

## SAMPLE PAPER 2014 (SET F): PAPER 2

### QUESTION 6A (25 MARKS)

*Explanation:*

Proof by contradiction is a form of proof that establishes the truth or validity of a proposition by showing that the proposition being false would imply a contradiction.

*Example:*

Prove  $x + \frac{1}{x} \geq 2$  for all  $x > 0, x \in \mathbb{R}$ .

To prove this let's assume it is false, i.e.  $x + \frac{1}{x} < 2$  for all  $x > 0, x \in \mathbb{R}$ .

$$x + \frac{1}{x} < 2$$

$$x^2 + 1 < 2x$$

$$x^2 - 2x + 1 < 0$$

$$(x-1)^2 < 0 \text{ [This statement is false for all values of } x\text{.]}$$

This is a contradiction.

### QUESTION 6B (25 MARKS)

$OECD$  is a cyclic quadrilateral because its opposite angles add up to  $180^\circ$ .

$$|\angle OEC| + |\angle ODC| = 90^\circ + 90^\circ = 180^\circ$$

It follows that the other pair of opposite angles also add up to  $180^\circ$  as the four angles in a quadrilateral add up to  $360^\circ$ .

#### CYCLIC QUADRILATERALS

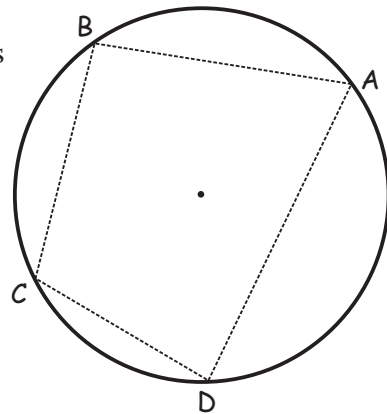
A cyclic quadrilateral is a four sided figure whose vertices lie on a circle.

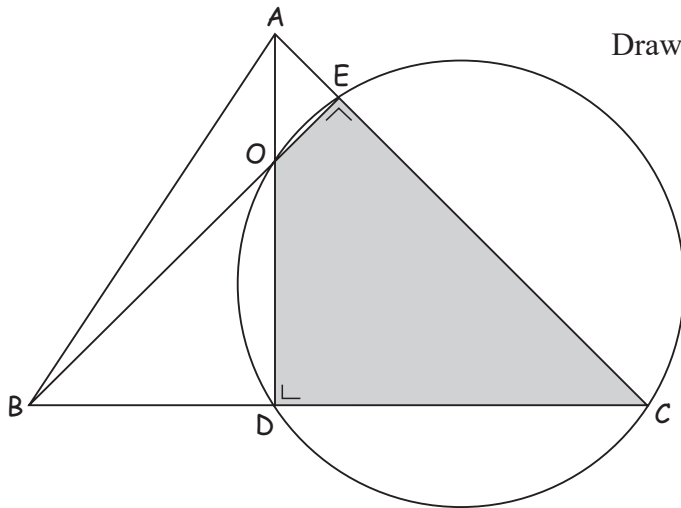
Opposite angles of a cyclic quadrilateral add up to  $180^\circ$ .

$$\angle A + \angle C = 180^\circ$$

$$\angle B + \angle D = 180^\circ$$

Conversely, if the opposite angles of a quadrilateral add up to  $180^\circ$  then it is a cyclic quadrilateral.





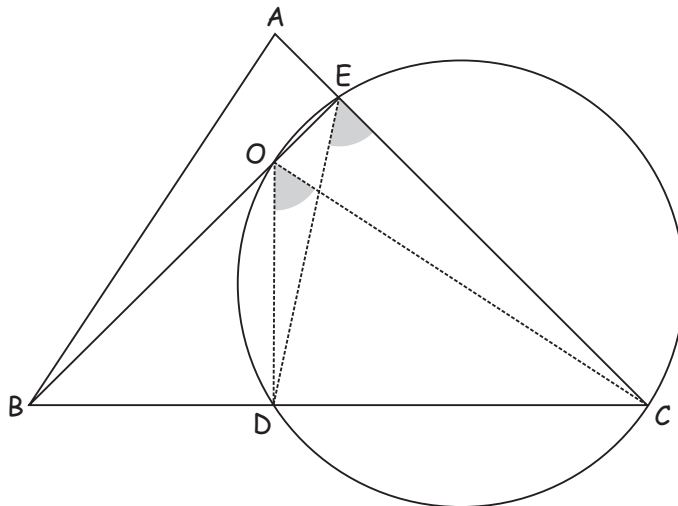
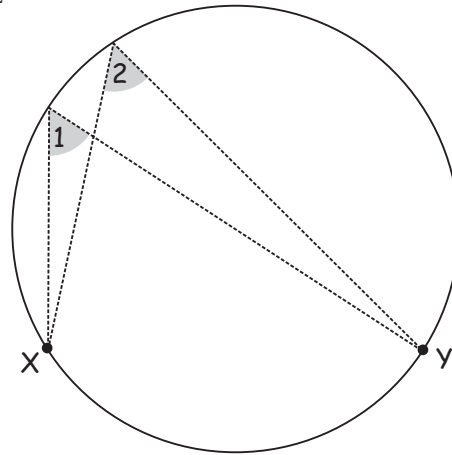
Draw a circle around the quadrilateral.

ANGLES STANDING ON THE SAME ARC IN A CIRCLE

Angles 1 and 2 are standing on the same arc  $[AB]$ .

Angles standing on the same arc are equal.

$$\therefore |\angle 1| = |\angle 2|.$$



$$|\angle DOC| = |\angle DEC| \text{ [Both angles are standing on arc } [DC]\text{]}$$


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