Lines, Angles and Shapes (F)

Intervention Booklet

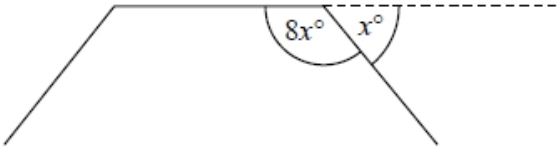
Interior and exterior angles

Things to remember:

- Interior Angles:
  - For n sides, the sum of interior angles = (n – 2) x 180
  - Each interior angle = $\frac{(n - 2) \times 180}{n}$
- Exterior Angles:
  - The sum of exterior angles in any shape (or polygon) is 360°

Questions:

1. The diagram shows three sides of a regular polygon.
The size of each exterior angle of the regular polygon is x°.
The size of each interior angle of the regular polygon is 8x°.
Work out the number of sides the regular polygon has.



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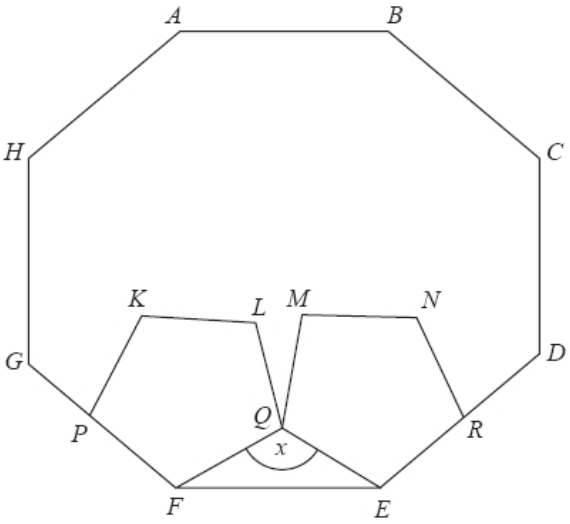
(Total for question = 3 marks)

2. ABCDEFGH is a regular octagon.
KLQFP and MNREQ are two identical regular pentagons.

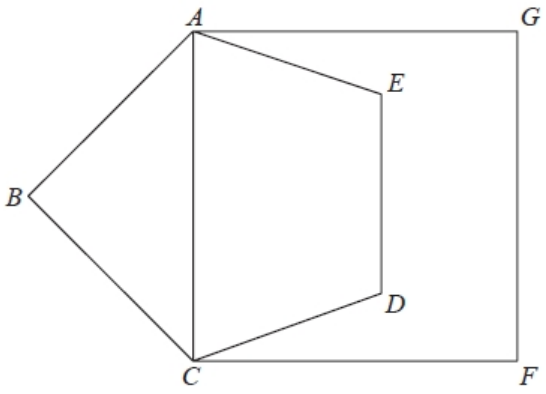
Work out the size of the angle marked x.
You must show all your working.



.....°

(Total for question = 4 marks)

3. Diagram not drawn accurately.
ABCDE is a regular pentagon.
ACFG is a square.
Work out the size of angle DCF.
You must show all your working.



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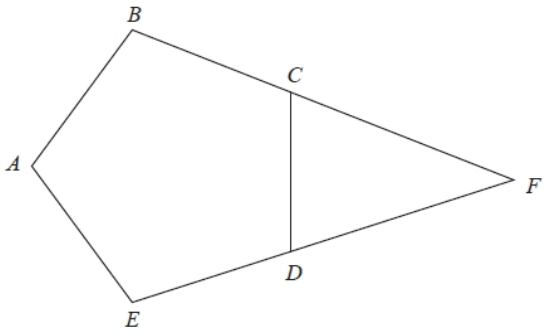
(Total for question = 4 marks)

4. ABCDE is a regular pentagon.
BCF and EDF are straight lines.
Work out the size of angle CFD.
You must show how you got your answer.



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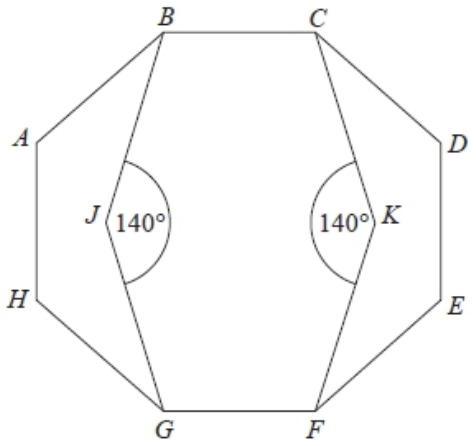
(Total for question = 3 marks)

5. Diagram not drawn accurately.
ABCDEFGH is a regular octagon.
BCKFGJ is a hexagon.
JK is a line of symmetry of the hexagon.
Angle BJG = angle CKF = 140°
Work out the size of angle KFE.
You must show all your working.



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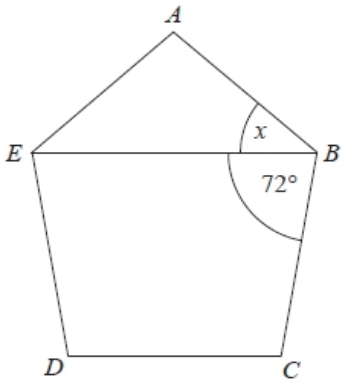
(Total for Question is 4 marks)

6. Diagram not drawn accurately .
ABCDE is a regular polygon.
EB is a straight line.
Angle EBC = 72°.
Work out the size of the angle marked x.



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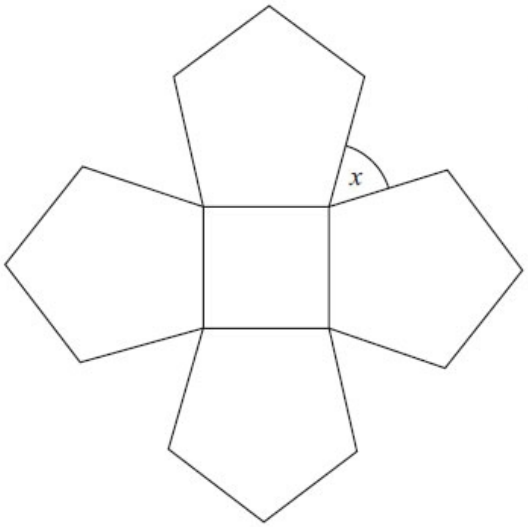
(Total for question = 3 marks)

7. The diagram shows a square and 4 regular pentagons.
Work out the size of the angle marked x.



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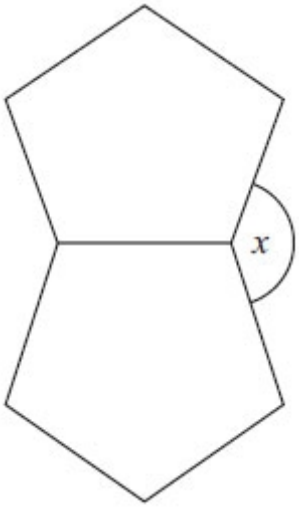
(Total for question = 3 marks)

8. The diagram shows two regular shapes.
Work out the size of the angle marked x.



..... °

(Total for Question is 3 marks)

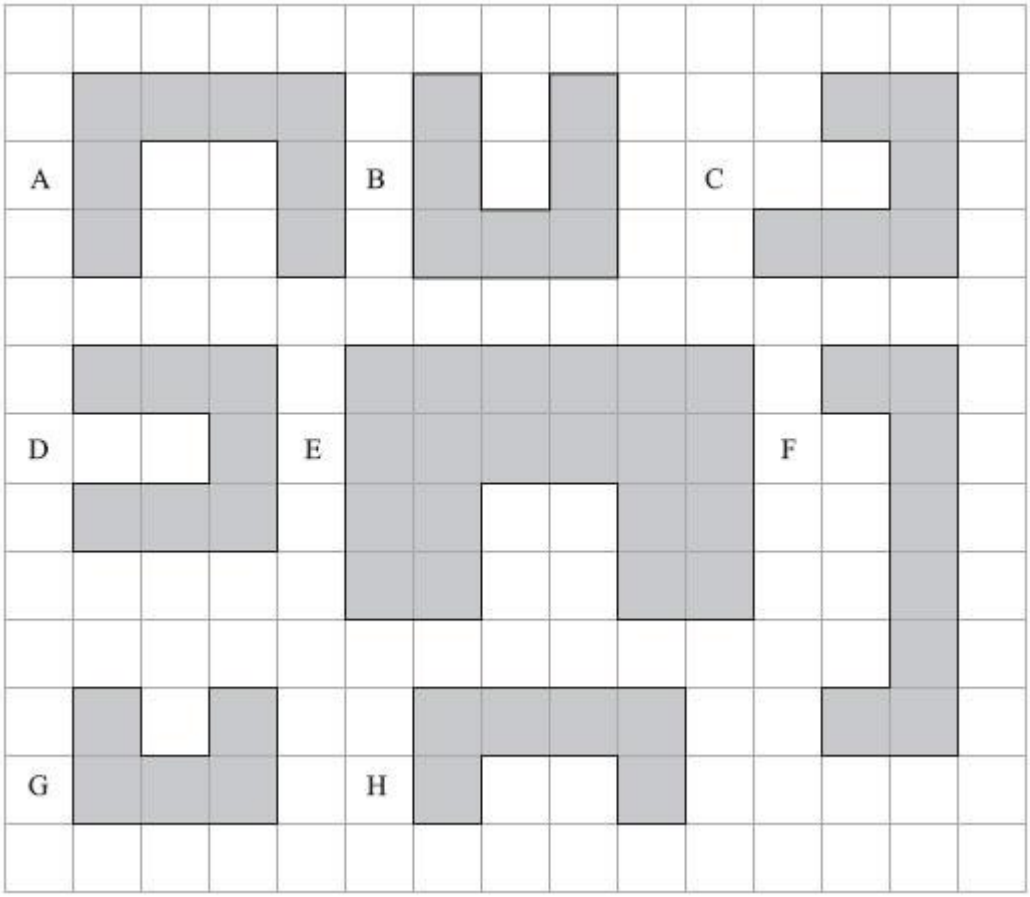
Proofs of congruence and similarity

Things to remember:

- To prove congruence, look for:
  - Side, angle, side
  - Angle, side, angle
  - Side, side, side, or
  - Right-angle, hypotenuse, (other) side

Questions:

1. These shapes have been drawn on a grid of centimetre squares.



(a) (i) Write down the letters of a pair of shapes that are congruent.

.....

(ii) Write down the letters of a different pair of shapes that are similar.

.....

(2)

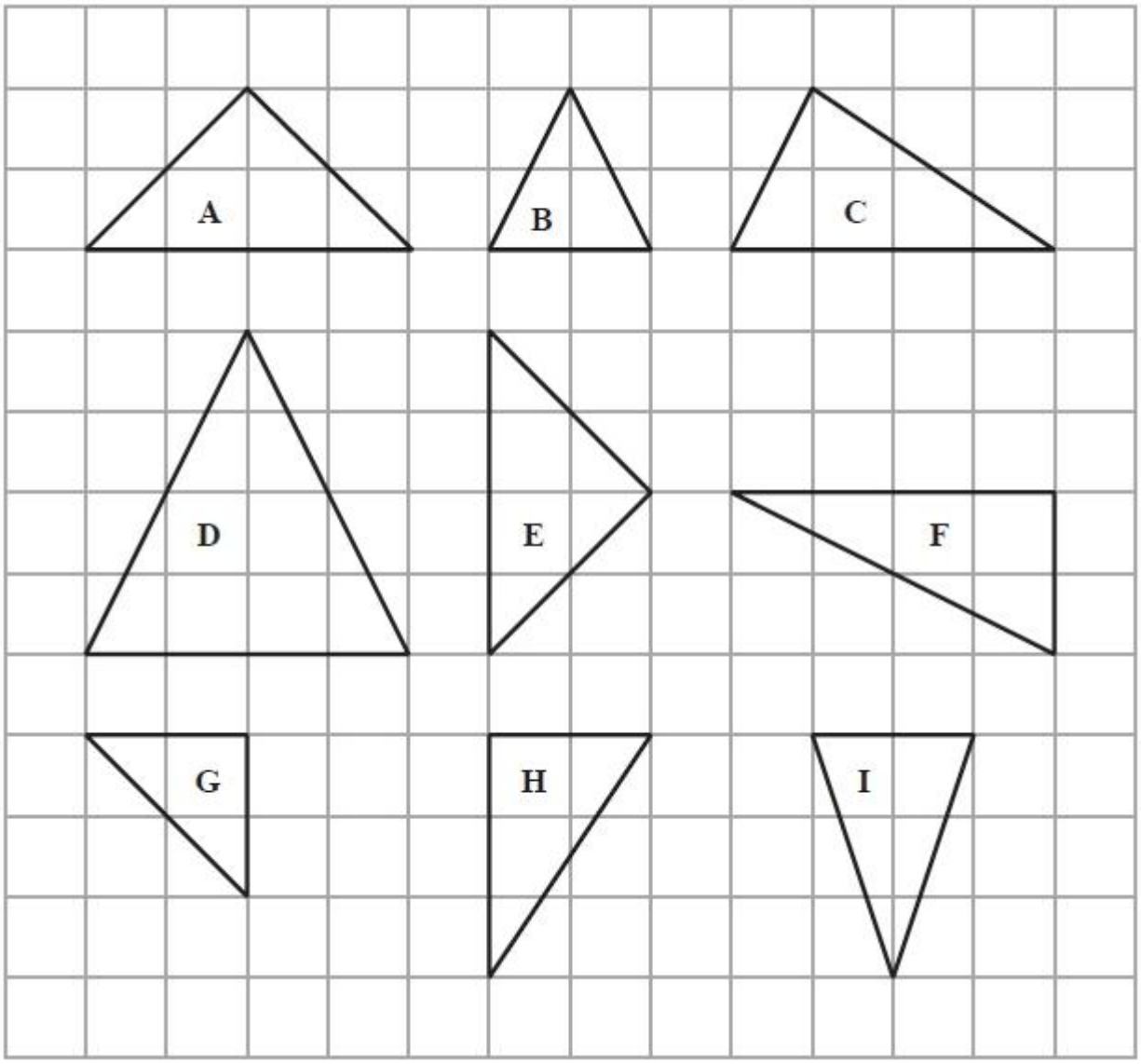
(b) Find the perimeter of shape D.

.....

(1)

(Total for Question is 3 marks)

2. Here are some triangles drawn on a grid.



Two of these triangles are congruent.

(a) Write down the letters of these triangles.

..... and .....

(1)

One of the triangles is similar to triangle **B**.

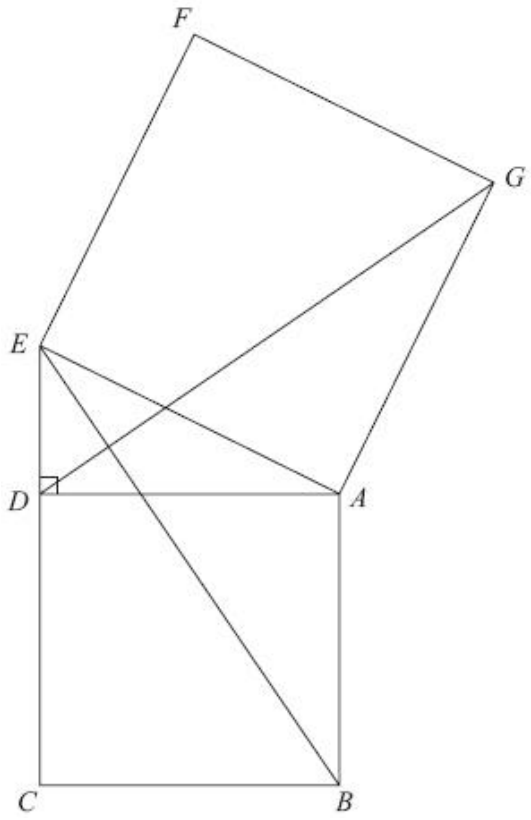
(b) Write down the letter of this triangle.

.....

(1)

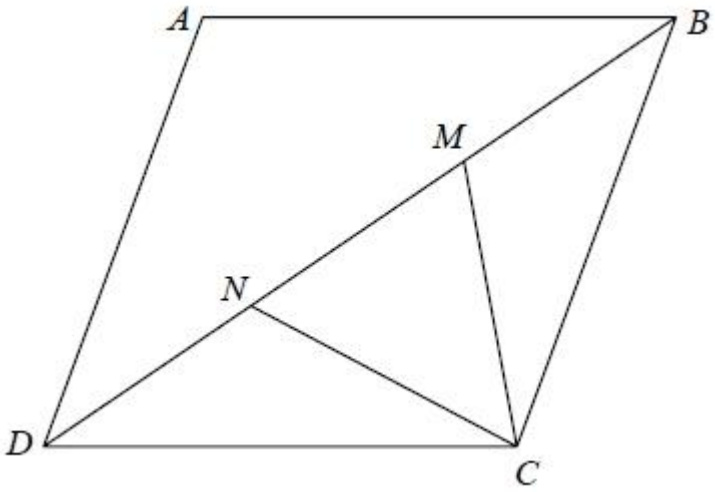
(Total for Question is 2 marks)

3. Diagram not drawn accurately.
In the diagram,
ADE is a right-angled triangle,
ABCD and *AEFG* are squares.
Prove that triangle *ABE* is congruent to triangle *ADG*.



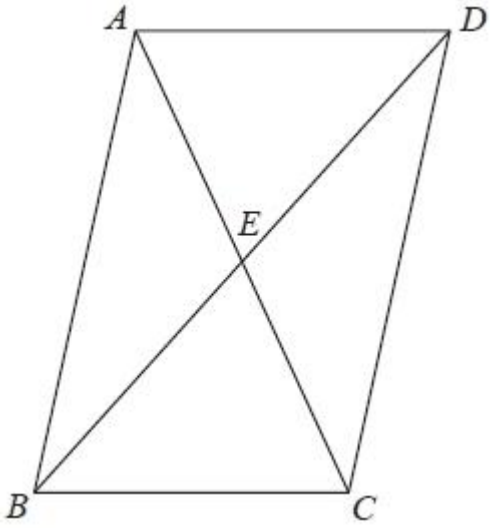
(Total for Question is 3 marks)

4. *ABCD* is a rhombus.
M and *N* are points on *BD* such that *DN* = *MB*.
Prove that triangle *DNC* is congruent to triangle *BMC*.



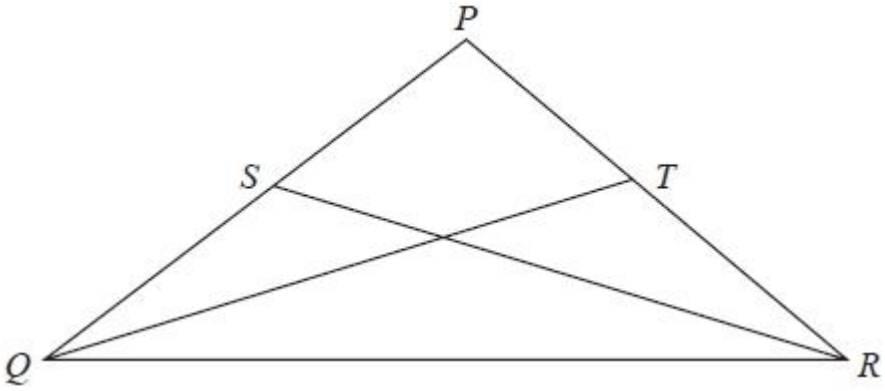
(Total for question = 3 marks)

5. *ABCD* is a parallelogram.
E is the point where the diagonals *AC* and *BD* meet.
Prove that triangle *ABE* is congruent to triangle *CDE*.



(Total for question = 3 marks)

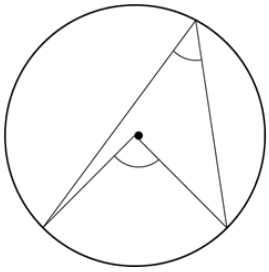
6. *PQ* = *PR*.
S is the midpoint of *PQ*.
T is the midpoint of *PR*.
Prove triangle *QTR* is congruent to triangle *RSQ*.



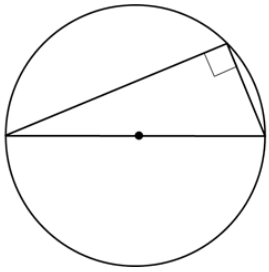
(Total for question is 3 marks)

Circle theorems

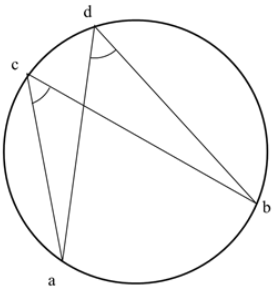
Things to remember:



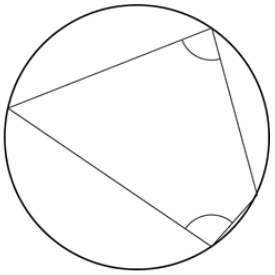
The angle at the centre is twice the angle at the circumference.



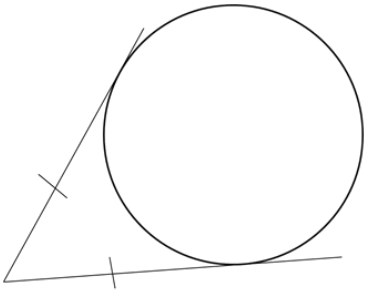
The angle in a semi-circle is 90°.



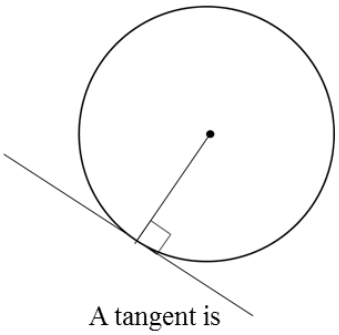
Angles subtended by the same arc are equal.



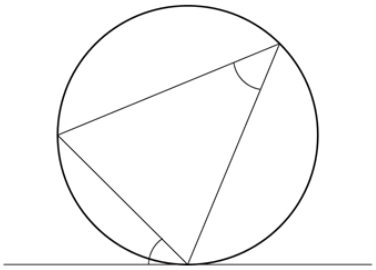
Opposite angles in a cyclic quadrilateral sum to 180°.



Tangents from a point are equal.



A tangent is perpendicular to a radius.



Angles in alternate segments are equal.

Questions:

1.

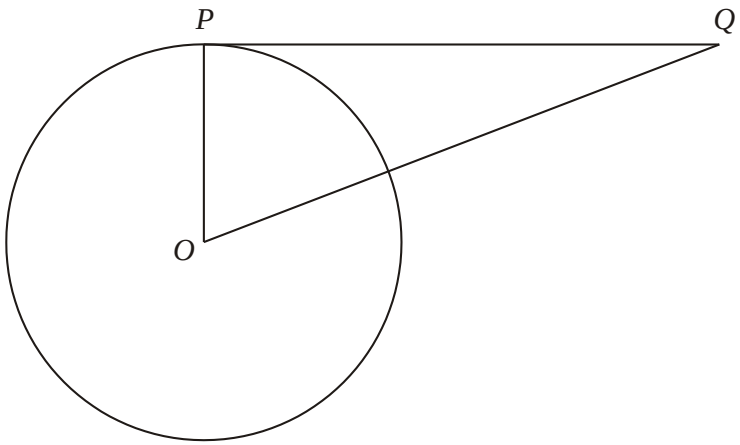


Diagram **NOT** accurately drawn

P is a point on the circumference of the circle, centre *O*.

PQ is a tangent to the circle.

(i) Write down the size of angle *OPQ*.

..... °

(ii) Give a reason for your answer.

.....

.....

(Total 2 marks)

2.

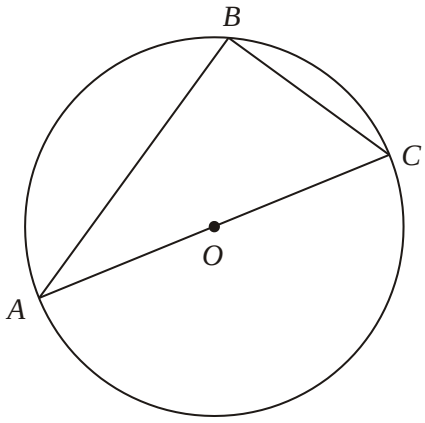


Diagram **NOT** accurately drawn

A, *B* and *C* are points on the circumference of a circle, centre *O*.

AC is a diameter of the circle.

(a) (i) Write down the size of angle *ABC*.

..... °

(ii) Give a reason for your answer.

.....

.....

(2)

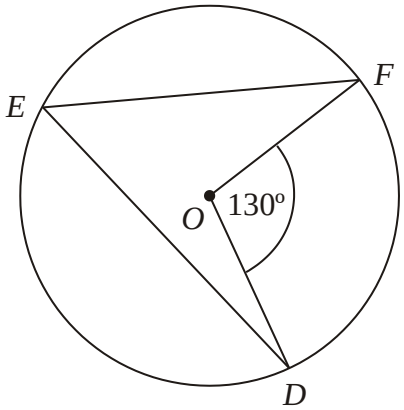


Diagram **NOT** accurately drawn

D, *E* and *F* are points on the circumference of a circle, centre *O*.

Angle *DOF* = 130°.

(b) (i) Work out the size of angle *DEF*.

..... °

(ii) Give a reason for your answer.

.....

.....

(2)

(Total 4 marks)

3.

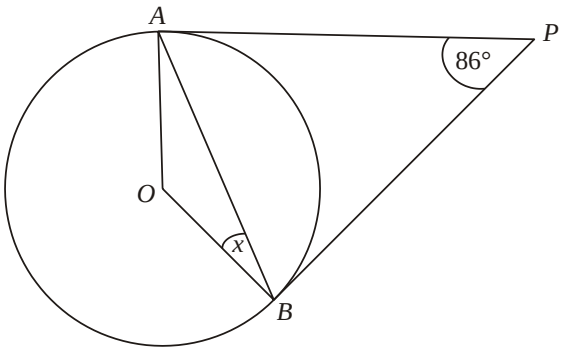


Diagram **NOT** accurately drawn
A and *B* are points on the circumference of a circle, centre *O*.
PA and *PB* are tangents to the circle.
Angle *APB* is 86°.
Work out the size of the angle marked *x*.

..... °

(Total 2 marks)

4.

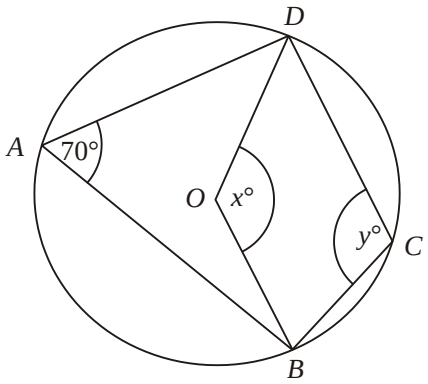


Diagram **NOT** accurately drawn
In the diagram, *A*, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.
Angle *BAD* = 70°.
Angle *BOD* = *x*°.
Angle *BCD* = *y*°.

(a) (i) Work out the value of *x*.

..... °

(ii) Give a reason for your answer.

……

……

(2)

(b) (i) Work out the value of *y*.

..... °

(ii) Give a reason for your answer.

……

……

(2)

(Total 4 marks)

5.

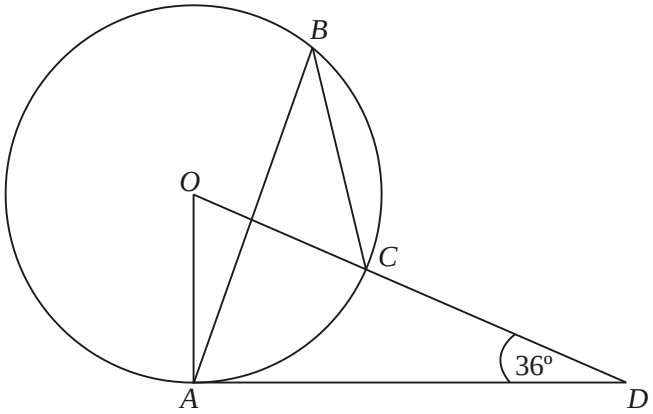


Diagram **NOT** accurately drawn

The diagram shows a circle centre *O*.
A, *B* and *C* are points on the circumference.
DCO is a straight line.
DA is a tangent to the circle.
Angle *ADO* = 36°

(a) Work out the size of angle *AOD*.

..... °

(2)

(b) (i) Work out the size of angle *ABC*.

..... °

(ii) Give a reason for your answer.

……

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(3)

(Total 5 marks)