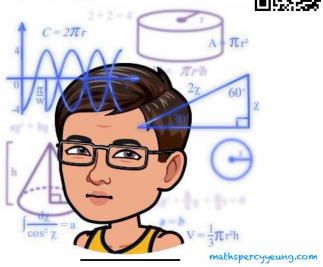
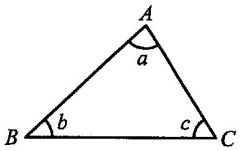
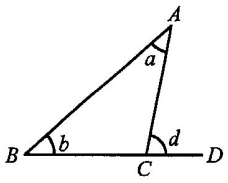
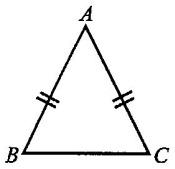
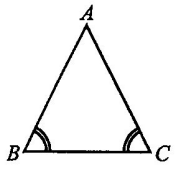


TT S2 SBE Ch4 Angles Related to Rectilinear Figures Q

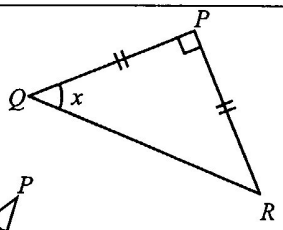
Paper I

Theorems of Triangles

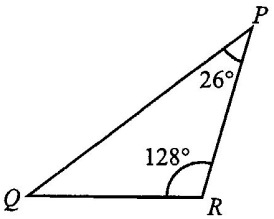
	$a + b + c = 180°$ ($\angle$ *sum of* $\triangle$)
	BCD is a straight line. $a + b = d$ (*ext.* $\angle$ *of* $\triangle$)
	If $AB = AC$, then $\angle ABC = \angle ACB$ (*base* $\angle$*s, isos.* $\triangle$)
	If $\angle ABC = \angle ACB$, then $AB = AC$ (*sides opp. equal* $\angle$*s*)

Exercise 4A

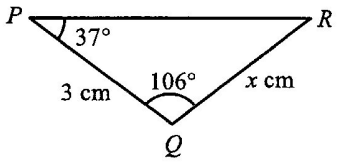
1. In the figure, $PQ = PR$. Find x.



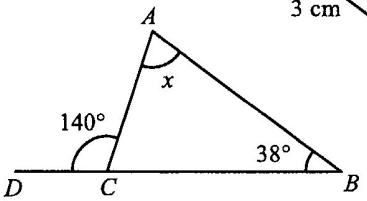
2. Prove that $\triangle PQR$ is an isosceles triangle.



3. In the figure, find x.

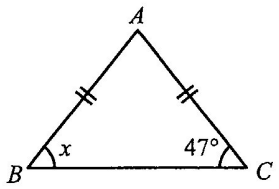


4. In the figure, BCD is a straight line. Find x.

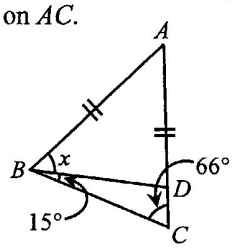


In each of the following, find the unknown(s). (5 – 13)

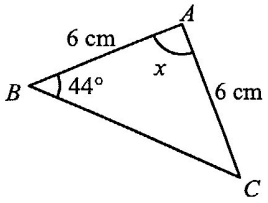
5.



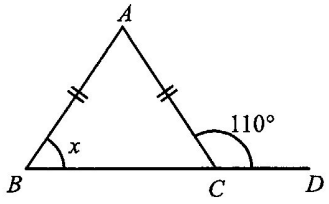
6. $AB = AC$ and D is a point on AC.



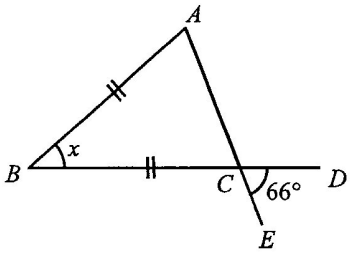
7.



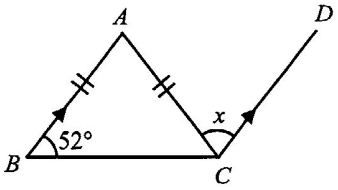
8. BCD is a straight line.



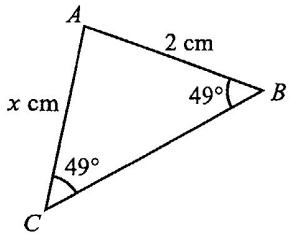
9. BCD and ACE are straight lines.



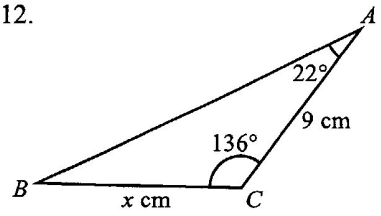
10.



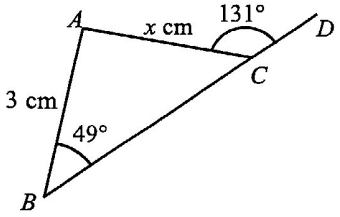
11.



12.

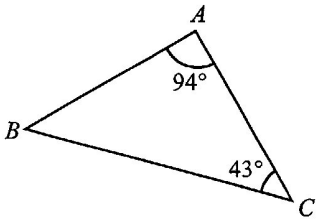


13. BCD is a straight line.

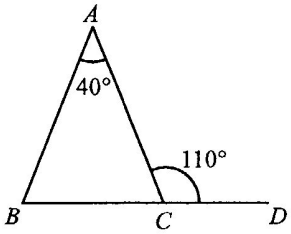


In each of the following, determine whether $\triangle ABC$ is an isosceles triangle. (14 – 19)

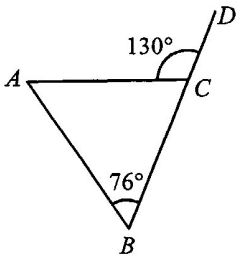
14.



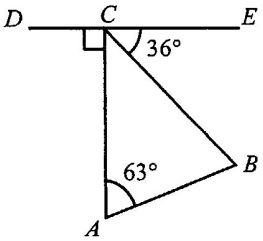
15. BCD is a straight line.



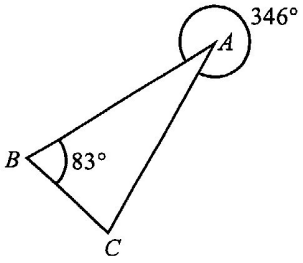
16. BCD is a straight line.



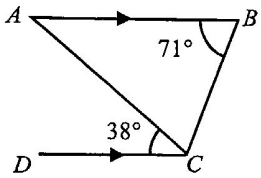
17. DCE is a straight line.



18.

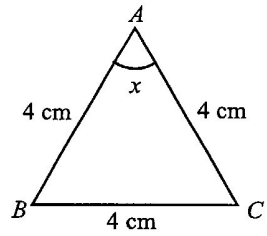


19.

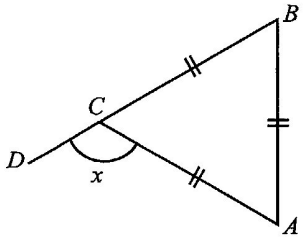


In each of the following, find the unknown(s). (20 – 34)

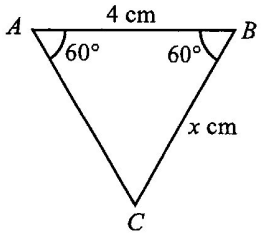
20.



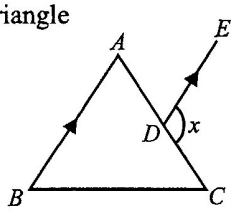
21. BCD is a straight line.



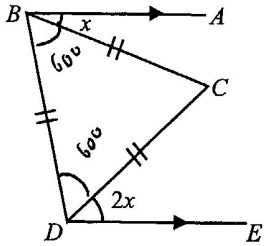
22.



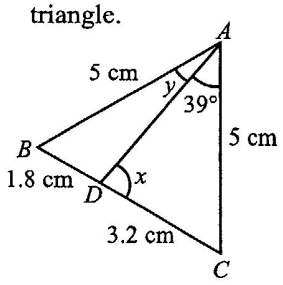
23. $\triangle ABC$ is an equilateral triangle



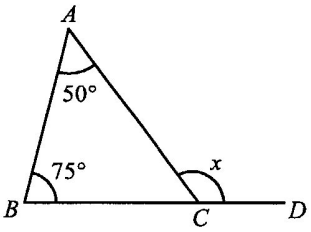
24.



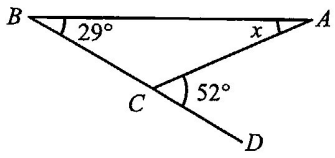
25. BDC is a straight line. triangle.



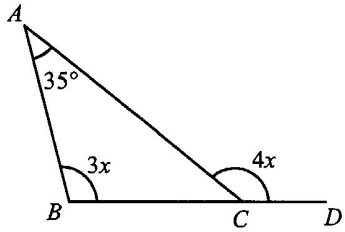
26. BCD is a straight line.



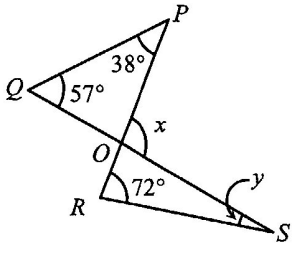
27. BCD is a straight line.



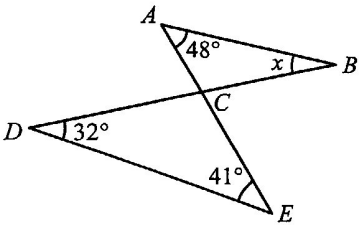
28. BCD is a straight line.



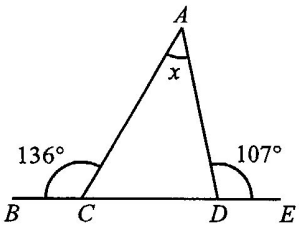
29. PR and QS intersect at O.



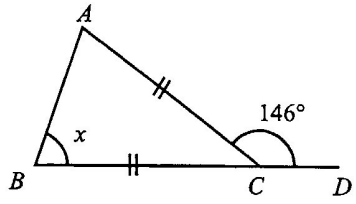
30. AE and BD intersect at C.



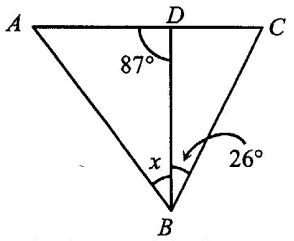
31. $BCDE$ is a straight line.



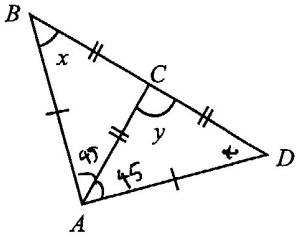
32. BCD is a straight line.



33. $AB = AC$ and D is a point on AC.

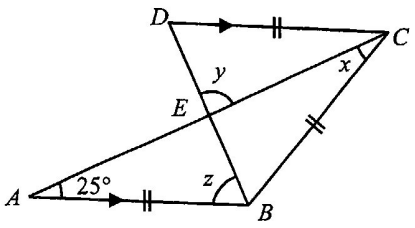


34. BCD is a straight line.

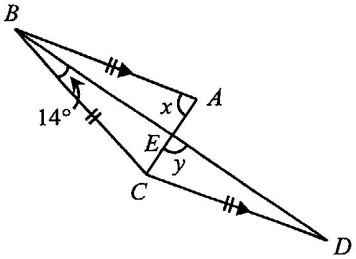


In each of the following, find the unknown(s). (35 – 40)

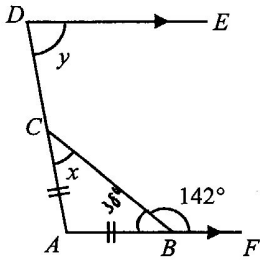
35. AC and BD intersect at E.



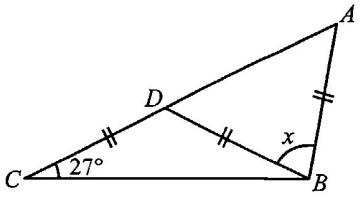
36. AC and BD intersect at E.



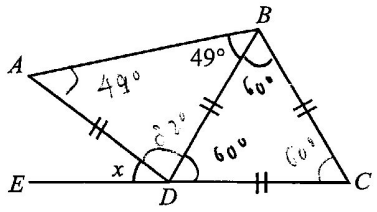
37. ABF and ACD are straight lines.



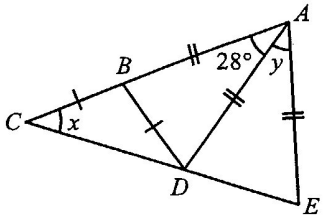
38. ADC is a straight line.



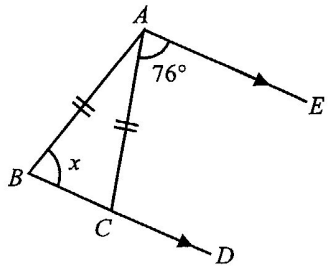
39. CDE is a straight line.



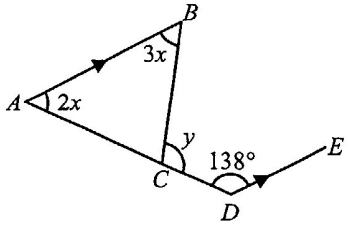
40. ABC and CDE are straight lines.



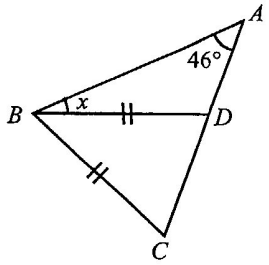
41. In the figure, BCD is a straight line. $AE \parallel BD$. Find x.



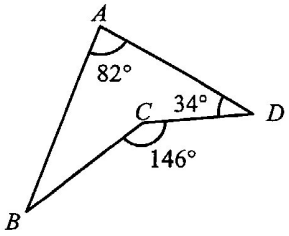
42. In the figure, ACD is a straight line. $AB \parallel DE$. Find x and y.



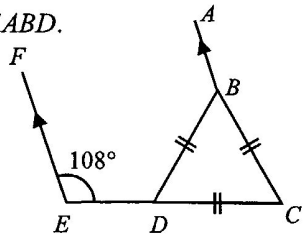
43. In the figure, $AB = AC$ and D is a point on AC. Find x.



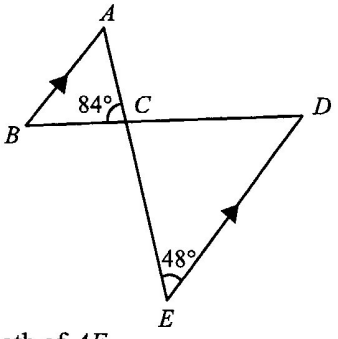
44. In the figure, find $\angle ABC$.



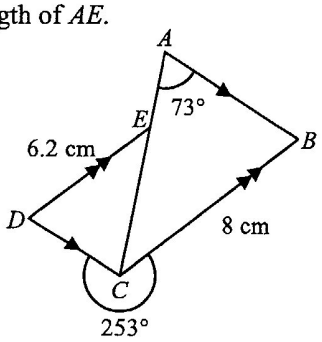
45. In the figure, EDC is a straight line. $AB \parallel FE$ and $BC = CD = DB$. Find $\angle ABD$.
(Hint: ABC is a NOT straight line)



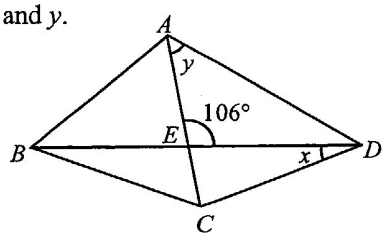
46. In the figure, $AB \parallel DE$. AE and BD intersect at C.
(a) Find $\angle ABC$.
(b) If $AE = 9$ cm and $BC = 4$ cm, find the length of CD.



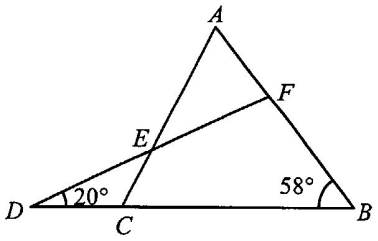
47. In the figure, AEC is a straight line. $AB \parallel DC$ and $CB \parallel DE$. Find the length of AE.



48. In the figure, AC and BD intersect at E. If $AB = BC = AC = CD$, find x and y.



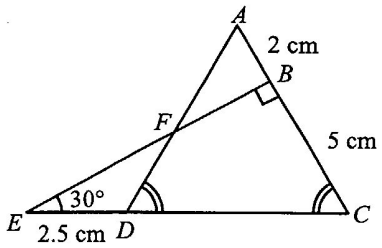
49. In the figure, AC and DF intersect at E. If $AB = BC$, find $\angle AED$.



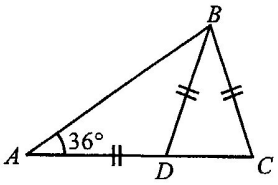
50. In the figure, B and D are points on AC and CE respectively. AD and BE intersect at F. $\angle ADC = \angle ACD$.

(a) Find $\angle ADC$ and $\angle DFE$.

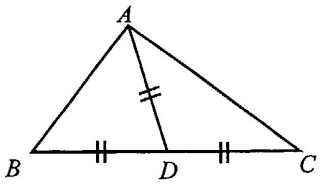
(b) Find the length of AF.



51. In the figure, ABC is a triangle in which $\angle BAC = 36°$. D is a point on AC such that $AD = BD = BC$. Is $\triangle ABC$ an isosceles triangle? Explain your answer.



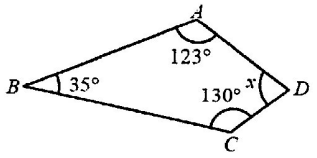
52. In the figure, D is a point on BC such that $AD = CD = BD$. Prove that $\triangle ABC$ is a right-angled triangle.



Angles of Polygons

The sum of interior angles of an n-sided polygon is $(n-2) \times 180°$. [Reference: $\angle$ *sum of polygon*]

e.g. In the figure, find x.



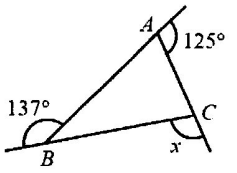
$x + 123° + 35° + 130° = (4-2) \times 180°$ ($\angle$ *sum of polygon*)

$x + 288° = 360°$

$x = \underline{72°}$

The sum of exterior angles of a convex polygon is 360°. [Reference: *sum of ext.* $\angle$*s of polygon*]

e.g. In the figure, find x.



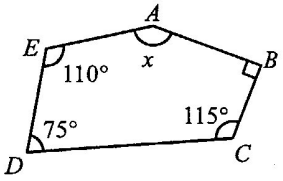
$x + 125° + 137° = 360°$ (*sum of ext.* $\angle$*s of polygon*)

$x + 262° = 360°$

$x = \underline{98°}$

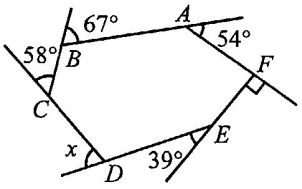
Exercise 4B

1. In the figure, find x.



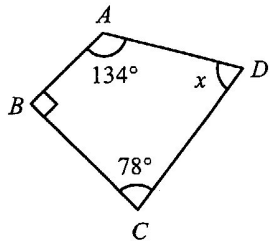
2. Consider a regular 12-sided polygon.
   (a) Find the sum of interior angles of the polygon.
   (b) Find the size of each interior angle of the polygon.

3. In the figure, find x.

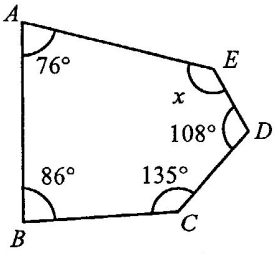


In each of the following, find x. (4 – 18)

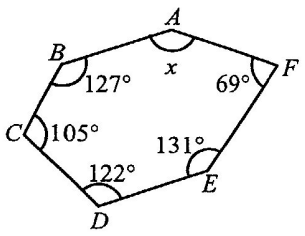
4.



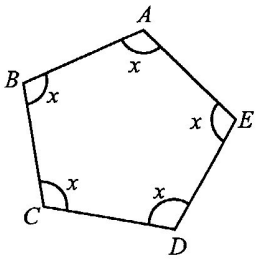
5.



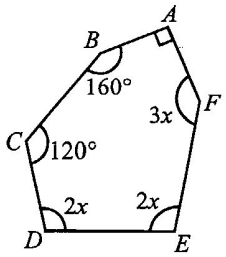
6.



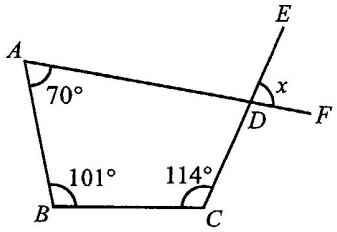
7.



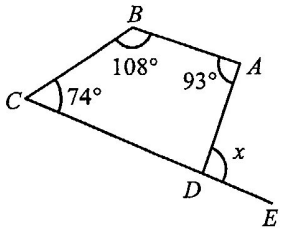
8.



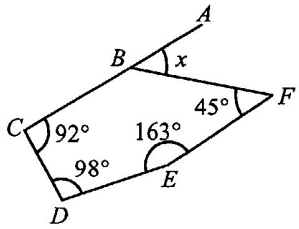
9. *ADF* and *CDE* are straight lines.



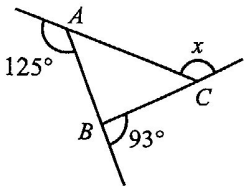
10. *CDE* is a straight line.



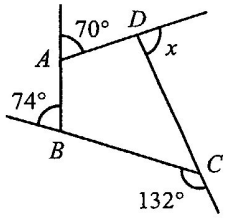
11. *ABC* is a straight line.



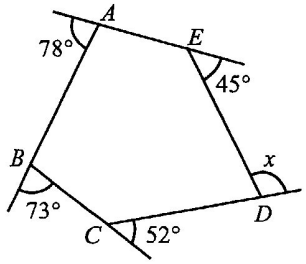
12.



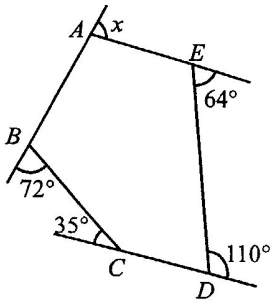
13.



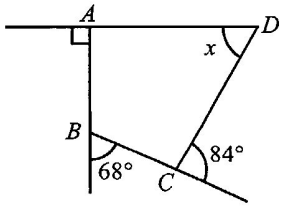
14.



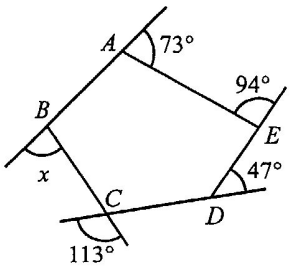
15.



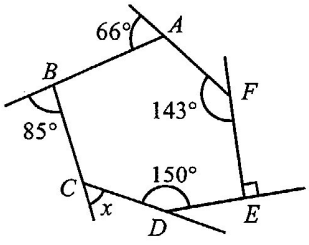
16.



17.



18.



19. Find the sum of interior angles of a pentagon.

20. Find the sum of interior angles of a decagon (i.e. a 10-sided polygon).

21. Find the size of each interior angle of a regular 15-sided polygon.

22. Find the size of each interior angle of a regular 20-sided polygon.

23. Find the number of sides of a polygon if the sum of its interior angles is 2880°.

24. Find the number of sides of a polygon if the sum of its interior angles is 5760°.

25. Find the number of sides of a regular polygon if the size of each interior angle is 135°.

26. Find the size of each exterior angle of a regular hexagon.

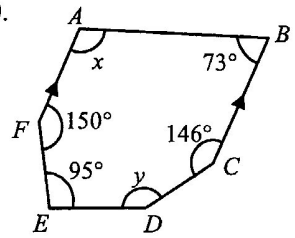
27. Find the size of each exterior angle of a regular 16-sided polygon.

28. Find the number of sides of a regular polygon if the size of each exterior angle of the polygon is 120°.

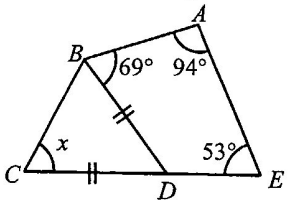
29. Find the number of sides of a regular polygon if the size of each exterior angle of the polygon is 20°.

In each of the following, find the unknown(s). (30 – 35)

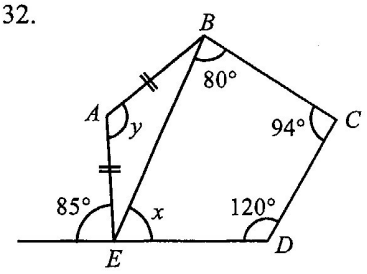
30.



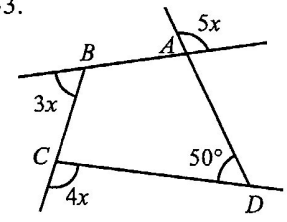
31. *CDE* is a straight line.



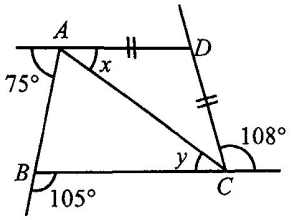
32.



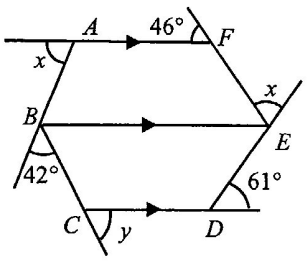
33.



34.



35.



36. The sum of interior angles of an n-sided polygon is three times that of a regular hexagon. Find the value of n.

37. The sum of interior angles of an n-sided polygon is five times that of a regular pentagon. Find the value of n.

38. Each interior angle of a regular polygon is 165°.
    (a) Find the number of sides of the polygon.
    (b) Find the sum of interior angles of the polygon.

39. Each interior angle of a regular polygon is 168°.
    (a) Find the number of sides of the polygon.
    (b) Find the sum of interior angles of the polygon.

40. The exterior angle of a regular polygon is 22.5°. Find the sum of interior angles of the polygon.

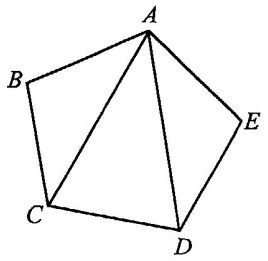
41. The exterior angle of a regular polygon is 40°. Find the sum of interior angles of the polygon.

42. Each interior angle of a regular polygon is 5 times each exterior angle.
    (a) Find the size of each exterior angle of the polygon.
    (b) Find the number of sides of the polygon.

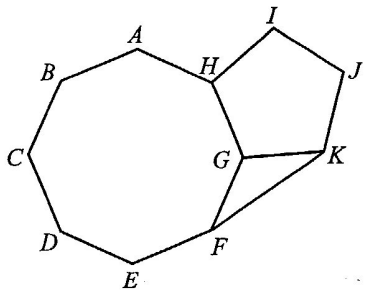
43. Each interior angle of a regular polygon is 7 times each exterior angle.
    (a) Find the size of each exterior angle of the polygon.
    (b) Find the number of sides of the polygon.

44. Is it possible that an interior angle of a regular polygon is 100°? Explain your answer.

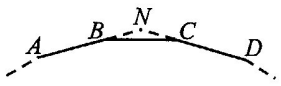
45. In the figure, $ABCDE$ is a regular pentagon. Find $\angle CAD$.



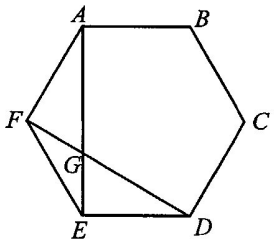
46. In the figure, *ABCDEFGH* is a regular octagon and *GHIJK* is a regular pentagon. Find $\angle GKF$.



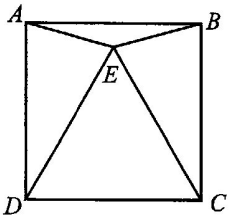
47. In the figure, *ABCD* is a part of a regular polygon. *AB* and *DC* are extended to meet at *N*. If $\angle BNC = 150°$, find the number of sides of the polygon.



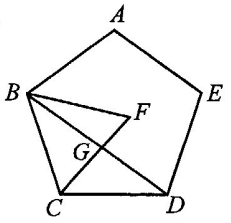
48. In the figure, *ABCDEF* is a regular hexagon. *AE* and *DF* intersect at *G*. Find $\angle FDE$ and $\angle AGD$.



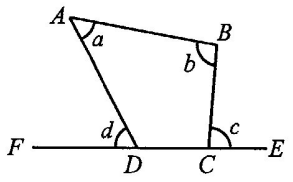
49. In the figure, *ABCD* is a square and $\triangle CDE$ is an equilateral triangle. Find $\angle AEB$.



50. In the figure, *ABCDE* is a regular pentagon and $\triangle BCF$ is an equilateral triangle. *BD* and *CF* intersect at *G*. Find $\angle DGF$.

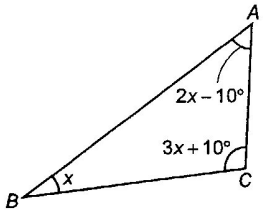


51. In the figure, *FDCE* is a straight line. Show that $a + b = c + d$.



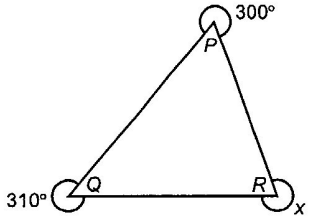
Paper II

1. Find x in the figure.



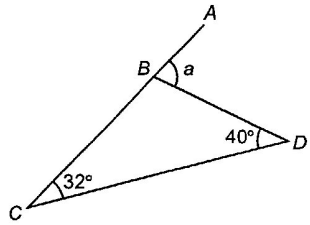
A. 25°
B. 30°
C. 36°
D. 40°

2. Find x in the figure.



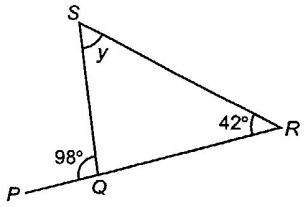
A. 290°
B. 300°
C. 310°
D. 320°

3. In the figure, ABC is a straight line. Find a.



A. 32°
B. 40°
C. 72°
D. 108°

4. In the figure, PQR is a straight line. Find y.



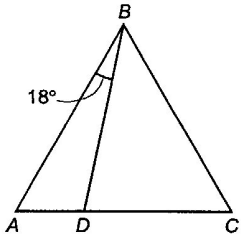
A. 40°

B. 42°

C. 56°

D. 98°

5. In the figure, ΔABC is an equilateral triangle. Find $\angle BDC$.



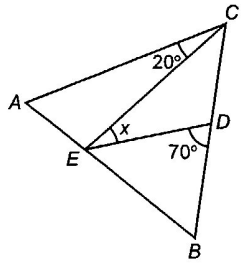
A. 42°

B. 54°

C. 60°

D. 78°

6. In the figure, AEB and BDC are straight lines. ΔABC is an equilateral triangle. Find x.



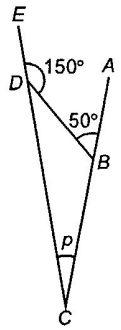
A. 20°

B. 30°

C. 50°

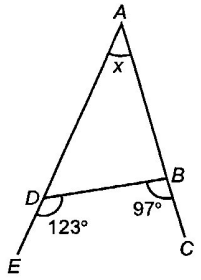
D. 60°

7. In the figure, ABC and CDE are straight lines. Find p.



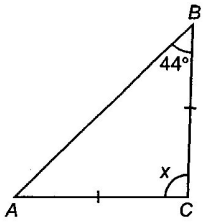
A. 20°
B. 30°
C. 40°
D. 50°

8. In the figure, ABC and ADE are straight lines. Find x.



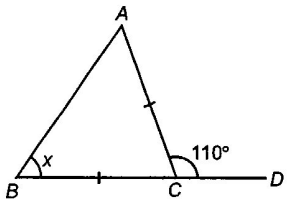
A. 26°
B. 40°
C. 57°
D. 83°

9. Find x in the figure.



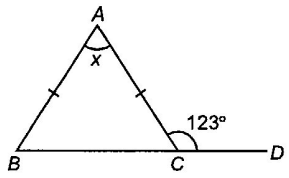
A. 44°
B. 88°
C. 92°
D. 112°

10. In the figure, BCD is a straight line. Find x.



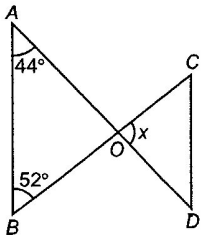
A. 20°
B. 50°
C. 55°
D. 70°

11. In the figure, BCD is a straight line. Find x.



A. 41°
B. 57°
C. 61.5°
D. 66°

12. In the figure, AOD and BOC are straight lines. Find x.



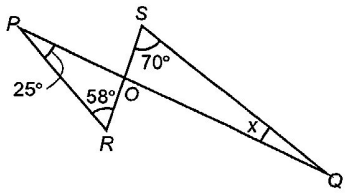
A. 74°

B. 78°

C. 84°

D. 96°

13. In the figure, POQ and ROS are straight lines. Find x.



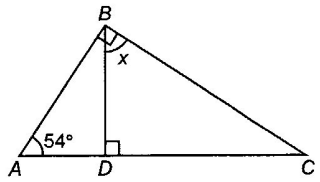
A. 12°

B. 13°

C. 25°

D. 45°

14. In the figure, ADC is a straight line. Find x.



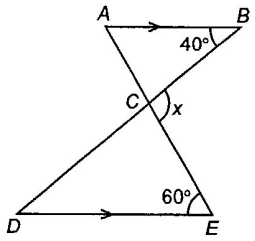
A. 27°

B. 36°

C. 48°

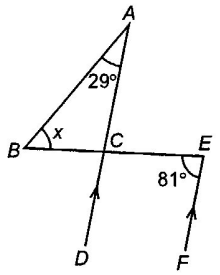
D. 54°

15. In the figure, ACE and BCD are straight lines, and $AB // DE$. Find x.



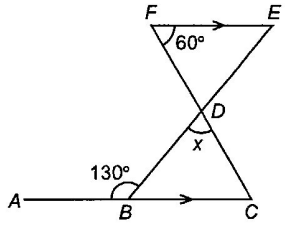
A. 80°
B. 100°
C. 120°
D. 140°

16. In the figure, BCE and ACD are straight lines, and $AD // EF$. Find x.



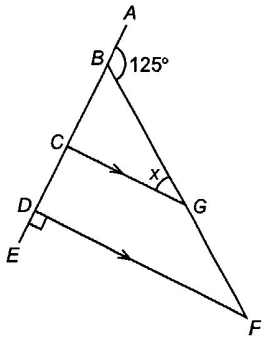
A. 52°
B. 55°
C. 61°
D. 70°

17. In the figure, *ABC*, *BDE* and *CDF* are straight lines, and *AC* // *FE*. Find x.



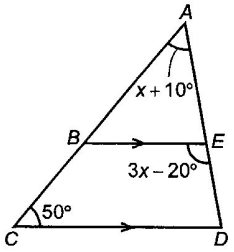
A. 50°
B. 60°
C. 65°
D. 70°

18. In the figure, *ABCDE* and *BGF* are straight lines, and *CG* // *DF*. Find x.



A. 25°
B. 35°
C. 50°
D. 55°

19. In the figure, ABC and AED are straight lines, and BE // CD. Find x.



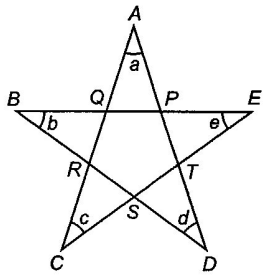
A. 15°

B. 35°

C. 40°

D. 50°

20. In the figure, $AQRC$, $APTD$, $BQPE$, $BRSD$ and $CSTE$ are straight lines. Find $a+b+c+d+e$.



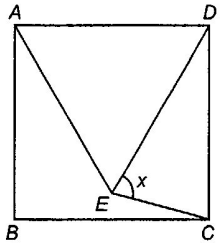
A. 180°

B. 240°

C. 270°

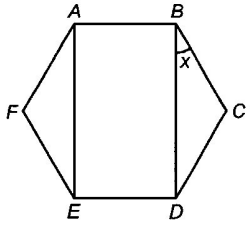
D. 360°

21. In the figure, $ABCD$ is a square and ΔADE is an equilateral triangle. Find x.



A. 30°
B. 45°
C. 60°
D. 75°

22. In the figure, $ABCDEF$ is a regular hexagon and $ABDE$ is a rectangle. Find x.



A. 15°
B. 30°
C. 45°
D. 60°

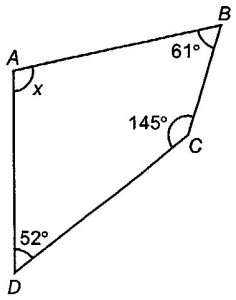
23. Find the sum of interior angles of a heptagon.

A. 540°
B. 720°
C. 900°
D. 1 080°

24. Find the sum of interior angles of a regular 14-sided polygon.

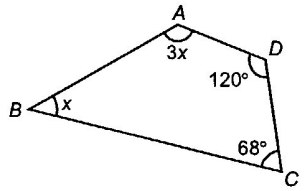
A. 180°
B. 360°
C. 2 160°
D. 2 520°

25. In the figure, $x =$



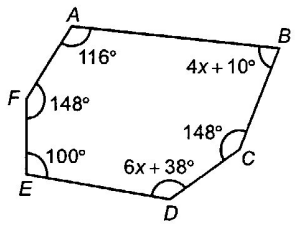
A. 101°.
B. 102°.
C. 103°.
D. 104°.

26. In the figure, $x =$



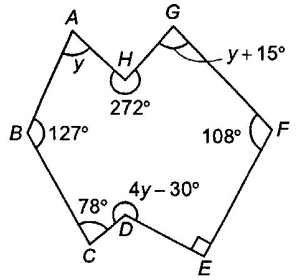
A. 38°.
B. 43°.
C. 48°.
D. 53°.

27. In the figure, $x =$



A. 16°.
B. 18°.
C. 20°.
D. 22°.

28. In the figure, $y =$



A. 60°.
B. 65°.
C. 70°.
D. 85°.

29. Find the size of each interior angle of a regular decagon.

A. 120°
B. 135°
C. 144°
D. 150°

30. Find the size of each interior angle of a regular 20-sided polygon.

A. 162°
B. 164°
C. 171°
D. 180°

31. If the sum of interior angles of an n-sided polygon is 4 860°, then $n =$

A. 25.
B. 27.
C. 29.
D. 31.

32. If the sum of interior angles of a polygon is 3 060°, find the number of sides of the polygon.

A. 13
B. 15
C. 17
D. 19

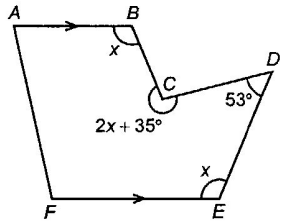
33. If the size of each interior angle of a regular polygon is 170°, find the number of sides of the regular polygon.

A. 34
B. 36
C. 38
D. 40

34. If the size of each interior angle of a regular polygon is 156°, find the number of sides of the regular polygon.

A. 11
B. 13
C. 15
D. 17

35. In the figure, $x =$



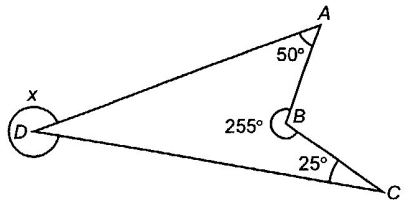
A. 108°.

B. 110°.

C. 111°.

D. 113°.

36. In the figure, $x =$



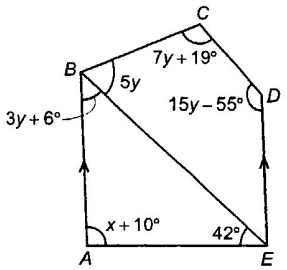
A. 250°.

B. 280°.

C. 300°.

D. 330°.

37. In the figure, $x =$



A. 73°.

B. 83°.

C. 93°.

D. 103°.

38. An octagon has three equal interior angles, and the sum of the other five interior angles is 360°. Find the size of each of the three equal interior angles.

A. 90°
B. 144°
C. 216°
D. 240°

39. If the interior angles of a hexagon are in the ratio of $1:1:2:3:8:9$, find the size of the smallest interior angle.

A. 30°
B. 36°
C. 60°
D. 72°

40. The sizes of interior angles of a heptagon are in the ratio of $2:2:4:5:7:7:9$. Find the size of the largest interior angle.

A. 25°
B. 50°
C. 225°
D. 315°

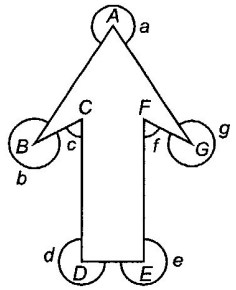
41. If the sum of interior angles of an n-sided polygon is more than that of a decagon by 360°, then $n =$

A. 8.
B. 9.
C. 12.
D. 14.

42. If the sum of interior angles of an n-sided polygon is less than that of a pentagon by 180°, find the value of n.

A. 3
B. 4
C. 6
D. 7

43. In the figure, $a+b+c+d+e+f+g=$



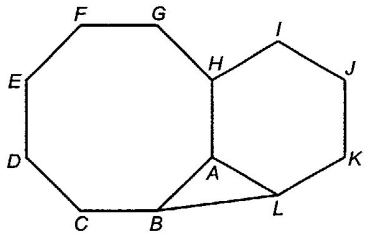
A. 360°.

B. 720°.

C. 1 260°.

D. 1 620°.

44. In the figure, *ABCDEFGH* is a regular octagon and *AHIJKL* is a regular hexagon. Find $\angle CBL$.



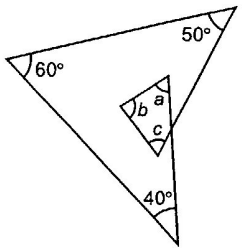
A. 157.5°

B. 165°

C. 172.5°

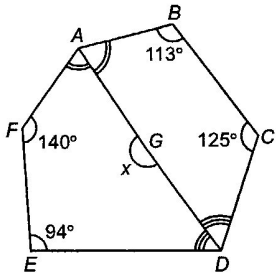
D. 180°

45. In the figure, $a+b+c=$



A. 150°.
B. 180°.
C. 210°.
D. 240°.

46. In the figure, $ABCDG$ and $AFEDG$ are pentagons. $\angle BAG = \angle FAG$ and $\angle GDC = \angle GDE$. Find x.

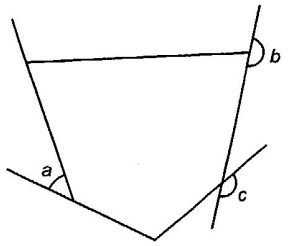


A. 124°
B. 174°
C. 178°
D. 182°

47. Which of the following must **NOT** be an interior angle of a regular polygon?

A. 165.6°
B. 168.75°
C. 170.5°
D. 172.8°

48. In the figure, which of the following is/are the exterior angle(s) of the polygon?



I. a

II. b

III. c

A. I only

B. II only

C. I and II only

D. II and III only

49. Find the sum of exterior angles of a regular 36-sided polygon.

A. 170°

B. 360°

C. 4 320°

D. 6 480°

50. Find the size of each exterior angle of a regular octagon.

A. 45°

B. 60°

C. 90°

D. 135°

51. Find the size of each exterior angle of a regular 45-sided polygon.

A. 4°

B. 6°

C. 8°

D. 10°

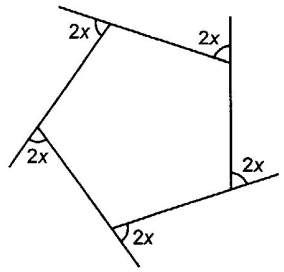
52. If the size of each exterior angle of a regular n-sided polygon is 14.4°, then $n =$

A. 22.
B. 23.
C. 24.
D. 25.

53. If the size of each exterior angle of a regular polygon is 30°, find the number of sides of the regular polygon.

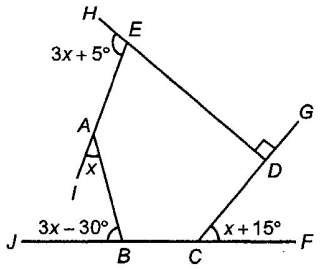
A. 6
B. 12
C. 14
D. 16

54. In the figure, the marked angles are exterior angles of the polygon. $x =$



A. 18°.
B. 36°.
C. 54°.
D. 72°.

55. In the figure, *EAI*, *JBCF*, *CDG* and *HED* are straight lines. Find x.



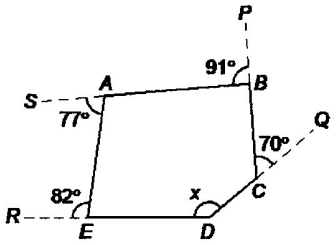
A. 27°

B. 35°

C. 40°

D. 44°

56. In the figure, the sides of the polygon are produced by dotted lines. Find x.



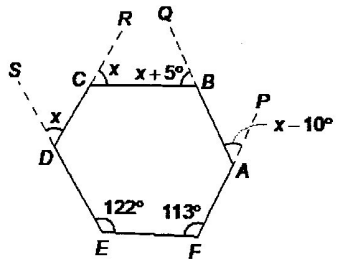
A. 30°

B. 40°

C. 140°

D. 150°

57. In the figure, the sides of the polygon are produced by dotted lines. Find x.



A. 55°
B. 60°
C. 65°
D. 70°

58. The sizes of exterior angles of a convex hexagon are in the ratio of $1:2:3:4:4:6$. Find the size of the smallest exterior angle.

A. 18°
B. 27°
C. 36°
D. 45°

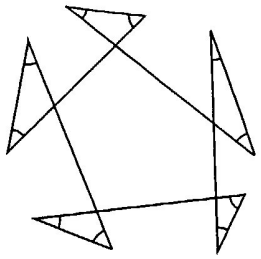
59. If 10 times an exterior angle of a regular polygon is less than its interior angle by 70°, find the number of sides of the regular polygon.

A. 30
B. 32
C. 34
D. 36

60. If an interior angle of a regular polygon is three times its exterior angle, then this polygon is

A. a square.
B. a regular pentagon.
C. a regular heptagon.
D. a regular octagon.

61. Find the sum of all marked angles in the figure.



A. 180°
B. 360°
C. 540°
D. 720°

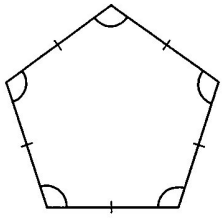
62. Which of the following must **NOT** be an exterior angle of a regular polygon?

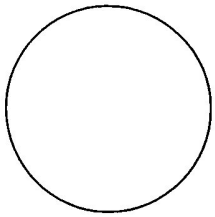
A. 36°
B. 32°
C. 30°
D. 20°

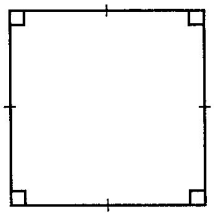
63. Which of the following cannot tessellate?

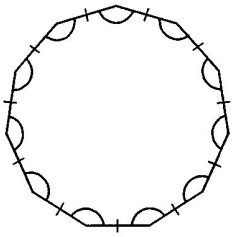
A. Equilateral triangles
B. Squares
C. Regular hexagons
D. Regular 12-sided polygons

64. Which of the following can tessellate?

A. 

B. 

C. 

D. 

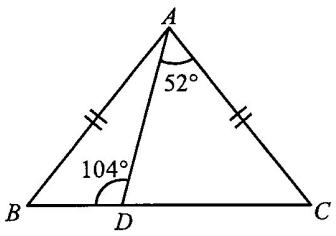
65. In the figure, $AB = AC$ and BDC is a straight line. Find $\angle BAD$.

A. 12°

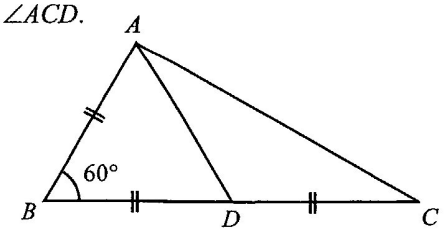
B. 24°

C. 26°

D. 39°



66. In the figure, D is a point on BC such that $AB = BD = DC$. Find $\angle ACD$.



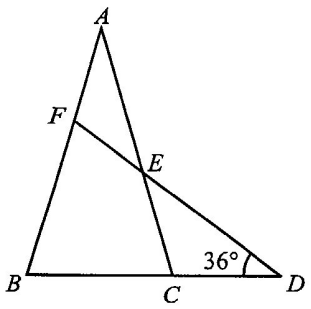
A. 20°

B. 30°

C. 40°

D. 50°

67. In the figure, AFB, BCD, AEC and DEF are straight lines. If $AB = AC$ and $CD = CE$, which of the following are true?



I. $\angle BAC = 36°$

II. $\triangle AFE$ is an isosceles triangle.

III. $\triangle BDF$ is an isosceles triangle.

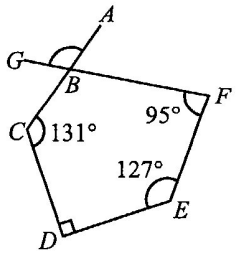
A. I and II only

B. I and III only

C. II and III only

D. I, II and III

68. In the figure, ABC and FBG are straight lines. $\angle ABG =$



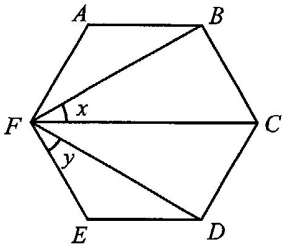
A. 57°.

B. 83°.

C. 97°.

D. 123°.

69. In the figure, $ABCDEF$ is a regular hexagon. $x + y =$



A. 30°.

B. 45°.

C. 60°.

D. 90°.

70. If an interior angle of a regular n-sided polygon is greater than an exterior angle by 120°, which of the following are true?

I. The value of n is 12.

II. Each exterior angle of the polygon is 30°.

III. The sum of interior angles of the polygon is 2160°.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III