

Practice on Polygons

SHOW ALL OF YOUR WORK by using the following formulae (along with substitution) and solving ALGEBRAICALLY!

ANGLE MEASURES

$$S = 180^\circ(n-2)$$

$$m = \frac{180^\circ(n-2)}{n}$$

where: S = sum of all interior angles

m = measure of one interior angle

n = number of sides

PERIMETER AND AREA

$$P = ns$$

$$A = \frac{aP}{2}$$

where:

n = number of sides

s = length of one side

a = apothem

P = perimeter

A = area

1. A regular hexagon has a perimeter of 36 m. Determine the length of one side of the hexagon.

$$P = ns$$

$$36 = 6s$$

$$\boxed{6 \text{ sides} = 6}$$

2. How many sides does a regular polygon have if the sum of its interior angles is 1260° ?

$$S = 180^\circ(n-2)$$

$$1260^\circ = 180^\circ(n-2)$$

$$7 = n-2$$

$$\boxed{9 \text{ sides} = n}$$

3. What is the sum of the interior angles of a regular decagon?

$$S = 180^\circ(n-2)$$

$$= 180^\circ(10-2)$$

$$= 180^\circ(8)$$

$$\boxed{S = 1440^\circ}$$

4. Determine the area of a regular hexagon that has a perimeter of 30 cm and an apothem of 4.5 cm.

$$A = \frac{aP}{2}$$
$$= \frac{4.5(30)}{2}$$

$$A = 67.5 \text{ cm}^2$$

5. Determine the area of a regular pentagon that has a perimeter of 22 cm and an apothem of 3 cm.

$$A = \frac{aP}{2}$$
$$= \frac{3(22)}{2}$$

$$A = 33 \text{ cm}^2$$

6. Determine the area of a regular hexagon that has a side length of 8 m and an apothem of 7 m.

$$A = \frac{as}{2}$$
$$= \frac{7(6)(8)}{2}$$

$$A = 168 \text{ m}^2$$

7. Determine the perimeter of a regular octagon with an apothem of 11 dm and an area of 396 dm².

$$A = \frac{aP}{2}$$
$$396 = \frac{11P}{2}$$

$$72 \text{ dm} = P$$

8. Determine the perimeter of a regular octagon with an area of 130 cm^2 and an apothem of 6.5 cm .

$$A = \frac{aP}{2}$$

$$130 = \frac{6.5P}{2}$$

$$\boxed{40 \text{ cm} = P}$$

9. Determine the length of one side of a regular octagon which has an area of 154 m^2 and an apothem of 7 m .

$$A = \frac{as}{2}$$

$$154 = \frac{7(8)s}{2}$$

$$154 = 28s$$

$$\boxed{5.5 \text{ m} = s}$$

10. Determine the perimeter of the regular polygon that has a side that measures 7 dm and whose sum of interior angles is 540° .

$$S = 180(n-2)$$

$$540 = 180(n-2)$$

$$3 = n-2$$

$$5 \text{ sides} = n$$

$$P = ns$$

$$P = 5(7)$$

$$\boxed{P = 35 \text{ dm}}$$

11. Determine the area of the regular polygon that has an interior angle measuring 108° , a side measuring 9 m and an apothem that measures 6.5 m .

$$m = \frac{180(n-2)}{n}$$

$$108^\circ = \frac{180(n-2)}{n}$$

$$108n - 180n = 180n - 360 - 180n$$

$$-72n = -360$$

$$n = 5 \text{ sides}$$

$$A = \frac{as}{2}$$

$$A = \frac{6.5(5)(9)}{2}$$

$$\boxed{A = 146.25 \text{ m}^2}$$

12. Determine the perimeter of the regular polygon that has an interior angle measuring 144° and a side that measures 5 cm.

$$m = \frac{180^\circ(n-2)}{n}$$

$$144^\circ = \frac{180^\circ n - 360^\circ}{n}$$

$$144^\circ n = 180^\circ n - 360^\circ$$

$$-36^\circ n = -360^\circ$$

$$n = 10 \text{ sides}$$

$$P = ns$$

$$P = 10(5)$$

$$P = 50 \text{ cm}$$

13. Determine the area of the regular polygon that has an interior angle measuring 162° , a side measure 7 m and an apothem that measures 5 m.

$$m = \frac{180^\circ(n-2)}{n}$$

$$162^\circ = \frac{180^\circ n - 360^\circ}{n}$$

$$162^\circ n = 180^\circ n - 360^\circ$$

$$-18^\circ n = -360^\circ$$

$$n = 20 \text{ sides}$$

$$A = \frac{ans}{2}$$

$$= \frac{5(20)(7)}{2}$$

$$A = 350 \text{ m}^2$$

14. Each of the interior angles of a regular polygon are 156° . How many sides does the regular polygon have?

$$m = \frac{180^\circ(n-2)}{n}$$

$$156^\circ n = 180^\circ n - 360^\circ$$

$$-24^\circ n = -360^\circ$$

$$15 \text{ sides} = n$$