MATHS

BOOKS - ICSE

UNDERSTANDING SHAPES

Example

1. Is it possible to have a polygon, the sum of whose interior angle is 9 right angles.

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2. The sides of a pentagon are produced in order. If the measures of exterior angles so obtaineed are $x^\circ, (2x)^\circ, (3x)^\circ, (4x)^\circ$ and $(5x)^\circ$, find all the exterior angles.

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3. One angle of a seven-sided polygon is 114° and each of the other six angles is x°. Find the magnitude of x°.

A. 144°

B. 131°

C. 122°

D. 191°

Answer: B

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4. If each interior angle of a regular polygon is 144°, find the number of sides in it.

A. No. of sides $=9$

B. No. of sides $=10$

C. No. of sides $=11$

D. No. of sides $=13$

Answer: B

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5. Is it possible to have a regular polygon with each interior angle equal to 105° ?

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6. The sum of the interior angles of a regular polygon is equal to six times the sum of exterior angles. Find the number of sides of the polygon.

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7. An exterior angle and an interior angle of a regular polygon are in the ratio $2:7$. Find the number of sides in the polygon.

A. 8

B. 7

C. 10

D. 9

Answer: D

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8. The ratio of the number of sides of two polygons is $1:2$, and the ratio of the sum of their angles is $3:8$. Find the number of sides in each polygon.

A. 7 and 19

B. 5 and 19

C. 5 and 18

D. 8 and 11

Answer: B

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9. The angle of a quadrilateral are in the ratio 3:4:5:6. Find all its angles.

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10. Three angles of a quadrilateral are in the ratio 4:6:3. If the fourth angle is 100°, find the ther three angles of the quadrilateral.

A. $90^\circ, 110^\circ$ and 60°

B. $70^\circ, 110^\circ$ and 60°

C. $80^\circ, 120^\circ$ and 60°

D. $80^\circ, 120^\circ$ and 80°

Answer: C

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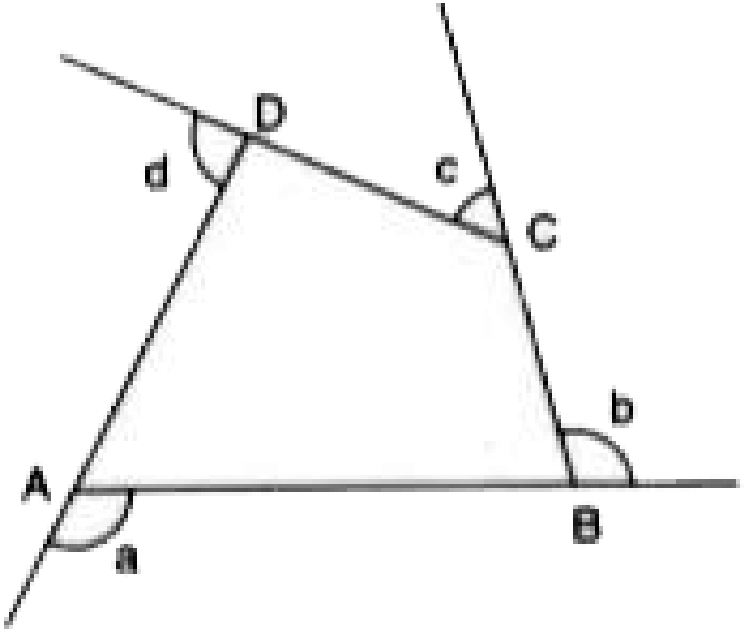
11. Using the adjoining figure, find a+b+c+d.



A. 180°

B. 360°

C. 270°

D. 380°

Answer: B

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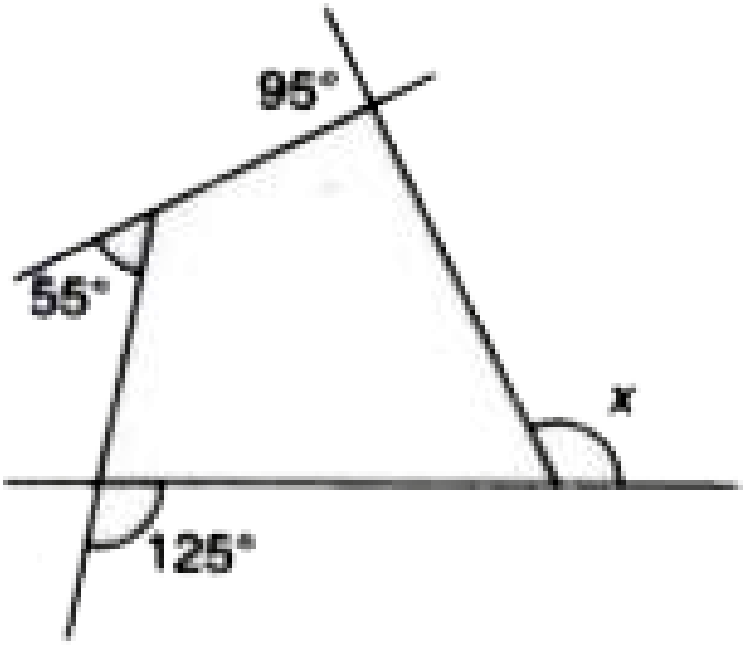
12. From the adjoining figure, find the value of x.



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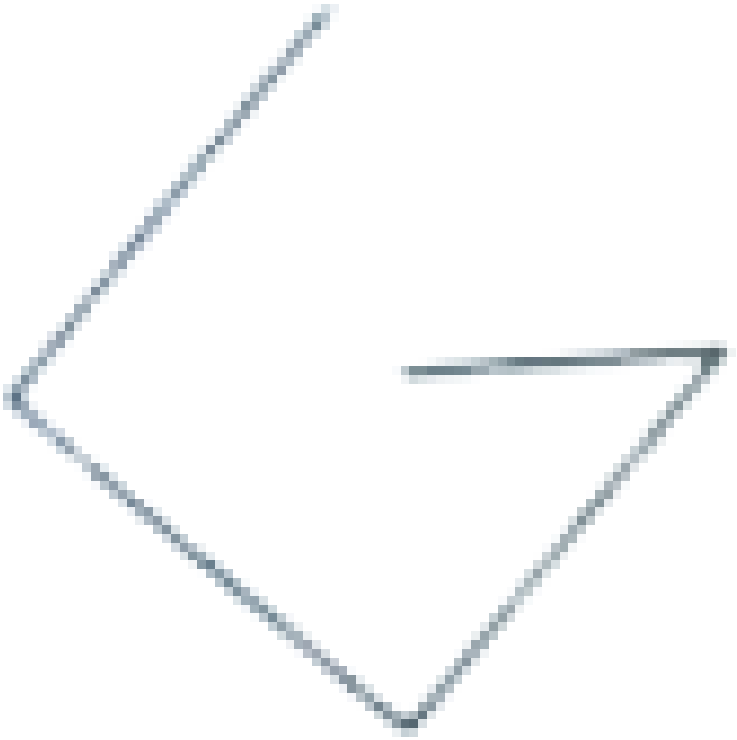
Exercise 16 A

1. State which of the following are polygons:

If the given figure is a polygon, name it as convex or concave



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2. State which of the following are polygons:

If the given figure is a polygon, name it as convex or concave

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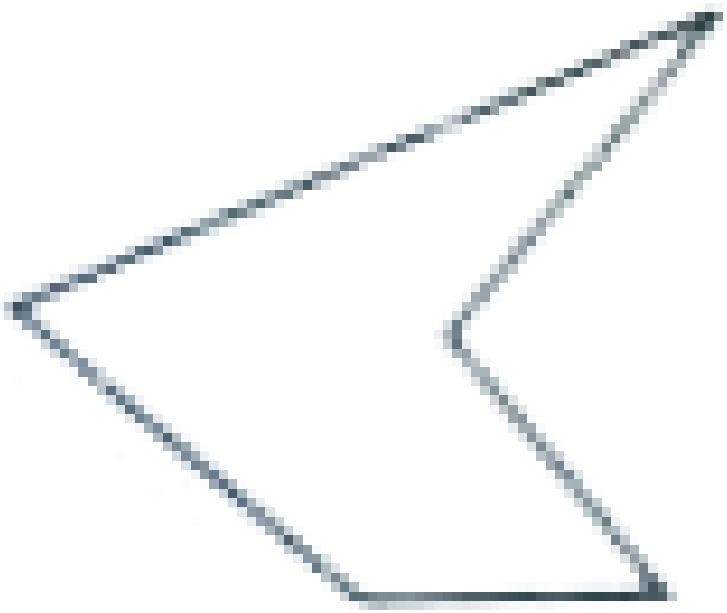
3. State which of the following are polygons:



If the given figure is a polygon, name it as convex or concave.

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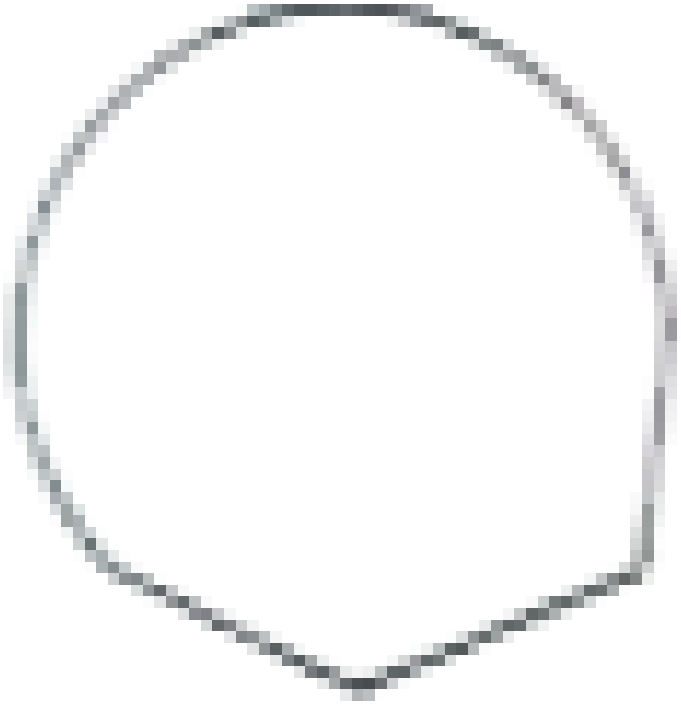
4. State which of the following are polygons:



If the given figure is a polygon, name it as convex or concave.

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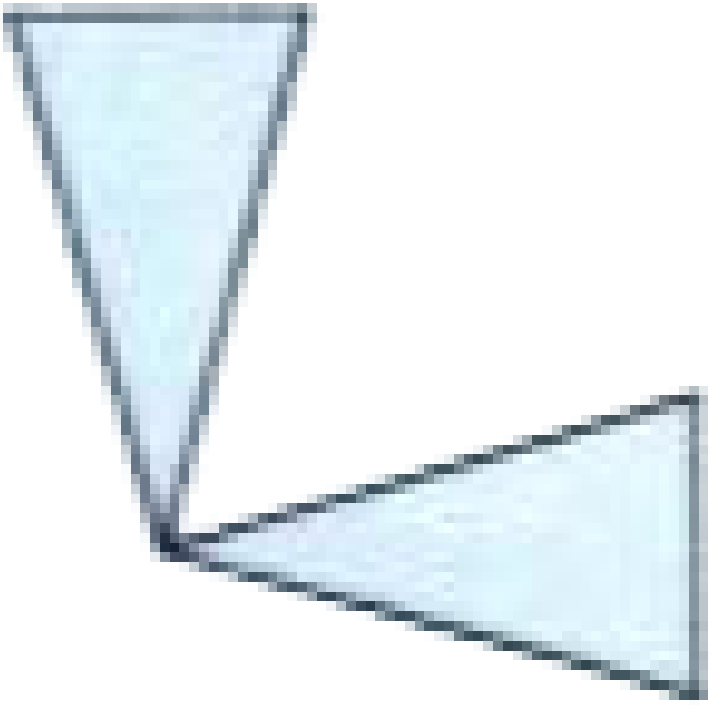
5. State which of the following are polygons:



If the given figure is a polygon, name it as convex or concave.

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6. Calculate the sum of angles of a polygon with :

(i) 10 sides

(ii) 12 sides

(iii) 20 sides

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7. Find the number of sides in a polygon if the sum of its interior angles is :

(i) 900°

(ii) 1620°

(iii) 16 right angles

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8. Is it possible to have a polygon, whose sum of interior angles is :

(i) 870° (ii) 2340° (iii) 7 right angles?

A. (i) No (ii) Yes (iii) No

B. (i) Yes (ii) Yes (iii) No

C. (i) No (ii) No (iii) No

D. (i) No (ii) Yes (iii) Yes

Answer: A

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9. (i) If all the angles of a hexagon are equal, find the measure of each angle.

(ii) If all the angles of a 14-sided figure are equal, find the measure of each angle.

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10. Find the sum of exterior angles obtained on producing, in order, the sides of a polygon with:

(i) 7 sides (ii) 10 sides (iii) 250 sides

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11. The sides of a hexagon are produced in order. If the measures of exterior angles so obtained are $(6x-1)^\circ, (10x+2)^\circ, (8x+2)^\circ, (9x-3)^\circ, (5x+4)^\circ$ and $(12x+6)^\circ$, find each exterior angle.

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12. The interior angles of a pentagon are in the ratio 4:5:6:7:5. Find each angle of the pentagon.

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13. Two angles of a hexagon are 120° and 160°. If the remaining four angles are equal, find each equal angle.

A. 190°

B. 140°

C. 110°

D. 120°

Answer: C

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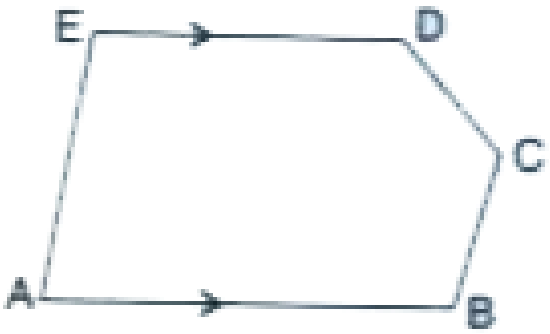
14. The figure, given below, shows a pentagon ABCDE with sides AB and ED parallel to each other, and $\angle B : \angle C : \angle D = 5 : 6 : 7$.

(i) Using formula, find the sum of interior angles of the pentagon



(ii) Write the value of $\angle A + \angle E$.

(iii) Find angles B,C and D

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15. Two angles of a polygon are right angles and the remaining are 120° each. Find the number of sides in it.

A. 8

B. 7

C. 9

D. 5

Answer: D

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16. In a hexagon, ABCDEF, side AB is parallel to side FE and $\angle B : \angle C : \angle D : \angle E = 6 : 4 : 2 : 3$ Find $\angle B$ and $\angle D$.

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17. The angle of a hexagon are $x + 10^\circ, 2x + 20^\circ, 2x - 20^\circ, 3x - 50^\circ, x + 40^\circ$ and $x + 20^\circ$. Find x.

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18. In a pentagon, two angles are 40° and 60° and the rest are in the ratio 1:3:7. Find the biggest angle of the pentagon.

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Exercise 16 B

1. Fill in the blanks:

In case of regular polygon, with :		
no. of sides	each exterior angle	each interior angle
(i) ..8.....	.....	.....
(ii) ..12..	.....	.....
(iii)	.....72°.....	.....
(iv)	.....45°.....	.....
(v)	.....	.....150°....
(vi)	.....	.....140°.....

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2. Find the number of sides in a regular polygon, If its each interior angle is :

$(i) 160^\circ$ (ii) 135° (iii) $1\frac{1}{5}$ of a right angle.

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3. Find the number of sides in a regular polygon, if its each exterior angle is :

$(i)\frac{1}{3}$ of a right angle

(ii) two-fifths of a right angle

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4. Is it possible to have a regular polygon whose each interior angle is :

(i) 170° $(ii)1370^\circ$

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5. Is it possible to have a regular polygon whose each exterior angle is :

(i) 80° (ii) 40% of a right angle

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6. Find the number of sides in a regular polygon, if its interior angle is equal to its exterior angle.

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7. The exterior angle of a regular polygon is one-third of its interior angle. Find the number of sides in the polygon.

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8. The measure of each interior angle of a regular polygon is five times the measure of its exterior angle. Find :

(i) measure of each interior angle,

(ii) measure of each exterior angle and

(iii) number of sides in the polygon

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9. The ratio between the interior angle and the exterior angle of a regular polygon is 2: 1. Find :

(i) each exterior angle of the polygon.

(ii) number of sides in the polygon.

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10. The ratio between the exterior angle and the interior angle of a regular polygon is 1 : 4. Find the number of sides in the polygon.

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11. The sum of interior angles of a regular polygon is twice the sum of its exterior angles. Find the number of sides of the polygon.

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12. AB, BC and CD are three consecutive sides of a regular polygon. If the angle $BAC = 20^\circ$, find

(i) its each interior angle

(ii) its each exterior angle

(iii) the number of sides in the polygon.

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13. Two alternate sides of a regular polygon, when produced, meet at right angle. Calculate the number of sides in the polygon.

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14. In a regular pentagon ABCDE, draw a diagonal BE and then find the measure of :

(i) $\angle BAE$ (ii) $\angle ABE$ (iii) $\angle BED$

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15. The difference between the exterior angles of two regular polygons, having the sides equal to (n-1) and (n+1) is 9°. Find the value of n.

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16. If the difference between the exterior angle of an(n)sided regular polygon and an (n + 1) sided regular polygon is 12° find the value of n.

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17. The ratio between the number of sides of two regular polygons is 3 : 4 and the ratio between the sum of their interior angles is 2:3. Find the number of sides in each polygon.

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18. Three of the exterior angles of a hexagon are $40^\circ, 51^\circ$ and 86°. If each of the remaining exterior angles is x, find the value of x.

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19. Calculate the number of sides of a regular polygon, if

(i) its interior angle is five times its exterior angle.

(ii) the ratio between its exterior angle and interior angle is 2:7.

(iii) its exterior angle exceeds its interior angle by 60°.

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20. The sum of interior angles of a regular polygon is twice the sum of its exterior angles. Find the number of sides of the polygon.

A. 8

B. 7

C. 5

D. 9

Answer: A

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Exercise 16 C

1. Two angles of a quadrilateral are 89° and 113°. If the two angles are equal, find the equal angles.

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2. Two angles of a quadrilateral are 68° and 76°. If the other two angles are in the ratio 5:7, find the measure of each of them.

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3. Angles of a quadrilateral are $(4x)^\circ, 5(x+2)^\circ, (7x-20)^\circ$ and $6(x+3)^\circ$. Find:

(i) the value of x.

(ii) each angle of the quadrilateral.

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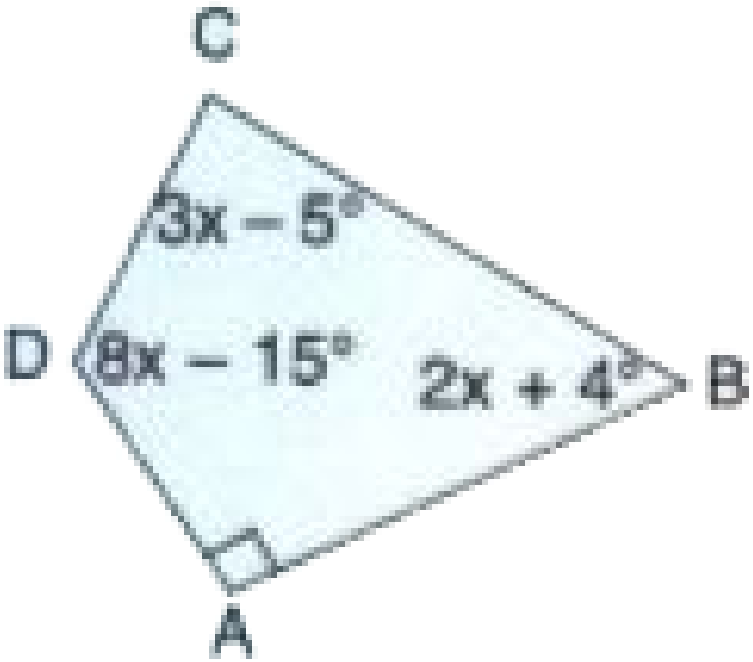
4. Use of the information given in the following figure to find:

$(i) x$

$(ii)\ \angle B$ and $\angle C$.



A. $(i)\ x = 32^\circ$

$(ii) \angle B = 38^\circ$ and $\angle C = 61^\circ$

B. $(i)\ x = 22^\circ$

$(ii) \angle B = 48^\circ$ and $\angle C = 61^\circ$

C. $(i)\ x = 22^\circ$

$(ii) \angle B = 49^\circ$ and $\angle C = 66^\circ$

D. $(i)\ x = 22^\circ$

$(ii) \angle B = 44^\circ$ and $\angle C = 56^\circ$

Answer: B

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5. In quadrilateral ABCD, side AB is parallel to side DC. If $\angle A : \angle D = 1:2$ and $\angle C : \angle B = 4:5$.

(i) Calculate each angle of the quadrilateral.

(ii) Assign a special name to quadrialateral ABCD.

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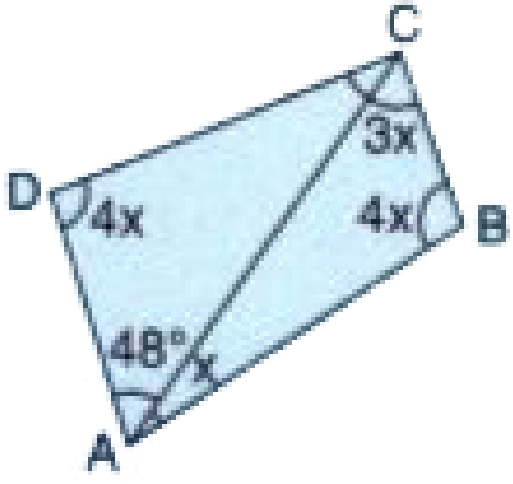
6. From the following figure, find

$(i) x$

$(ii)\ \angle ABC$

$(iii)\ \angle ACD$



A. $(i)\ x = 18^\circ$

$(ii) \angle ABC = 124^\circ$

$(iii)\ \angle ACD = 30^\circ$

B. $(i)\ x = 16^\circ$

$(ii) \angle ABC = 104^\circ$

$(iii)\ \angle ACD = 28^\circ$

C. $(i)\ x = 26^\circ$

$(ii) \angle ABC = 114^\circ$

$(iii)\ \angle ACD = 36^\circ$

D. $(i)\ x = 26^\circ$

$(ii) \angle ABC = 104^\circ$

$(iii)\ \angle ACD = 28^\circ$

Answer: D

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7. Given : In quadrilateral ABCD, $\angle C = 64^\circ, \angle D = \angle C - 8^\circ, \angle A = 5(a+2)^\circ$ and $\angle B = 2(2a+7)^\circ$.

Calculate $\angle A$.

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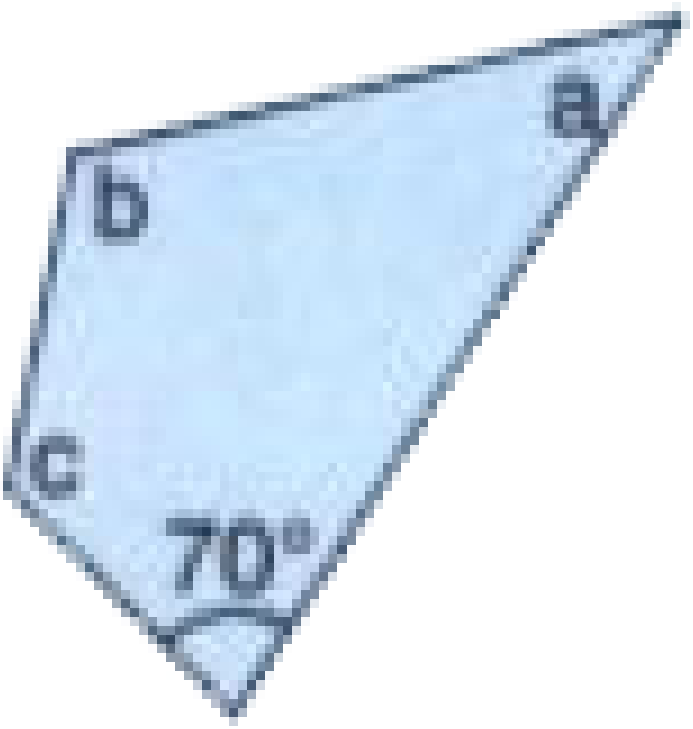
8. In the given figure : $\angle b = 2a + 15^\circ$ and $\angle c = 3a + 5^\circ$, find the values of b and c.



A. $\angle b = 125^\circ$ and $\angle c = 130^\circ$

B. $\angle b = 95^\circ$ and $\angle c = 170^\circ$

C. $\angle b = 105^\circ$ and $\angle c = 140^\circ$

D. $\angle b = 115^\circ$ and $\angle c = 142^\circ$

Answer: C

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9. Three angles of a quadrilateral are equal. If the fourth angle is 69°, find the measure of equal angles.

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10. In quadrilateral PQRS, $\angle P : \angle Q : \angle R : \angle S = 3 : 4 : 6 : 7$. Calculate each angle of the quadrilateral and then prove that PQ and SR are parallel to each other.

(i) Is PS also parallel to QR ?

(ii) Assign a special name to quadrilateral PQRS.

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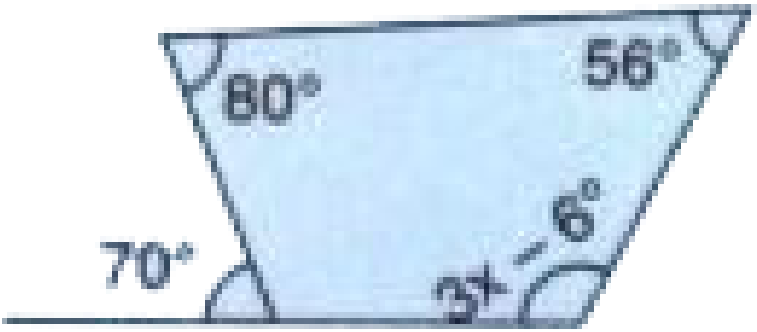
11. Use the information given in the following figure to find the value of x.



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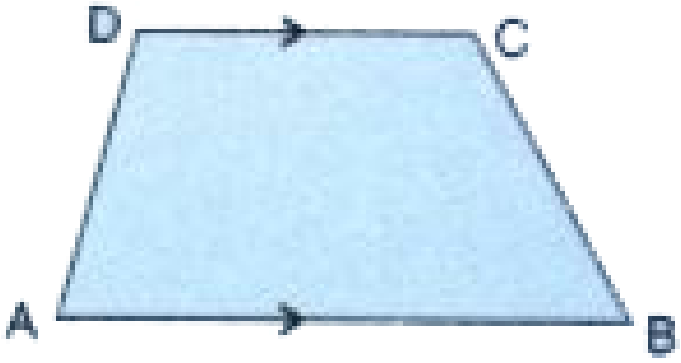
12. The following figure shows a quadrilateral in which sideo AB and DC are parallel. If $\angle A : \angle D = 4:5, \angle B = (3x - 15)^\circ$ and $\angle C = (4x + 20)^\circ$, find each angle of the quadrilateral ABCD.



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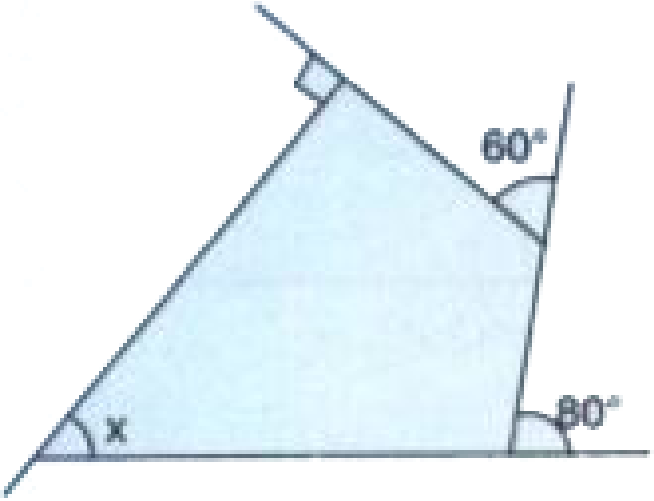
13. Use the following figure to find the value of x.



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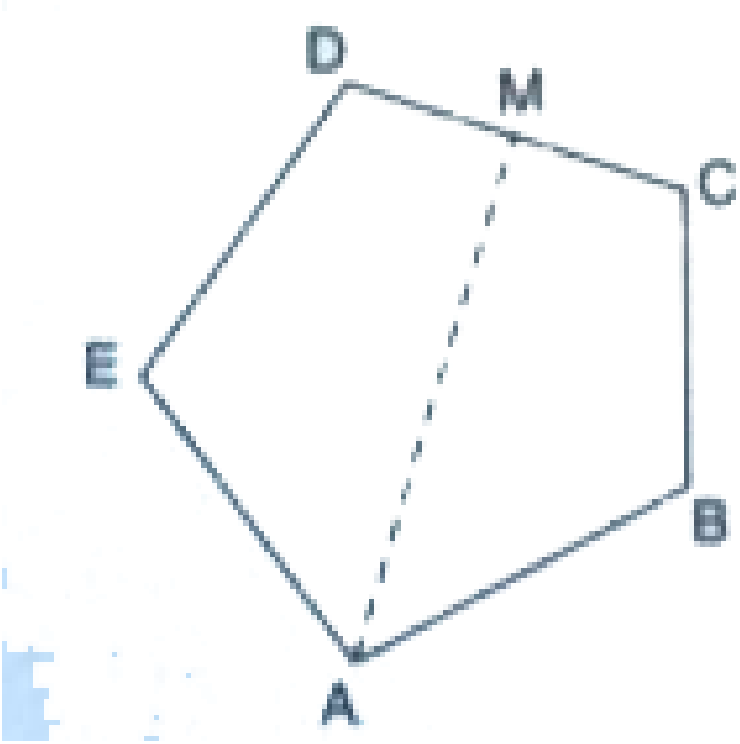
14. ABCDE is a regular pentagon. The bisector of angle A of the pentagon meet the side CD in point M. Show that $\angle AMC = 90^\circ$.



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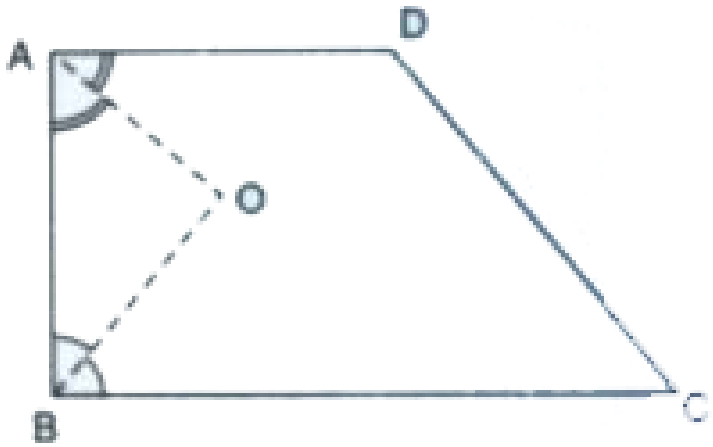
15. In a quadrilateral ABCD, AO and BO are bisector of angle A and angle B resepectively. Show that :

$\angle AOB = \frac{1}{2}(\angle C + \angle D)$



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