POLYGON Assignment –1

Answersheet
1. (a), 2. (c), 3. (b), 4. (c), 5. (d), 6. (c),
7. (c), 8. (d), 9. (a), 10. (a), 11. (c),
12. (b), 13. (B), 14. (c)

1. **Solution:** (a)
Step 1: Write down the formula $(n - 2) \times 180°$
Step 2: Plug in the values $(7 - 2) \times 180° = 5 \times 180° = 900°$
Answer: The sum of the interior angles of a heptagon (7-sided) is 900°.

2. **Solution:** (c)
Step 1: Write down the formula $\frac{(n-2)\times 180°}{n}$
Step 2: Plug in the values $\frac{(8-2)\times 180°}{8} = 135°$
Answer: Each interior angle of an otagon (8-sided) is 135°.
The answer is 180° – 45° = 135°.
A regular polygon has equal exterior angles of 72°.

3. (b) The sum of interior angles of a polygon of n sides is given by

$$(2n-4)\times\frac{\pi}{4}$$

$$(2n-4)\times\frac{\pi}{2} = 1620\times\frac{\pi}{180}$$

$$(2n-4) = \frac{1620\times 2}{180} = (2n-4) = \frac{3240}{180}$$

$$2n-4 = 18$$

$$2n = 22, \Rightarrow n = 11$$

4. (c) Let n be the number of sides of the polygon.
Interior anle = 8×Exterior angles

$$\frac{(2n-4)\times\frac{\pi}{2}}{n} = 8\times\frac{2\pi}{n}$$

$$n-2 = 16 \Rightarrow n = 18$$

5. Solution (d)

Each Interior angle of regular polygon = 2n-4. 90 / n

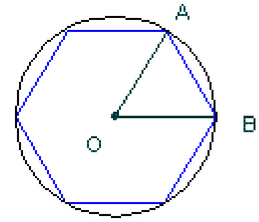
Each external angle of regular polygon = 360 / n

By question, 2n-4. 90 / n = 2. 360 / n

After solving above question we get n = 6

6. **Solution (c) :** Sum of Interior Angles in a Polygon = 180(n - 2)
Sum of Interior Angles in a Polygon = 180(5 - 2)
Sum of Interior Angles in a Polygon = 180(3)
Sum of Interior Angles in a Polygon = 540
Now you have x parts that make up this degree.
x = 2 + 3 + 3 + 5 + 5
x = 18
540/18 = The Degree of One Part
30 = The Degree of One Part
And the smallest angle has 2x so 2 time 30 equals to 60 degrees.
Therefore the smallest angle is 60 degrees.

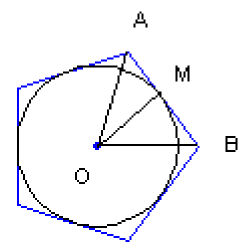
7. **Solution :** (c)



Angle AOB is given by
angle (AOB) = $360^o / 6 = 60^o$
Since OA = OB = 10 cm, triangle OAB is isosceles which gives
angle (OAB) = angle (OBA)
So all three angles of the triangle are equal and therefore it is an equilateral triangle. Hence

AB = OA = OB = 10 cm.

8. **Solution**



- Let t be the size of angle AOB, hence
  $t = 360^o / 5 = 72^o$
- The polygon is regular and OA = OB. Let M be the midpoint of AB so that OM is perpendicular to AB. OM is the radius of the inscribed circle and is equal to 6 cm. Right angle trigonometry gives
  tan(t / 2) = MB / OM
- The side of the pentagon is twice MB, hence
  side of pentagon = 2 OM tan(t / 2) = 8.7 cm (answer rounded to two decimal places)

9. Solution (a)

- A dodecagon is a regular polygon with 12 sides and the central angle t opposite one side of the polygon is given by.
  $t = 360^o / 12 = 30^o$
  We now use the formula for the area when the side of the regular polygon is known
  Area = $(1 / 4)\, n\, x^2 \cot (180^o / n)$
  Set n = 12 and x = 6 mm
  area = $(1 / 4) (12) (6 \text{ mm})^2 \cot (180^o / 12)$
  = 403.1 mm^2 (approximated to 1 decimal place).

10. Let the smallest side of the plygon be a
The largest side of the polygon =20a
Since the polygon has 25 sides of the polygon are respectively

$a, a+d, a+2d, \ldots, a+23d, a+24d; d$ being the common difference.

$a+24d = 20a \Rightarrow 19a = 24d$

Sum of the lengths of the sides =2100

$a+(a+d)+\ldots+(a+24d) = 2100$

$25a + d(1+2+\ldots 24) = 2100$

$25a + d\left[\frac{(2424+1}{2}\right] = 2100$

$25a + 300d = 2100$

$25 \times \frac{24d}{19} + 300d = 2100$

$\frac{600d}{19} + 300d = 2100$

$\frac{6d}{19} + 3d = 21 \Rightarrow 63d = 19 \times 21 \Rightarrow d = 19/3.$

$19a = \frac{24 \times 19}{3} = 8 \times 19, a = 8$

Smallest side = 8 cm

And the common difference =19/3 = $6\frac{1}{3}$ cm.

11. (c) Interior and exterior angle are always supplementery i.e., interior angle + exterior angle =180
Their ratio is given 2:1
So that exterior angle of the polygon =180×1/3
But sumof the exterior angle ofa polygon is always 360º
Therefore the no. of sides =360º/6=6

12. (b) Let there be n side polygon, eachside 2P/n
A=n×area of triangle whose side is 2P/n and altitude 'r'.

$A = n \times \frac{1}{2} \times 2\frac{p}{n} \times r$

$\therefore r = A/P$

13. (b) Let n be number of sides of polygon.
Sum of the interior angles of a polygon of n sides = (n-2)× π

$n \times \frac{5\pi}{6} = (n-2) \times \pi \quad \Rightarrow n = 12$

14. (c) Sum of the interior angle = (n-2)180º
So, sum of the interior angles of a six sides polygon
=6-2×180º=720
sum of the interior angles of a eight sided polygon
= (8-2)×180º=1080º and
sum of the interior angles of a ten sided polygon.
=(10-2)×180=1440º