
TRIANGLES- CHAPTER 8

EXERCISE 8

Answer1

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

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

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

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

$$\angle A = 180 - 76 - 48$$

$$\angle A = 56^\circ$$

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

$$2x = 2 \times 20 = 40^\circ$$

$$3x = 3 \times 20 = 60^\circ$$

$$4x = 4 \times 20 = 80^\circ$$

Answer3

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

So, if we assume

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

$$\text{Then, } \angle A = (x/3)^\circ$$

$$\angle B = (x/4)^\circ$$

$$\angle C = (x/6)^\circ$$

We know that sum of all angles be 180°

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

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

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

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

$$9x = 180 \times 12$$

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

$$x = 240$$

Hence,

$$\angle A = x/3 = 240/3 = 80^\circ$$

$$\angle B = x/4 = 240/4 = 60^\circ$$

$$\angle C = x/6 = 240/6 = 40^\circ$$

Answer4

In $\triangle ABC$,

$$\angle A + \angle B = 108^\circ \dots\dots\dots[i]$$

$$\angle B + \angle C = 130^\circ \dots\dots\dots[ii]$$

Sum of all the angle be 180°

Adding both the equation

$$\angle A + \angle B + \angle B + \angle C = 108 + 130$$

$$(\angle A + \angle B + \angle C) + \angle B = 238$$

$$180 + \angle B = 238$$

$$\angle B = 238 - 180$$

$$\angle B = 58^\circ$$

Hence, $\angle A + \angle B = 108$

$$\angle A = 108 - 58$$

$$\angle A = 50^\circ$$

$$\angle B + \angle C = 130^\circ$$

$$\angle C = 130 - 58$$

$$\angle C = 72^\circ$$

Answer5 Given, In $\triangle ABC$

$$\angle A + \angle B = 125^\circ \dots\dots[i]$$

$$\angle A + \angle C = 113^\circ \dots\dots[ii]$$

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, $\angle A + \angle B = 125$

$$58 + \angle B = 125$$

$$\angle B = 125 - 58$$

$$\angle B = 67^\circ$$

$$\angle A + \angle C = 113$$

$$58 + \angle C = 113$$

$$\angle C = 113 - 58$$

$$\angle C = 55^\circ$$

Answer6 In $\triangle PQR$

Given, $\angle P - \angle Q = 42^\circ$

$$\angle P = 42 + \angle Q \dots\dots\dots[i]$$

$$\angle Q - \angle R = 21^\circ$$

$$\angle R = 21 + \angle Q \dots\dots\dots[ii]$$

We know sum of all the triangle be 180°

$$\angle P + \angle Q + \angle R = 180^\circ$$

$$(42 + \angle Q) + \angle Q + (21 + \angle Q) = 180 \dots\dots\dots(\text{by using i and ii})$$

$$63 + 3\angle Q = 180$$

$$3\angle Q = 180 - 63$$

$$\angle Q = 117 / 3 = 39^\circ$$

$$\text{Hence, } \angle P - \angle Q = 42^\circ$$

$$\angle P = 42 + 39 = 81^\circ$$

$$\text{And } \angle R = 21 + \angle Q$$

$$\angle R = 21 + 39 = 60^\circ$$

Answer7

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

Acc to question,

$$x^\circ + y^\circ = 116^\circ \dots\dots\dots(i)$$

$$x^\circ - y^\circ = 24^\circ \dots\dots\dots(ii)$$

by adding both equ...

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

$$2x = 140$$

$$x = 140 / 2 = 70^\circ$$

$$\text{And } y = 116 - x^\circ$$

$$y^\circ = 116 - 70 = 46^\circ$$

we know sum of all the angle be

$$x^\circ + y^\circ + z^\circ = 180$$

$$70^\circ + 46^\circ + z^\circ = 180$$

$$z^\circ = 180 - 70 - 46$$

$$z^\circ = 64^\circ$$

Answer8

Let the angles be x , y , z

Acc to question

$$x = y, \text{ third angle be } x + 18$$

so,

$$x + y + z = 180$$

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

$$3x = 180 - 18$$

$$x = 162 / 3 = 54^\circ$$

$$\text{hence, } y = 54^\circ$$

$$z = 18 + x = 18 + 54$$

$$z = 72^\circ$$

Answer9

Let the smallest angle be x°

2nd angle be $2x^\circ$ and 1st angle be $3x^\circ$

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

$$x + 2x + 3x = 180$$

$$6x = 180$$

$$X = 180/6 = 30^\circ$$

$$2^{\text{nd}} \text{ angle} = 2x = 2 \times 30 = 60^\circ$$

$$1^{\text{st}} \text{ angle} = 3x = 3 \times 30 = 90^\circ$$

Answer10

In right angle triangle

Let the angle be x, y, z

So, $x = 90^\circ$ (right angle)

$y = 53^\circ$ (given)

sum of all the angle of a Δ

$$x + y + z = 180$$

$$90 + 53 + z = 180$$

$$Z = 180 - 53 - 90$$

$$Z = 37^\circ$$

Answer11

Let the angle be X, Y, Z of Δ

$X = Y + Z$ (given)

So, we know sum of all the angle be 180

$$\Rightarrow X + X = (X + Y + Z) = 180$$

$$\Rightarrow 2X = 180$$

$$\Rightarrow X = 180/2 = 90^\circ$$

Answer12

Let the angle be X, Y, Z of Δ

Given, $X < Y + Z$

$$Y < X + Z$$

$$Z < X + Y$$

So, we know sum of all the angle be 180

Then, $X < Y + Z$

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

$$\Rightarrow X = 180/2 = 90^\circ$$

$$\Rightarrow X < 90^\circ$$

And $Y < X + Z$

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

$$\Rightarrow Y = 180/2 = 90^\circ$$

$$\Rightarrow Y < 90^\circ$$

And $Z < X + Y$

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

$$\Rightarrow Z = 180/2 = 90^\circ$$

$$\Rightarrow Z < 90^\circ$$

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 Δ

Given, $X > Y + Z$

$$Y > X + Z$$

$$Z > X + Y$$

So, we know sum of all the angle be 180

Then, $X > Y + Z$

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

$$\Rightarrow X = 180/2 = 90^\circ$$

$$\Rightarrow X > 90^\circ$$

And $Y > X + Z$

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

$$\Rightarrow Y = 180/2 = 90^\circ$$

$$\Rightarrow Y > 90^\circ$$

And $Z > X + Y$

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

$$\Rightarrow Z = 180/2 = 90^\circ$$

$$\Rightarrow Z > 90^\circ$$

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

Answer14

Given, side BC of ΔABC is produced to D. $\angle ACD = 128^\circ$ and $\angle ABC = 43^\circ$

On straight line BCD

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

$$\angle ACB = 180 - \angle ACD$$

$$\angle ACB = 180 - 128 = 52^\circ$$

And in ΔABC

$$\angle ABC + \angle ACB + \angle BAC = 180^\circ$$

$$43 + 52 + \angle BAC = 180$$

$$\angle BAC = 180 - 52 - 43$$

$$\angle BAC = 85^\circ$$

Answer15

Given, $\angle ABD = 106^\circ$ and $\angle ACE = 118^\circ$

In straight line DBCE

$$\angle DBA + \angle CBA = 180$$

$$106^\circ + \angle CBA = 180$$

$$\angle CBA = 180 - 106$$

$$\angle CBA = 74^\circ$$

And $\angle ACE + \angle BCA = 180^\circ$

$$118^\circ + \angle BCA = 180^\circ$$

$$\angle BCA = 180 - 118$$

$$\angle BCA = 62^\circ$$

In $\triangle ABC$

$$\angle BAC + \angle CBA + \angle BCA = 180^\circ$$

$$\angle BAC + 74^\circ + 64^\circ = 180$$

$$\angle BAC = 180 - 74 - 62$$

$$\angle BAC = 44^\circ$$

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

Answer 16

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

On straight line EAC

$$\angle EAB + \angle BAC = 180^\circ$$

$$110^\circ + \angle BAC = 180^\circ$$

$$\angle BAC = 180 - 110^\circ$$

$$\angle BAC = 70^\circ$$

And on straight line BCD

$$\angle BCD + \angle DCA = 180$$

$$\angle BCD + 120^\circ = 180^\circ$$

$$\angle BCD = 180 - 120$$

$$\angle BCD = 60^\circ$$

The value of x°

In $\triangle BCA$

$$\angle BAC + \angle CBA + \angle BCA = 180^\circ$$

$$x^\circ + 70 + 60 = 180$$

$$x^\circ = 180 - 70 - 60$$

$$x^\circ = 50^\circ$$

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

In $\triangle BCA$

$$\angle BAC + \angle CBA + \angle BCA = 180^\circ$$

$$40 + 30 + \angle BCA = 180$$

$$\angle BCA = 180 - 40 - 30$$

$$\angle BCA = 110^\circ$$

On straight line BCD

$$\angle BCA + \angle ECD = 180^\circ$$

$$\angle ECD = 180 - \angle BCA$$

$$= 180 - 110$$

$$\Rightarrow \angle ECD = 70^\circ$$

And In $\triangle CED$

$$\angle CED + \angle ECD + \angle EDC = 180^\circ$$

$$\angle CED + 50^\circ + 70^\circ = 180^\circ$$

$$\angle CED = 180 - 50 - 70$$

$$\Rightarrow \angle CED = 60^\circ$$

So line AEC

$$\angle CED + \angle AED = 180^\circ$$

$$60^\circ + \angle AED = 180$$

$$\angle AED = 180 - 60$$

$$\angle AED = 120^\circ$$

$$x = 120^\circ$$

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- (iii) Given, $\angle EAF = 60^\circ$ $\angle ACD = 115^\circ$
 $\angle EAF = \angle BAC$ [vertical opp angle]
 $\angle BAC = 60^\circ$
 On straight line
 $\angle BCA + \angle DCA = 180^\circ$
 $\angle BCA + 115^\circ = 180$
 $\angle BCA = 180 - 115$
 $\Rightarrow \angle BCA = 65^\circ$
 In $\triangle ABC$
 $\angle BAC + \angle CBA + \angle BCA = 180^\circ$
 $60^\circ + x + 65 = 180^\circ$
 $x = 180 - 65 - 60$
 $x = 55^\circ$
- (iv) Given $AB \parallel CD$, $\angle BAD = 60^\circ$, $\angle DCE = 45^\circ$
 $\angle BAD = \angle ADC$ [alternative angles]
 $\angle ADC = 60^\circ$
 In $\triangle EDC$
 $\angle EDC + \angle CED + \angle DCE = 180^\circ$
 $60 + x + 45^\circ = 180^\circ$
 $x = 180 - 45 - 60$
 $x = 75^\circ$
- (v) Given $\angle BEF = 100^\circ$, $\angle EAF = 40^\circ$, $\angle BCA = 90^\circ$
 In liner BEA
 $\angle BEF + \angle FEA = 180^\circ$
 $\angle BEF = 180 - \angle FEA$
 $\angle BEF = 180 - 100$
 $\angle BEF = 80^\circ$
 In $\triangle EFA$
 $\angle EFA + \angle EAF + \angle AEF = 180$
 $\angle EFA + 40 + 80 = 180$
 $\angle EFA = 180 - 40 - 80$
 $\angle EFA = 60^\circ$
 So, $\angle AFE = \angle CFD$ [vertical opp angle]
 $\angle CFD = 60^\circ$
 In $\triangle FCD$, hence $\angle BCF = \angle DCF = 90^\circ$ [right angle]
 $\angle FCD + \angle CFD + \angle FDC = 180^\circ$
 $90^\circ + 60 + \angle FDC = 180^\circ$
 $\angle FDC = 180 - 60 - 90$
 $\angle FDC = 30^\circ$
 $x = 30^\circ$
- (vi) Given, $\angle BAE = 75^\circ$, $\angle EBA = 65^\circ$, $\angle ECD = 110^\circ$
 In $\triangle ABE$

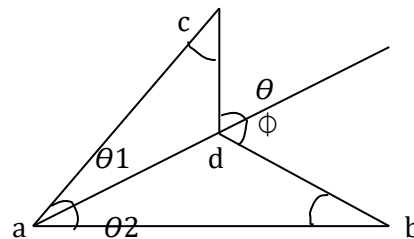
$$\begin{aligned}
 \angle ABE + \angle BEA + \angle BAE &= 180^\circ \\
 75^\circ + \angle BEA + 65^\circ &= 180^\circ \\
 \angle BEA &= 180 - 65 - 75 \\
 \angle BEA &= 40^\circ \\
 \text{So, } \angle BEA &= \angle ECD \text{[vertical opp angle]} \\
 \angle ECD &= 40^\circ \\
 \text{In } \triangle ECD \\
 \angle ECD + \angle EDC + \angle CED &= 180^\circ \\
 110 + x + 40^\circ &= 180^\circ \\
 x &= 180 - 40 - 110 \\
 x &= 30^\circ
 \end{aligned}$$

Answer17

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

Answer18

Draw intersect line on angle A° on D
 Now, x° be divided into 2 parts θ & ϕ
 And $\angle A = 55^\circ$ & $\angle A^\circ$ also divided into θ_1 and θ_2
 $\angle ACD = 30^\circ$, $\angle ABD = 45^\circ$
 So, In $\triangle ADC$
 $30^\circ + \theta_1 = \theta$ (i)
 And in $\triangle ADB$
 $45^\circ + \theta_2 = \phi$ (ii)
 Adding both equation,
 $(30 + \theta_1) + (45 + \theta_2) = \theta + \phi$
 $30 + 45 + (\theta_1 + \theta_2) = \theta + \phi$
 $30 + 45 + 55 = 130 = \theta + \phi$
 Hence, $x = 130^\circ$



Answer19

Given, AD divides $\angle BAC$ in the ratio 1:3 and $AD = DB$

In liner line

$$\angle BAC + \angle EAC = 180^\circ$$

$$\angle BAC = 180 - \angle EAC$$

$$\angle BAC = 180 - 108^\circ$$

$$\angle BAC = 72^\circ$$

$$\angle BAD : \angle CAD = 1:3$$

$$\therefore \angle BAD = \frac{1}{4} \times 72^\circ = 18^\circ$$

$$\text{And } \angle CAD = \frac{3}{4} \times 72 = 54^\circ$$

$$\text{Given, } AD = DB \Rightarrow \angle DBA = \angle BAD = 18$$

In $\triangle ABC$

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

$$18 + (18 + 54) + x^\circ = 180$$

$$x^\circ = 180 - 18 - 18 - 54$$

$$x^\circ = 90^\circ$$

Answer20

value of 4 right angle will be 360°

so, we have solve this

$$\angle ACD = \angle A + \angle B$$

$$\angle FBC = \angle A + \angle C$$

$$\text{And } \angle BAE = \angle B + \angle C$$

Hence,

$$\angle ACD + \angle FBC + \angle BAE$$

$$= (\angle A + \angle B) + (\angle A + \angle C) + (\angle B + \angle C)$$

$$= 2(\angle A + \angle B + \angle C)$$

$$= 2 \times 180$$

$$= 360^\circ$$

Answer21

There is 2 $\triangle$, $\triangle DFB$ and $\triangle AEC$

In $\triangle DFB$

$$\angle D + \angle F + \angle B = 180^\circ \dots\dots(i)$$

In $\triangle AEC$

$$\angle E + \angle A + \angle C = 180^\circ \dots\dots(ii)$$

By adding both equation

Hence,

$$\angle E + \angle A + \angle C + \angle D + \angle F + \angle B = 180 + 180 = 360^\circ$$

Answer22

Given, $AM \perp BC$ and AN is the bisector of $\angle A$. $\angle ABC = 70^\circ$ and $\angle ACB = 20^\circ$

In $\triangle ABC$

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

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

$$\angle A = 180 - 70 - 20 = 90^\circ$$

In $\triangle ABM$

$$\angle BAM + \angle AMB + \angle MBA = 180^\circ$$

$$\angle BAM + 90^\circ + 70 = 180^\circ$$

$$\angle BAM = 180 - 90 - 70$$

$$\angle BAM = 20^\circ$$

In $\triangle BAN$

Acc to given fig,

$$\angle BAN = \frac{1}{2} \angle A = 45^\circ$$

$$\Rightarrow \angle BAM + \angle MAN = 45^\circ$$

$$20^\circ + \angle MAN = 45^\circ$$

$$\angle MAN = 45^\circ - 20^\circ$$

$$\angle MAN = 25^\circ$$

Answer23 Given,

$$BAD \parallel EF, \angle AEF = 55^\circ \quad \angle ACB = 25^\circ$$

In liner

$$\angle FEA + \angle EAD = 180^\circ$$

$$55^\circ + \angle EAD = 180^\circ$$

$$\angle EAD = 180 - 55 = 125^\circ$$

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

$$\angle BAC = 125^\circ$$

In $\triangle ABC$

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

$$125^\circ + \angle ABC + 25^\circ = 180^\circ$$

$$\angle ABC = 180 - 25 - 125$$

$$\text{Hence, } \angle ABC = 30^\circ$$

Answer24

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

Let angle be x°

So, in $\triangle ABC$

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

$$3x + 2x + x = 180^\circ$$

$$6x = 180$$

$$x = 30^\circ$$

So, $\angle c = 30^\circ$

In linear line BCE

$$\angle ACB + \angle ACD + \angle ECD = 180^\circ$$

$$30^\circ + 90^\circ + \angle ECD = 180$$

$$\angle ECD = 180 - 90 - 30$$

$$\text{Hence, } \angle ECD = 60^\circ$$

Answer25

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

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

$$y + 120^\circ = 180^\circ$$

$$y = 180 - 120 = 60^\circ$$

acc to fig, alternative interior angles

$$\angle ABC = \angle CDE = \angle EFG \dots\dots\dots(\text{given, } \angle ABC = 50)$$

So, $\angle EFG = 50^\circ$

Hence, in $\triangle EFG$

$$\angle FEG + \angle EFG + \angle EGF = 180^\circ$$

$$X + 50 + 60 = 180^\circ$$

$$X = 180 - 50 - 60$$

Hence, $x = 70^\circ$

Answer 26 given,

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

By, alternative interior angles,

$$\angle AEF = \angle EFD = 65^\circ \text{ (given)}$$

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

$$65^\circ = \angle EFG + 30^\circ$$

$$\angle EFG = 65 - 30 = 35^\circ$$

$\therefore$ In $\triangle EFG$

$$\angle EFG + \angle GEF + \angle EGF = 180^\circ$$

$$35 + 90 + \angle EGF = 180^\circ$$

$$\angle EGF = 180 - 35 - 90 = 55^\circ$$

Answer 27

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

$\angle BAO = \angle DOE \dots\dots[\text{corresponding angle}]$

$\angle DOE = 65^\circ$

In line DOC

$$\angle DOE + \angle EOC = 180^\circ$$

$$65^\circ + \angle EOC = 180$$

$$\angle EOC = 180 - 65 = 115^\circ$$

In $\triangle COE$

$$\angle COE + \angle ECO + \angle CEO = 180^\circ$$

$$115 + \angle ECO + 20 = 180$$

$$\angle ECO = 180 - 20 - 115$$

$$\angle ECO = 45^\circ$$

Answer 28

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

$\angle EGB = 35^\circ$ and $QP \perp EF$

Vertical opp angles

$$\angle EGB = \angle AGH \Rightarrow \angle GHD = \angle CHP = 35^\circ$$

In $\triangle QPH$

$$\angle P + \angle Q + \angle H = 180^\circ$$

$$90^\circ + X^\circ + 35^\circ = 180^\circ$$

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

Answer29

given, $AB \parallel CD$, $EF \perp AB$, $\angle GED = 130^\circ$

$$\angle GED = \angle GEF + \angle FED$$

$$130 = \angle GEF + 90^\circ \dots\dots\dots[\text{right angle}]$$

$$\angle GEF = 130 - 90 = 40^\circ$$

In EFG

$$\angle EFG + \angle FEG + \angle EGF = 180^\circ$$

$$90^\circ + 40^\circ + \angle EGF = 180^\circ$$

$$\angle EGF = 180 - 90 - 40$$

$$\angle EGF = 50^\circ$$