Question 6 **(25 marks)**

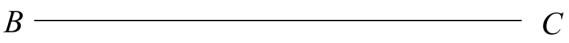
Answer **either** 6A **or** 6B.

Question 6A

(a) Prove that, if two triangles ΔABC and $\Delta A'B'C'$ are similar, then their sides are proportional, in order:

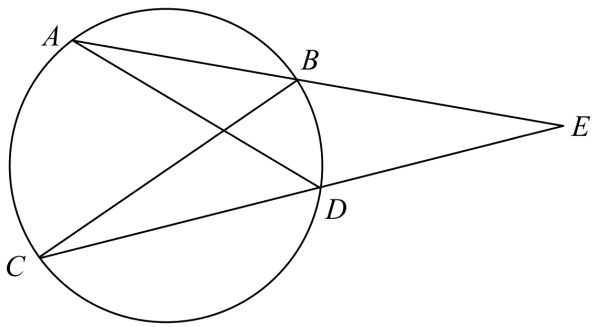
$$\frac{|AB|}{|A'B'|} = \frac{|BC|}{|B'C'|} = \frac{|CA|}{|C'A'|}.$$

(b) Given the line segment $[BC]$, construct, without using a protractor or set square, a point A such that $|\angle ABC| = 60°$. Show your construction lines.



Question 6B

$[AB]$ and $[CD]$ are chords of a circle that intersect externally at E, as shown.



(a) Name two similar triangles in the diagram above and give reasons for your answer.

(b) Prove that $|EA| . |EB| = |EC| . |ED|$.

(c) Given that $|EB| = 6 \cdot 25$, $|ED| = 5 \cdot 94$ and $|CB| = 10$, find $|AD|$.

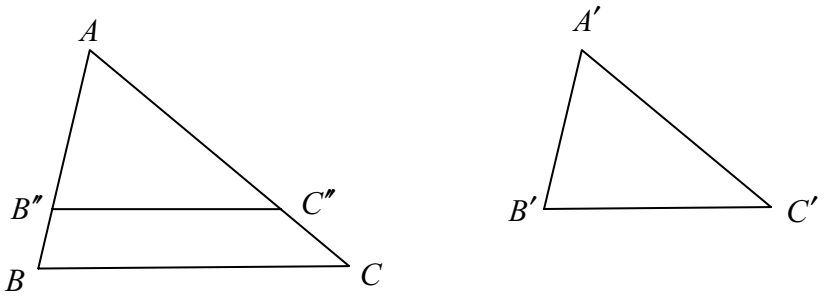
Question 6 **(25 marks)**

Answer **either** 6A **or** 6B.

Question 6A

(a) Prove that, if two triangles ΔABC and $\Delta A'B'C'$ are similar, then their sides are proportional, in order:

$$\frac{|AB|}{|A'B'|} = \frac{|BC|}{|B'C'|} = \frac{|CA|}{|C'A'|}.$$



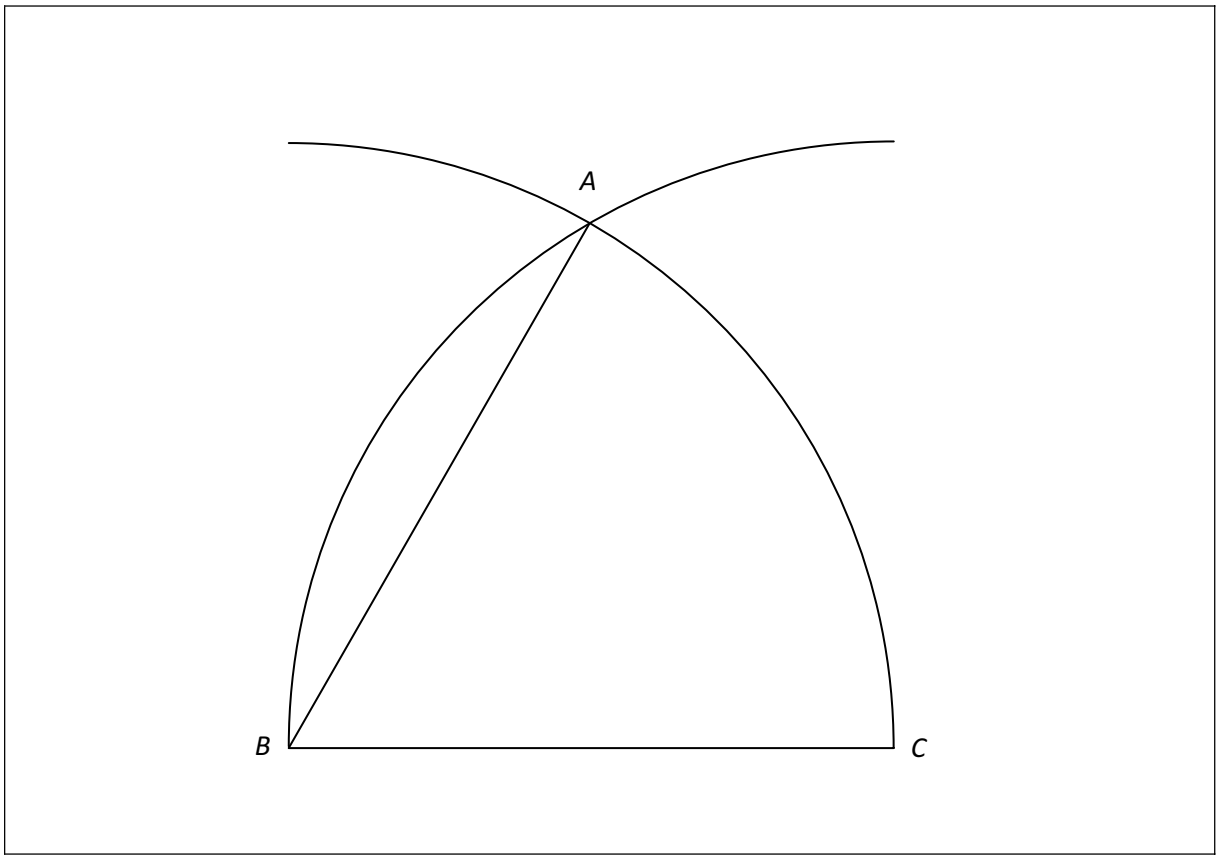
Given: The similar triangles ΔABC and $\Delta A'B'C'$.

To Prove: $\frac{|AB|}{|A'B'|} = \frac{|BC|}{|B'C'|} = \frac{|CA|}{|C'A'|}.$

Construction: Mark B'' on $|AB|$ such that $|AB''| = |A'B'|$.
Mark C'' on $|AC|$ such that $|AC''| = |A'C'|$.
Join $B''C''$

Proof: $\Delta AB''C''$ is congruent to $\Delta A'B'C'$. . SAS
$\Rightarrow |\angle AB''C''| = |\angle ABC|$
$\Rightarrow B''C'' \| BC$ ... corresponding angles
Hence, $\frac{|AB|}{|AB''|} = \frac{|AC|}{|AC''|}$...Theorem
$\Rightarrow \frac{|AB|}{|A'B'|} = \frac{|AC|}{|A'C'|}.$
Similarly, $\frac{|BC|}{|B'C'|} = \frac{|AB|}{|A'B'|}$
Hence, $\frac{|AB|}{|A'B'|} = \frac{|BC|}{|B'C'|} = \frac{|CA|}{|C'A'|}.$

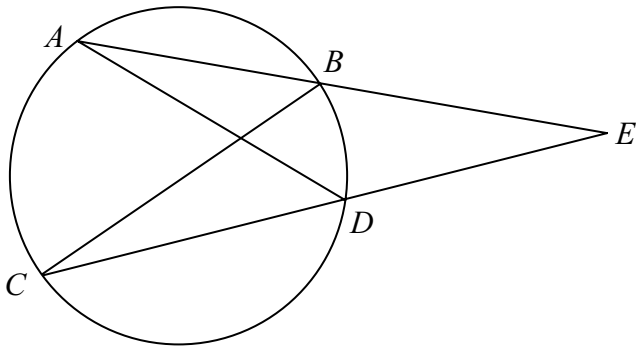
(b) Given the line segment $[BC]$, construct, without using a protractor or set square, a point A such that $|\angle ABC| = 60°$. Show your construction lines.



OR

Question 6B

$[AB]$ and $[CD]$ are chords of a circle that intersect externally at E, as shown.



(a) Name two similar triangles in the diagram above and give reasons for your answer.

ΔADE and ΔBCE are similar

$|\angle EAD| = |\angle BCE|$, on arc BD

$|\angle DEA| = |\angle CEB|$, same angle

$|\angle ADE| = |\angle EBC|$, third angle

Also (i) ΔAXB and ΔDXC are similar, where $AD \cap CB = \{X\}$

and (ii) ΔAXC and ΔBXD are similar, where $AD \cap CB = \{X\}$

(b) Prove that $|EA| . |EB| = |EC| . |ED|$.

ΔADE and ΔBCE are similar.

Hence, $\dfrac{|EA|}{|EC|} = \dfrac{|ED|}{|EB|}$

$\Rightarrow |EA| . |EB| = |EC| . |ED|$

(c) Given that $|EB| = 6 \cdot 25$, $|ED| = 5 \cdot 94$ and $|CB| = 10$, find $|AD|$.

$$\frac{|ED|}{|EB|} = \frac{|AD|}{|CB|} \Rightarrow \frac{5 \cdot 94}{6 \cdot 25} = \frac{|AD|}{10}$$

$$\Rightarrow |AD| = \frac{5 \cdot 94 \times 10}{6 \cdot 25} = 9 \cdot 504$$

Question 6A **(25 marks)**

(a) **Diagram / Given** : Scale 5B (0, 2, 5)
Partial Credit:
- Effort at *Diagram* or *Given*

Construction: Scale 5B (0, 2, 5)
Partial Credit:
- Construction attempted
- Construction not explained or explanation incomplete

Proof: Scale 10C (0, 3, 7, 10)
Low Partial Credit:
- More than one critical step omitted but still some substantial work of merit

High Partial Credit:
- Proof completed with one critical step omitted

(b) Scale 5B (0, 2, 5)
Partial Credit:
- Arc AC and/or arc AB
- Effort at drawing arc from B

Question 6B **(25 marks)**

(a) Scale 10C (0, 3, 7, 10)
Low Partial Credit:
- Triangles named

High Partial Credit:
- Two pairs of angles in relevant triangles identified but justification incomplete
- Two pairs of angles identified with justification but triangles not named

(b) Scale 10C (0, 3, 7, 10)
Low Partial Credit:
- Relevant triangles identified
- Partly correct ratio

High Partial Credit:
- Correct ratio established but fails to complete

(c) Scale 5C (0, 2, 3, 5)
Low Partial Credit:
- Effort at establishing ratio

High Partial Credit:
- Ratio established and values entered