TRIANGLES- CHAPTER 8

EXERCISE 8

Answer1

In $\triangle ABC$, given $\angle B = 76°$ and $\angle C = 48°$

Sum of all the angles of a $\triangle$ is 180°

$\therefore \angle A + \angle B + \angle C = 180$

$\angle A = 180 - \angle C - \angle B$

$\angle A = 180 - 76 - 48$

$\angle A = 56°$

Answer2

Let the angle be x°

So, the angles be 2x , 3x , 4x

Sum of all the angle of a $\triangle$ is 180°

$\therefore 2x + 3x + 4x = 180$

$9x = 180$

$x = \frac{180}{9} = 20$

hence angles be

2x = 2 X 20 = 40°

3x = 3 X 20 = 60°

4x = 4 X 20 = 80°

Answer3

In $\triangle ABC$, given $3\angle A = 4\angle B = 6\angle C$

So, if we assume

$3\angle A = 4\angle B = 6\angle C = x$ (say)

Then , $\angle A = (x/3)°$

$\angle B = (x/4)°$

$\angle C = (x/6)°$

We know that sum of all angles be 180°

$\angle A + \angle B + \angle C = 180°$

$$\frac{x}{3} + \frac{x}{4} + \frac{x}{6} = 180$$

$$\frac{4x+3x+2x}{12} = 180$$

$$\frac{9x}{12} = 180$$

$$9x = 180 \text{ X } 12$$

$$x = \frac{180 \text{ x } 12}{9}$$

$$x = 240$$

Hence,

$\angle A = x/3 = 240/3 = 80°$
$\angle B = x/4 = 240/4 = 60°$
$\angle C = x/6 = 240/6 = 40°$

Answer4
In $\triangle ABC$,
$\angle A + \angle B = 108°$…………..[i]
$\angle B + \angle C = 130°$…………..[ii]
Sum of all the angle be 180 °
Adding both the equation
$\angle A+\angle B+\angle B+\angle C = 108 +130$
$(\angle A + \angle B + \angle C) + \angle B = 238$
$180 + \angle B = 238$
$\angle B = 238 - 180$
$\angle B = 58°$
Hence, $\angle A +\angle B = 108$
$\angle A = 108 -58$
$\angle A = 50°$
$\angle B +\angle C = 130°$
$\angle C = 130 - 58$
$\angle C= 72°$

Answer5 Given, In $\triangle ABC$
$\angle A +\angle B = 125°$…….[i]
$\angle A +\angle C = 113°$………[ii]
Adding both equations
$\angle A+\angle A+\angle B+\angle C = 125+113$
$(\angle A + \angle B + \angle C) + \angle A = 238$
$180+ \angle A= 238$
$\angle A = 238 -180$
$\angle A = 58$
Hence, $\angle A +\angle B = 125$
$58 + \angle B = 125$
$\angle B = 125 -58$
$\angle B = 67°$
$\angle A+\angle C = 113$
$58 + \angle C = 113$
$\angle C = 113 - 58$
$\angle C = 55°$

Answer6 In $\triangle PQR$
Given, $\angle P - \angle Q = 42°$
$\angle P = 42 + \angle Q$ …………….[i]
$\angle Q-\angle R = 21°$
$\angle R=21 +\angle Q$ ……………….[ii]

We know sum of all the triangle be 180°

$\angle P+\angle Q+\angle R = 180°$

$(42+\angle Q) + \angle Q + (21 + \angle Q) = 180$ …………(by using i and ii)

$63 + 3\angle Q = 180$

$3\angle Q = 180 - 63$

$\angle Q = 117/3 = 39°$

Hence, $\angle P - \angle Q = 42°$

$\angle P = 42 + 39 = 81°$

And $\angle R = 21 + \angle Q$

$\angle R = 21 + 39 = 60°$

Answer7

Let the angle be x° , y °, z° of the triangle

Acc to question,

$x° + y° = 116°$…………..(i)

$x° - y° = 24°$ ………….. (ii)

by adding both equ…

$(x + y)+(x-y) = 116+24$

$2x = 140$

$X = 140/2 = 70°$

And $y = 116 - x°$

$y° = 116 - 70 = 46°$

we know sum of all the angle be

$x°+y°+z° = 180$

$70°+ 46° + z° = 180$

$z° = 180 - 70-46$

$z° = 64°$

Answer8

Let the angles be x, y, z

Acc to question

$x = y$, third angle be $x + 18$

so,

$x + y + z = 180$

$x + x + (x+18) = 180$

$3x = 180 - 18$

$x = 162/3 = 54°$

hence , $y = 54°$

$z = 18 + x = 18+54$

$z = 72°$

Answer9

Let the smallest angle be x°

2nd angle be 2x° and 1st angle be 3x°

We know, the sum of all the angle be 180°

$x + 2x + 3x = 180$
$6x = 180$
$X = 180/6 = 30°$
2^{nd} angle = $2x = 2 \text{ X } 30 = 60°$
1^{st} angle = $3x = 3 \text{ X } 30 = 90°$

Answer10

In right angle triangle
Let the angle be x , y, z
So, $x = 90°$ (right angle)
$y = 53°$ (given)
sum of all the angle of a △
$x + y + z = 180$
$90 + 53 + z = 180$
$Z = 180 – 53 - 90$
$Z = 37°$

Answer11

Let the angle be X , Y, Z of △
$X = Y + Z$ (given)
So, we know sum of all the angle be 180
$\Rightarrow X + X = (X+Y+Z) = 180$
$\Rightarrow 2X = 180$
$\Rightarrow X = 180/2 = 90°$

Answer12

Let the angle be X, Y, Z of △
Given , $X < Y + Z$
$Y < X + Z$
$Z < X + Y$
So, we know sum of all the angle be 180
Then, $X < Y+Z$
$2X < X + Y + Z = 180$
$\Rightarrow X = 180/2 = 90°$
$\Rightarrow X < 90°$
And $Y < X+Z$
$2Y < X + Y + Z = 180$
$\Rightarrow Y = 180/2 = 90°$
$\Rightarrow Y < 90°$
And $Z < X+Y$
$2Z < X + Y + Z = 180$
$\Rightarrow Z = 180/2 = 90°$
$\Rightarrow Z < 90°$
Hence, all the angle be more than 0° but less than 90° is the acute angle.

Answer13

Let the angle be X, Y, Z of $\triangle$

Given , $X > Y + Z$

$Y > X+Z$

$Z > X + Y$

So, we know sum of all the angle be 180

Then, $X > Y+Z$

$2X > X + Y + Z = 180$

$\Rightarrow X = 180/2 = 90°$

$\Rightarrow X > 90°$

And $Y > X+Z$

$2Y > X + Y + Z = 180$

$\Rightarrow Y = 180/2 = 90°$

$\Rightarrow Y > 90°$

And $Z > X+Y$

$2Z > X + Y + Z = 180$

$\Rightarrow Z = 180/2 = 90°$

$\Rightarrow Z > 90°$

Hence, all the angle be more than 90° but less than 180° is the obtuse angle.

Answer14

Given , side BC of $\triangle ABC$ is produced to D. $\angle ACD = 128°$ and $\angle ABC = 43°$

On straight line BCD

$\angle ACB + \angle ACD = 180$

$\angle ACB = 180 - \angle ACD$

$\angle ACB = 180 - 128 = 52°$

And in $\triangle ABC$

$\angle ABC + \angle ACB + \angle BAC = 180°$

$43 + 52 + \angle BAC = 180$

$\angle BAC = 180 - 52 - 43$

$\angle BAC = 85°$

Answer15

Given, $\angle ABD = 106°$ and $\angle ACE = 118°$

In straight line DBCE

$\angle DBA + \angle CBA = 180$

$106° + \angle CBA = 180$

$\angle CBA = 180 - 106$

$\angle CBA = 74°$

And $\angle ACE + \angle BCA = 180°$

$118° + \angle BCA = 180°$

$\angle BCA = 180 - 118$

$\angle BCA = 62°$

In $\triangle ABC$

$\angle BAC + \angle CBA + \angle BCA = 180°$

$\angle BAC + 74° + 64° = 180$

$\angle BAC = 180 - 74 - 62$

$\angle BAC = 44°$

Hence, $\angle A = 44°$, $\angle B = 74°$, $\angle C = 62°$

Answer16

(i) Given, $\angle BAE = 110°$, $\angle ACD = 120°$

On straight line EAC

$\angle EAB + \angle BAC = 180°$

$110° + \angle BAC = 180°$

$\angle BAC = 180 - 110°$

$\angle BAC = 70°$

And on straight line BCD

$\angle BCD + \angle DCA = 180$

$\angle BCD + 120° = 180°$

$\angle BCD = 180 - 120$

$\angle BCD = 60°$

The value of x °

In $\triangle BCA$

$\angle BAC + \angle CBA + \angle BCA = 180°$

$X° + 70 + 60 = 180$

$x° = 180 - 70 - 60$

$x° = 50°$

(ii) Given, $\angle ABC = 40°$, $\angle BAC = 30°$, $\angle CDE = 50°$

In $\triangle BCA$

$\angle BAC + \angle CBA + \angle BCA = 180°$

$40 + 30 + \angle BCA = 180$

$\angle BCA = 180 - 40 - 30$

$\angle BCA = 110°$

On straight line BCD

$\angle BCA + \angle ECD = 180°$

$\angle ECD = 180 - \angle BCA$

$= 180 - 110$

$\Rightarrow \angle ECD = 70°$

And In $\triangle CED$

$\angle CED + \angle ECD + \angle EDC = 180°$

$\angle CED + 50° + 70° = 180°$

$\angle CED = 180 - 50 - 70$

$\Rightarrow \angle CED = 60°$

So line AEC

$\angle CED + \angle AED = 180°$

$60° + \angle AED = 180$

$\angle AED = 180 - 60$

$\angle AED = 120°$

$x = 120°$

(iii) Given , $\angle EAF = 60°$ $\angle ACD = 115°$

$\angle EAF = \angle BAC$ ....[vertical opp angle]

$\angle BAC = 60°$

On straight line

$\angle BCA + \angle DCA = 180°$

$\angle BCA + 115° = 180$

$\angle BCA = 180 - 115$

$\Rightarrow \angle BCA = 65°$

In $\triangle ABC$

$\angle BAC + \angle CBA + \angle BCA = 180°$

$60° + x + 65 = 180°$

$x = 180 - 65 - 60$

$x = 55°$

(iv) Given $AB \parallel CD$, $\angle BAD = 60°$, $\angle DCE = 45°$

$\angle BAD = \angle ADC$ ....[alternative angles]

$\angle ADC = 60°$

In $\triangle EDC$

$\angle EDC + \angle CED + \angle DCE = 180°$

$60 + x + 45° = 180°$

$x = 180 - 45 - 60$

$x = 75°$

(v) Given $\angle BEF = 100°$, $\angle EAF = 40°$, $\angle BCA = 90°$

In liner BEA

$\angle BEF + \angle FEA = 180°$

$\angle BEF = 180 - \angle FEA$

$\angle BEF = 180 - 100$

$\angle BEF = 80°$

In $\triangle EFA$

$\angle EFA + \angle EAF + \angle AEF = 180$

$\angle EFA + 40 + 80 = 180$

$\angle EFA = 180 - 40 - 80$

$\angle EFA = 60°$

So, $\angle AFE = \angle CFD$ ....[vertical opp angle]

$\angle CFD = 60°$

In $\triangle FCD$, hence $\angle BCF = \angle DCF = 90°$..........[right angle]

$\angle FCD + \angle CFD + \angle FDC = 180°$

$90° + 60 + \angle FDC = 180°$

$\angle FDC = 180 - 60 - 90$

$\angle FDC = 30°$

$x = 30°$

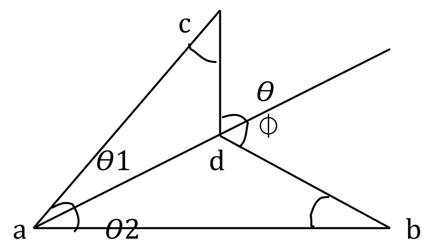
(vi) Given, $\angle BAE = 75°$, $\angle EBA = 65°$, $\angle ECD = 110°$

In $\triangle ABE$

$\angle ABE + \angle BEA + \angle BAE = 180°$
$75° + \angle BEA + 65° = 180°$
$\angle BEA = 180 - 65 - 75$
$\angle BEA = 40°$
So, $\angle BEA = \angle ECD$ ………….[vertical opp angle]
$\angle ECD = 40°$
In $\triangle ECD$
$\angle ECD + \angle EDC + \angle CED = 180°$
$110 + x + 40° = 180°$
$x = 180 - 40 - 110$
$x = 30°$

Answer17
Given, $AB \parallel CD$, $EF \parallel BC$
$\angle BAC = 60°$ and $\angle DHF = 50°$
Here, $\angle BAC = \angle GCH$ …….[alternative interior angles]
So, $\angle GCH = 60°$
And $\angle DFH = \angle CHG$ ………….[vertical opp angle]
$\angle CGH = 50°$
In $\triangle CGH$
$\angle CGH + \angle GCH + \angle CHG = 180°$
$\angle CGH + 50 + 60 = 180°$
$\angle CGH = 180 - 50 - 60$
$\angle CGH = 70°$
Hence, in linear line AGC
$\angle AGH + \angle GCH = 180°$
$\angle AGH + 70° = 180°$
$\angle AGH = 180 - 70$
$\angle AGH = 110°$

Answer18
Draw intersect line on angle A° on D
Now, x° be divided into 2 parts θ & ϕ
And $\angle A = 55°$ & $\angle A°$ also divided into $\theta 1$ and $\theta 2$
$\angle ACD = 30°$, $\angle ABD = 45°$
So, In $\triangle ADC$
$30° + \theta 1 = \theta$………….(i)
And in $\triangle ADB$
$45° + \theta 2 = \phi$ …………(ii)



Adding both equation,
$(30 + \theta 1) + (45 + \theta 2) = \theta + \phi$
$30 + 45 + (\theta 1 + \theta 2) = \theta + \phi$
$30 + 45 + 55 = 130 = \phi + \theta$
Hence, $x = 130°$

Answer19
Given, AD dvides ∠BAC in the ratio 1:3 and AD = DB
In liner line
∠BAC + ∠EAC = 180°
∠BAC = 180 - ∠EAC
∠ BAC = 180- 108°
∠BAC = 72°
∠BAD: ∠CAD = 1:3
∴ ∠BAD = ¼ X 72° = 18°
And ∠CAD = ¾ X 72 = 54°
Given, AD = DB ⇒ ∠DBA = ∠BAD = 18
In △ ABC
∠ABC +∠BAC + ∠BCA = 180°
18 + (18+54) + x° = 180
x° = 180- 18-18-54
x° = 90°

Answer20
value of 4 right angle will be 360°
so, we have solve this
∠ACD = ∠A + ∠B
∠FBC =∠A+∠C
And ∠BAE = ∠B +∠C
Hence,
∠ACD +∠FBC + ∠BAE
=(∠A+∠B)+(∠A+∠C) +(∠B +∠C)
= 2(∠A+∠B∠+C)
= 2 X 180
= 360°

Answer21
There is 2 △ , △DFB and △AEC
In △DFB
∠D +∠F +∠B = 180°…….(i)
In △AEC
∠E+∠A+∠C = 180°……….(ii)
By adding both equation
Hence,
∠E+∠A+∠C + ∠D +∠F +∠B = 180+180 = 360°

Answer22
Given , AM⊥BC and AN is the bisector of ∠A. ∠ABC = 70° and ∠ACB = 20°
In △ABC
∠A+∠B+∠C = 180°
∠A= 180 - ∠B-∠C
∠A = 180 – 70 – 20 = 90°

In $\triangle ABM$

$\angle BAM + \angle AMB + \angle MBA = 180°$

$\angle BAM + 90° + 70 = 180°$

$\angle BAM = 180 - 90 - 70$

$\angle BAM = 20°$

In $\triangle BAN$

Acc to given fig,

$\angle BAN = ½ \angle A = 45°$

$\Rightarrow \angle BAM + \angle MAN = 45°$

$20° + \angle MAN = 45°$

$\angle MAN = 45° - 20°$

$\angle MAN = 25°$

Answer23 Given,

$BAD \parallel EF$, $\angle AEF = 55°$ $\angle ACB = 25°$

In liner

$\angle FEA + \angle EAD = 180°$

$55° + \angle EAD = 180°$

$\angle EAD = 180 - 55 = 125°$

So, $\angle EAD = \angle BAC$…………..[vertical opp angle]

$\angle BAC = 125°$

In $\triangle ABC$

$\angle BAC + \angle ABC + \angle BCA = 180°$

$125° + \angle ABC + 25° = 180°$

$\angle ABC = 180 - 25 - 125$

Hence, $\angle ABC = 30°$

Answer24

Given, $\angle A : \angle B : \angle C = 3:2:1$ and $CD \perp AC$, so $\angle ACD = 90°$

Let angle be x°

So, in $\triangle ABC$

$\angle A + \angle B + \angle C = 180°$

$3x + 2x + x = 180°$

$6x = 180$

$X = 30°$

So, $\angle c = 30°$

In linear line BCE

$\angle ACB + \angle ACD + \angle ECD = 180°$

$30° + 90° + \angle ECD = 180$

$\angle ECD = 180 - 90 - 30$

Hence, $\angle ECD = 60°$

Answer25

Given, $AB \parallel DE$ and $BD \parallel FG$ and $\angle ABC = 50°$ and $\angle FGH = 120°$

Here $y° + \angle FGH = 180°$ [in linear]

$y + 120° = 180°$

$y = 180 - 120 = 60°$

acc to fig , alternative interior angles

$\angle ABC = \angle CDE = \angle EFG$ ………….(given, $\angle ABC = 50$)

So, $\angle EFG = 50°$

Hence, in $\triangle EFG$

$\angle FEG + \angle EFG + \angle EGF = 180°$

$X + 50 + 60 = 180°$

$X = 180 - 50\ 60$

Hence , $x = 70°$

Answer26 given,

$AB \parallel CD$, $\angle DFG = 30°$, $\angle AEF = 65°$, $\angle EGF = 90°$

By, alternative interior angles,

$\angle AEF = \angle EFD = 65°$ (given)

Where $\angle EFD = \angle EFG + \angle GFD$

$65° = \angle EFG + 30°$

$\angle EFG = 65 - 30 = 35°$

$\therefore$ In $\triangle EFG$

$\angle EFG + \angle GEF + \angle EGF = 180°$

$35 + 90 + \angle EGF = 180°$

$\angle EGF = 180 - 35 - 90 = 55°$

Answer27

Given, $AB \parallel CD$, $\angle BAE = 65°$ and $\angle OEC = 20°$

$\angle BAO = \angle DOE$ ……[corresponding angle]

$\angle DOE = 65°$

In liner DOC

$\angle DOE + \angle EOC = 180°$

$65° + \angle EOC = 180$

$\angle EOC = 180 - 65 = 115°$

In $\triangle COE$

$\angle COE + \angle ECO + \angle CEO = 180°$

$115 + \angle ECO + 20 = 180$

$\angle ECO = 180 - 20 - 115$

$\angle ECO = 45°$

Answer28

Given, $AB \parallel CD$ and EF is a trAnswerversal

$\angle EGB = 35°$ and $QP \perp EF$

Vertical opp angles

$\angle EGB = \angle AGH \Rightarrow \angle GHD = \angle CHP = 35°$

In $\triangle QPH$

$\angle P + \angle Q + \angle H = 180°$

$90° + X° + 35° = 180°$

$X^\circ = 180 - 35 - 90$
$x^\circ = 55^\circ$

Answer29

given, AB∥CD , EF⊥AB , ∠GED = 130°

∠GED = ∠GEF + ∠FED

130 = ∠GEF + 90°…………[right angle]

∠GEF = 130-90 = 40°

In EFG

∠EFG + ∠FEG +∠EGF = 180°

90° + 40 ° + ∠EGF = 180°

∠EGF = 180 – 90 – 40

∠EGF = 50°

MULTIPLE-CHOICE QUESTIONS

Answer1(b)

Given, in △ABC , 3∠A = 4∠B = 6∠C = k (say)

Then,

$$\angle A = \frac{k}{3}$$

$$\angle B = \frac{k}{4}$$

$$\angle C = \frac{k}{6}$$

Hence, ∠A :∠B:∠C = k/3 : k/4 : k/6

= 4k: 3k : 2k

= 4: 3: 2

Answer2 (c)

Given , in △ABC if ∠A - ∠B = 42°

∠B - ∠C = 21°

So, ∠A = 42 +∠B and ∠C = ∠B - 21°

In △ABC

∠A+∠B+∠C = 180°

42+ ∠B + ∠B + ∠B - 21° = 180

3∠B + 21 = 180

3∠B = 180 -21

∠B = 159 /3 = 53

Answer3(b)

Given, ∠ABC = 50° , ∠ACD=110°

On linear line BCD

∠BCA + ∠ACD = 180°

∠BCA = 180 - ∠ACD

⇒ ∠BCA = 180- 110

∠BCA = 70°

In △ABC

∠A+∠B+∠C = 180°

∠A = 180 - ∠B -∠C

∠A = 180 – 50 – 70

Hence, ∠A = 60°

Answer4(d)

Given , ∠ABD = 125° and ∠ACE = 130°

In linear DBC

$\angle DBA + \angle ABC = 180°$
$\angle ABC = 180 - \angle DBA$
$= 180 - 125$
$\angle ABC = 55°$
In linear BCE
$\angle BCA + \angle ACE = 180°$
$\angle BCA + 130 = 180$
$\angle BCA = 180 - 130 = 50°$
In $\triangle ABC$
$\angle BAC + \angle ABC + \angle BCA = 180°$
$\angle BAC + 50 + 55 = 180°$
$\angle BAC = 180 - 50 - 55 = 75°$

Answer5(a)
Given, $\angle ABD = 110°$, $\angle CAE = 135°$
In linear DBC
$\angle DBA + \angle BAC = 180°$
$110° + \angle BAC = 180°$
$\angle BAC = 180 - 110 = 70°$
In linear line EAB
$\angle EAC + \angle DBA = 180°$
$135° + \angle DBA = 180°$
$\angle DBA = 180 - 135 = 45°$
In $\triangle$ ABC
$\angle BAC + \angle ABC + \angle BCA = 180°$
$70 + 45 + \angle BCA = 180$
$\angle BCA = 180 - 70 - 45$
$\angle BCA = 65°$

Answer6(d)
Given, BC ,CA and AB of $\triangle ABC$ have been produced to D,E and F
If one side of triangle is produced then the exterior angle so found is equal to the sum of two interior opposite angles.
So,
$\angle BAE = \angle B + \angle C$....(i)
$\angle CBF = \angle A + \angle C$....(ii)
$\angle ACD = \angle A + \angle B$...(iii)
Adding all the equation,
$\angle BAE + \angle CBF + \angle ACD = \angle B + \angle C + \angle A + \angle C + \angle A + \angle B$
$= 2(\angle A + \angle B + \angle C)$
$= 2 \times 180$
$\angle BAE + \angle CBF + \angle ACD = 360°$

Answer7(b)
Given, $EAD \perp BCD$, $\angle EAF = 30°$ and $\angle BAC = x°$, $\angle ABC = (x + 10)°$
Here, $\angle EAF = \angle CAD$ ....[vertically opp angle]

$\angle CAD = 30°$
$\therefore \angle BAD = x° + \angle CAD = x° + 30$
In $\triangle BAD$
$\angle B + \angle A + \angle D = 180°$
$(x + 10) + (x + 30) + 90 = 180$
$2x + 40 + 90 = 180$
$2x = 180 - 40 - 90$
$x = 25$

Answer8(a)
`given, $\angle ABF = x°$, $\angle ACG = y°$, $\angle DAE = z°$
$\angle EAD = \angle BAC$ ……….[vertical opp angles]
In $\triangle ABC$
$\angle BAC + \angle ABC + \angle BCA = 180$
$z° + (180 - x) + (180 - y) = 180$
hence, $z° = x + y - 180$

Answer9(b)
By given fig, $\angle ACO = 80°$, $\angle AOC = 40°$, $\angle ODB = 70°$
Here $\angle AOC = \angle BOD$……[vertically opp angle]
$\angle BOD = 40°$
As we know the, the exterior angle so found is equal to the sum of two interior opposite angles.
$\angle EAO = \angle C + \angle O$
$x° = 80 + 40 = 120°$
and $\angle FBD = \angle O + \angle D$
$y° = 70 + 40 = 110°$
hence, $x° + y° = 120 + 110 = 230°$

Answer10(a)
Given, $\angle A : \angle B : \angle C = 3:2:1$ and $\angle ACD = 90°$
Let the angle be x of the $\triangle ABC$
$\angle A + \angle B + \angle C = 180$
$3x + 2x + x = 180$
$6x = 180$
$x = 180/6 = 30°$
so, $\angle BCA = 30°$
In linear BCE
$\angle BCA + \angle ACD + \angle ECD = 180°$
$30° + 90° + \angle ECD = 180°$
$\angle ECD = 180 - 30 - 90$
$\angle ECD = 60°$

Answer11(c)
Given, $\angle A = 50°$

In $\triangle ABC$

$\angle BAC + \angle ABC + \angle BCA = 180$

$\angle A + \angle B + \angle C = 180$..........(can also written)

$\angle B + \angle C = 180 - \angle A$

So, on bisector part

In $\triangle BOC$

$1/2 \angle B + 1/2 \angle C + \angle BOC = 180$

$½(\angle B + \angle C) + \angle BOC = 180$

$½ \text{ X } 130 + \angle BOC = 180$

$65° + \angle BOC = 180$

Hence, $\angle BOC = 180 – 65 = 115°$

Answer12(a)

Given, $\angle A = 3y°$, $\angle B = x°$, $\angle C = 5y°$, and $\angle CBD = 7y°$

In liner line BCD

$\angle BCA + \angle ACD = 180°$

$5y + 7y = 180$

$12 y = 180$

$y = 15°$

so, In $\triangle ABC$

$\angle A + \angle B + \angle C = 180$

$3y + x + 5y = 180$

$3 \text{ X } 15 + x + 5 \text{ X } 15 = 180$

$45 + x + 75 = 180$

$x = 180 - 45 - 75$

$x = 60$