IX Elite work-12 (Lines and Angles / Number Systems)

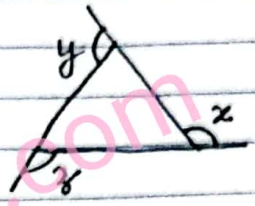
1) If the angles of a triangle are in the ratio 2:4:3, then the smallest angle of the triangle is:
(a) 10° (b) 25° (c) 30° (d) 40°

2) The sum of the bisectors of the angles of a linear pair is: (a) 100° (b) 90° (c) 85° (d) 60°

3) If one of the angles of a triangle is 130°, then the angle between the bisectors of the other two angle is:
(a) 50° (b) 60° (c) 155° (d) 70°

4) The complement of an angle m is:
(a) $90° \times m$ (b) $\frac{90°}{m}$ (c) $90° + m$ (d) $90° - m$

5) The value of $x+y+z$ is
(a) 60° (b) 180° (c) 300° (d) 360°



6) If $x = 2+\sqrt{3}$, then $x+\frac{1}{x}$ = (a) 3 (b) 4 (c) 5 (d) 6

7) If a and b are rational numbers and $\frac{3+\sqrt{7}}{3-\sqrt{7}} = a+b\sqrt{7}$, then $a+b$=
(a) 10 (b) 11 (c) 13 (d) 16

8) $\frac{6-4\sqrt{2}}{6+4\sqrt{2}}$ = (a) $15+12\sqrt{2}$ (b) $17-12\sqrt{2}$ (c) $19+2\sqrt{2}$ (d) $18+3\sqrt{2}$

9) $\frac{3^{50}+3^{49}-9^{24}}{3^{48}+3^{47}-9^{23}}$ = (a) $\frac{99}{13}$ (b) $\frac{88}{13}$ (c) $\frac{77}{13}$ (d) $\frac{66}{13}$

10) $\left(\frac{3^a}{3^b}\right)^{a+b} \times \left(\frac{3^b}{3^c}\right)^{b+c} \times \left(\frac{3^c}{3^a}\right)^{c+a}$ =

(a) 0 (b) 1 (c) 2 (d) ½

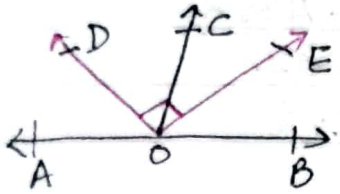
11) If $64^{2x-5} = 4 \times 8^{x-5}$, then the value of x is
(a) $\frac{13}{9}$ (b) $\frac{17}{9}$ (c) $\frac{13}{7}$ (d) $\frac{11}{9}$

12) If $(81)^{\frac{5}{x}} = 243$, then x = (a) 2 (b) 3 (c) 4 (d) 5

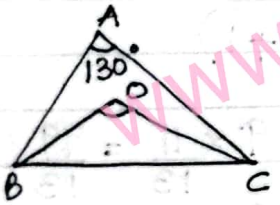
13) $\sqrt[4]{(81)^{-2}}$ = (a) ⅓ (b) ⅕ (c) ⅐ (d) 1/9

IX EW-12 (Lines & Angles / Number Systems - Answers)

1) Let the angles be $2x, 4x$ and $3x$.
Then, using angle sum property of a $\triangle$,
$$2x+4x+3x = 180^\circ$$
$$9x = 180^\circ$$
$$\therefore x = \frac{180^\circ}{9} = 20^\circ$$
Then, the smallest angle is $2x = 2\times 20^\circ = 40^\circ$ (d)

2) 

Let $\angle AOC$ and $\angle BOC$ form a linear pair.
OD bisects $\angle AOC$
OE bisects $\angle BOC$.
$\angle AOC + \angle BOC = 180^\circ$ (linear pair)
$\Rightarrow \frac{1}{2}\angle AOC + \frac{1}{2}\angle BOC = \frac{1}{2}\times 180^\circ$
$\Rightarrow \angle DOC + \angle COE = 90^\circ$
$\Rightarrow \angle DOE = 90^\circ$ (b)

3) 

Let $\angle A = 130^\circ$.
Then, using angle sum property of $\triangle ABC$,
$\angle A + \angle B + \angle C = 180^\circ$
$\Rightarrow 130^\circ + \angle B + \angle C = 180^\circ$
$\Rightarrow \angle B + \angle C = 180^\circ - 130^\circ = 50^\circ$
$\Rightarrow \frac{1}{2}(\angle B + \angle C) = \frac{1}{2}\times 50^\circ = 25^\circ \longrightarrow (1)$

In $\triangle BOC$, using angle sum property
$\angle OBC + \angle OCB + \angle BOC = 180^\circ$
$\Rightarrow \frac{1}{2}\angle B + \frac{1}{2}\angle C + \angle BOC = 180^\circ$
$\Rightarrow \frac{1}{2}(\angle B + \angle C) + \angle BOC = 180^\circ$
$\Rightarrow 25^\circ + \angle BOC = 180^\circ$ [from (1)]
$\therefore \angle BOC = 180^\circ - 25^\circ$
$= 155^\circ$ (c)

4) Complement of an angle m is $90^\circ - m$ (d)

5) $x+y+z = 360^\circ$ (d)

6) $x = 2+\sqrt{3}$
$$\frac{1}{x} = \frac{1}{2+\sqrt{3}} = \frac{2-\sqrt{3}}{(2)^2-(\sqrt{3})^2} = \frac{2-\sqrt{3}}{4-3} = 2-\sqrt{3}$$
$$\therefore x+\frac{1}{x} = 2+\sqrt{3}+2-\sqrt{3} = 4 \text{ (b)}$$

7) $\frac{3+\sqrt{7}}{3-\sqrt{7}} = \frac{(3+\sqrt{7})^2}{3^2-(\sqrt{7})^2} = \frac{9+7+6\sqrt{7}}{9-7} = \frac{16+6\sqrt{7}}{2} = \frac{2(8+3\sqrt{7})}{2}$

$= 8+3\sqrt{7}$

On comparing with $a+b\sqrt{7}$, $a=8$

$b=3$

Then, $a+b = 8+3 = 11$ (b)

8) $\frac{6-4\sqrt{2}}{6+4\sqrt{2}} = \frac{(6-4\sqrt{2})^2}{6^2-(4\sqrt{2})^2} = \frac{36+32-48\sqrt{2}}{36-32}$

$= \frac{68-48\sqrt{2}}{4} = \frac{4(17-12\sqrt{2})}{4}$

$= 17-12\sqrt{2}$ (b)

9) $\frac{3^{50}+3^{49}-9^{24}}{3^{48}+3^{47}+9^{23}} = \frac{3^{50}+3^{49}-3^{48}}{3^{48}+3^{47}+3^{46}}$

$= \frac{3^{48}(3^2+3^1-1)}{3^{46}(3^2+3^1+1)}$

$= 3^{48-46} \times \frac{11}{13} = 9 \times \frac{11}{13} = \frac{99}{13}$ (a)

10) $(3^{a-b})^{a+b} \times (3^{b-c})^{b+c} \times (3^{c-a})^{c+a}$

$= 3^{a^2-b^2} \times 3^{b^2-c^2} \times 3^{c^2-a^2}$

$= 3^{a^2-b^2+b^2-c^2+c^2-a^2}$

$= 3^0 = 1$ (b)

11) $2^{6(2x-5)} = 2^2 \times 2^{3(x-5)}$

$\Rightarrow 2^{12x-30} = 2^2 \times 2^{3x-15}$

$\Rightarrow 2^{12x-30} = 2^{2+3x-15}$

$\therefore 12x-30 = 3x-13$

$9x = 17$

$x = \frac{17}{9}$ (b)

12) $3^{4 \times \frac{5}{x}} = 3^5$

$\therefore \frac{20}{x} = 5$

$x = \frac{20}{5} = 4$ (c)

13) $\sqrt[4]{(81)^{-2}} = 3^{4x-2x\frac{1}{4}} = 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$ (d)
