

# CH 5 GEOMETRY

## ANSWERS AND EXPLANATIONS

### EXERCISE 1

1. (a)  $a + 36^\circ + 70^\circ = 180^\circ$  (sum of angles of triangle)

$$\Rightarrow a = 180^\circ - 36^\circ - 70^\circ = 74^\circ$$

$$b = 36^\circ + 70^\circ (\text{Ext. angle of triangle}) = 106^\circ$$

$$c = a - 50^\circ (\text{Ext. angle of triangle})$$

$$= 74^\circ - 50^\circ = 24^\circ.$$

2. (b) Since the sum of all the angle of a quadrilateral is  $360^\circ$

$$\text{We have } \angle ABC + \angle BQE + \angle DEF + \angle EPB$$

$$= 360^\circ$$

$$\therefore \angle ABC + \angle DEF = 180^\circ$$

$$[\because \text{BPE} = \text{EQB} = 90^\circ]$$

3. (b)  $m \angle AHG = 180 - 108 = 72^\circ$

$\therefore \angle AHG = \angle ABC$  .....(same angle with different names)

$\therefore \triangle AHG \sim \triangle ABC$  .....(AA test for similarity)

$$\frac{AH}{AB} = \frac{AG}{AC} \quad \frac{6}{12} = \frac{9}{AC}$$

$$\therefore AC = \frac{12 \times 9}{6} = 18$$

$$\therefore HC = AC - AH = 18 - 6 = 12$$

4. (b) In  $\triangle ABC$ ,  $\angle C = 180 - 90 - 30 = 60^\circ$

$$\therefore \angle DCE = \frac{60}{2} = 30^\circ$$

$$\text{Again in } \triangle DEC, \angle CED = 180 - 90 - 30 = 60^\circ$$

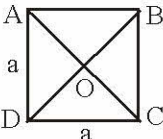
5. (c) In a right angled  $\Delta$ , the length of the median is  $\frac{1}{2}$  the length of the hypotenuse. Hence

$$BD = \frac{1}{2} AC = 3\text{cm.}$$

6. (a)  $\angle D = 180 - \angle B = 180 - 70 = 110^\circ$

$$\therefore \angle ACD = 180 - \angle D - \angle CAD$$

$$180 - 110 - 30 = 40^\circ$$

7. (b) 

ABCD is square  $a^2 = 4 \Rightarrow a = 2$

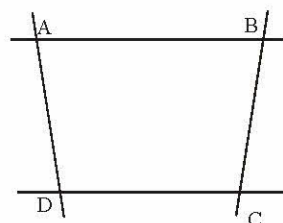
$$ac = BD = 2\sqrt{2}$$

perimeters of four triangles

$$= AB + BC + CD + DA + 2(AC + BD)$$

$$= 8 + 2(2\sqrt{2} + 2\sqrt{2}) = 8(1 + \sqrt{2})$$

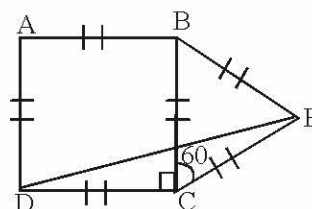
8. (d) The quadrilateral obtained will always be a trapezium as it has two lines which are always parallel to each other.



9. (b) It is a rectangle.

(In a cyclic parallelogram each angle is equal to  $90^\circ$ . So, it is definitely either a square or a rectangle. Since the given cyclic parallelogram has unequal adjacent sides, it is a square.)

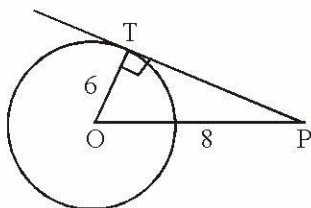
10. (a)



In  $\triangle DEC$ ,  $\angle DCE = 90^\circ + 60^\circ = 150^\circ$

$$\angle CDE = \angle DEC = \frac{180 - 150}{2} = 15^\circ$$

11. (e)  $OP = 8$  cm,  $OT = 6$  cm



$$\therefore PT = \sqrt{OP^2 - OT^2} = \sqrt{8^2 - 6^2} = \sqrt{28}$$

12. (d)  $\angle MBA = 180^\circ - 95^\circ = 85^\circ$

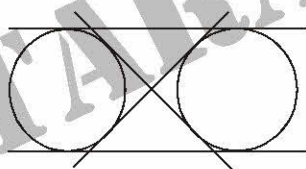
$\angle AMB = \angle TMN$  ... (Same angles with different names)

$\therefore \triangle MBA \sim \triangle MNT$  ..... (AA test for similarity)

$$\frac{MB}{MN} = \frac{AB}{NT} \quad \text{..... (proportional sides)}$$

$$\frac{10}{MN} = \frac{5}{9} \quad \therefore MN = \frac{90}{5} = 18$$

13. (a) Four tangents can be drawn to two non-intersecting circles in the following manner :



14. (c) Tangent at any point of a circle is  $\perp$  to the radius

In  $\triangle OPT$ ,  $OP^2 = PT^2 + OT^2$

$$(13)^2 = (12)^2 + OT^2$$

$$\Rightarrow 169 - 144 = OT^2$$

$$\Rightarrow 25 = OT^2 \Rightarrow 5 = OT$$

15. (c) Let the angles of the triangle be  $5x$ ,  $3x$  and  $2x$ .

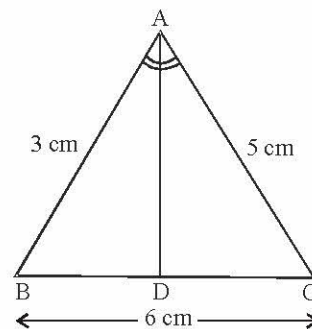
Now,  $5x + 3x + 2x = 180^\circ$

$$\text{or } 10x = 180 \quad \text{or } x = 18$$

or Angles are  $36^\circ$ ,  $54^\circ$  and  $90^\circ$

Given  $\triangle$  is right angled.

16. (b)



As AD bisects  $\angle BAC$ , we have

$$\frac{BD}{AB} = \frac{DC}{AC} \quad \text{or} \quad \frac{DC}{BD} = \frac{5}{3}$$

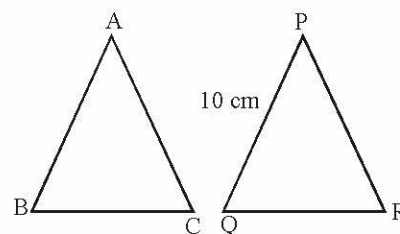
$$\text{or} \quad \frac{DC}{BD} + 1 = \frac{5}{3} + 1$$

$$\text{or} \quad \frac{DC + BD}{BD} = \frac{5 + 3}{3}$$

$$\text{or} \quad \frac{BC}{BD} = \frac{8}{3}$$

$$\text{or} \quad BD = \frac{BC \times 3}{8} = \frac{6 \times 3}{8} = \frac{9}{4} = 2.25 \text{ cm}$$

17. (d)



$\triangle ABC$  and  $\triangle PQR$  are similar.

$$\frac{AB}{PQ} = \frac{\text{Perimeter of } \triangle ABC}{\text{Perimeter of } \triangle PQR}$$

$$\Rightarrow \frac{AB}{PQ} = \frac{36}{24}$$

$$\text{or } AB = \frac{36}{24} \times 10 = 15$$

18. (c) We have,

$$\angle OBC = \angle OCB = 37^\circ$$



(equal angles of an isosceles triangle)

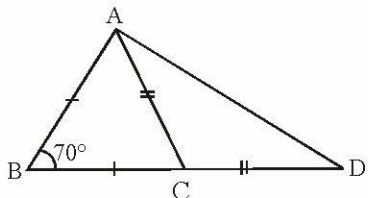
$$\Rightarrow \angle COB = 180^\circ - (37^\circ + 37^\circ) = 106^\circ$$

Therefore,  $\angle BAC$

$$= \frac{1}{2} \angle COB = \frac{106^\circ}{2} = 53^\circ$$

19. (b)  $\angle ACB = \angle BAC$

(Angles opposite equal sides are equal)



Similarly,  $\angle ADC = \angle CAD$

$$\therefore \angle ACB = \angle BAC$$

$$= \left( \frac{180^\circ - 70^\circ}{2} \right) = 55^\circ$$

$$\Rightarrow \angle ADC = \angle CAD$$

$$= \frac{180^\circ - 125^\circ}{2} = 27.5^\circ$$

20. (b) The sum of the interior angles of a polygon of  $n$  sides is given by the expression  $(2n - 4) \frac{\pi}{2}$

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

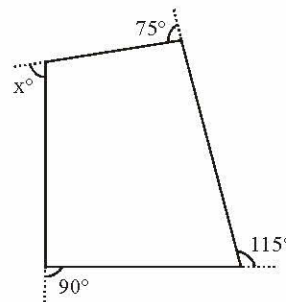
$$(2n - 4) = \frac{1620 \times 2}{180} = 18$$

or  $2n = 22$  or  $n = 11$

Thus the no. of sides of the polygon are 11.

## EXERCISE 2

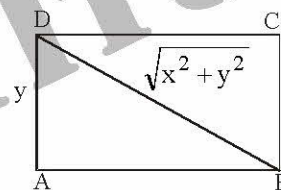
1. (c) Sum of all the interior angles of a polygon taken in order is  $360^\circ$ .



$$\text{i.e. } x + 90 + 115 + 75 = 360$$

$$\text{or } x = 360^\circ - 280^\circ = 80^\circ \quad \text{or } x = 80^\circ$$

2. (d)



According to question,

$$(x + y) - \sqrt{x^2 + y^2} = \frac{x}{2}$$

$$(x + y) - \frac{x}{2} = \sqrt{x^2 + y^2}$$

$$\left( \frac{x}{2} + y \right)^2 = x^2 + y^2$$

$$\frac{x^2}{4} + y^2 + xy = x^2 + y^2$$

$$x^2 + 4xy = 4x^2$$

$$4xy = 3x^2 \Rightarrow 4y = 3x \Rightarrow \frac{y}{x} = \frac{3}{4}$$



