yo}=18\mp@subsup{0}{}{\circ}-4\mp@subsup{2}{}{\circ}-7\mp@subsup{6}{}{\circ
    =62
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4 (b)
Theorem 10: The sum of the lengths of any two sides of a triangle is greater than that of the third side.

Given: $\Delta a b c$


To Prove: $|a b|<|a c|+|b c|$

Construction: Draw a perpendicular [cd] onto [ab].


Proof: $\quad X<90^{\circ} \Rightarrow|a d|<|a c| \ldots . . . .1$
$Y<90^{\circ} \Rightarrow|d b|<|b c| . . . . .2$
Adding 1 and 2: $|a d|+|d b|<|a c|+|b c|$
$\therefore|a b|<|a c|+|b c|$.

4 (c) (i)


Object: Triangle $O P Q$
Image: Triangle ORS
Scale factor $k=\frac{|O S|}{|O Q|}=\frac{9+6}{6}=\frac{15}{6}=\frac{5}{2}=2.5 \quad$ Scale factor $k=\frac{\mid \text { Image length } \mid}{\mid \text { Object length } \mid}$

## 4 (c) (ii)

$k=\frac{|S R|}{|P Q|} \Rightarrow 2.5=\frac{6}{|P Q|}$

$$
|P Q|=\frac{6}{2.5}
$$

$$
\therefore|P Q|=\frac{6}{2.5}=2.4
$$

## 4 (c) (iii)

Area of object triangle $O P Q=7.2$ square units
Area of image triangle $O R S=$ ?
$k=2.5$
$2.5^{2}=\frac{\mid \text { Area of } O R S \mid}{7.2} \quad k^{2}=\frac{\mid \text { Image area } \mid}{\mid \text { Object area } \mid}$
$2.5^{2} \times 7.2=\mid$ Area of ORS $\mid$
$\therefore \mid$ Area of $O R S \mid=45$ square units

## 4 (c) (iv)

$\mid$ Area of $P R S Q|=|$ Area of $O R S|-|$ Area of $O P Q \mid$

$$
=45-7.2
$$

$$
=37.8 \text { square units }
$$

