9. Triangle and Its Angles

Exercise 9.1

1. Question

In a ΔABC, if $\angle A = 55°$, $\angle B = 40°$, find $\angle C$

Answer

Given, $\angle A = 55^o$

$\angle B = 40^o$ and $\angle C = ?$

We know that, In ΔABC sum of all angles of triangle is 180^o

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

$55^o + 40^o + \angle C = 180^o$

$95^o + \angle C = 180^o$

$\angle C = 85^o$

2. Question

If the angles of a triangle are in the ratio 1 : 2 : 3, determine three angles.

Answer

Given that the angles of the triangle are in ratio 1 : 2 : 3

Let, the angles be a, 2a, 3a

Therefore, we know that

Sum of all angles if triangle is 180^o

$a + 2a + 3a = 180^o$

$6a = 180^o$

$a = \frac{180}{6}$

$a = 30^o$

Since, $a = 30^o$

$2a = 2\ (30^o) = 60^o$

$3a = 3\ (30^o) = 90^o$

Therefore, angles are $a = 30^o$, $2a = 60^o$ and $3a = 90^o$

Hence, angles are 30^o, 60^o and 90^o.

3. Question

The angles of a triangle are $(x-40)°$, $(x-20)°$ and $\left(\frac{1}{2}x - 10\right)^°$. Find the value of x.

Answer

Given that,

The angles of the triangle are $(x - 40^o)$, $(x - 20^o)$ and $(\frac{x}{2} - 10^o)$

We know that,

Sum of all angles of triangle is 180^o.

Therefore,

$x - 40^o + x - 20^o + \frac{x}{2} - 10^o = 180^o$

$2x + \frac{x}{2} - 70^o = 180^o$

$\frac{5x}{2} = 250^o$

$5x = 250^o * 2$

$5x = 500^o$

$x = 100^o$

Therefore, $x = 100^o$

4. Question

The angles of a triangle are arranged ascending order of magnitude. If the difference between two consecutive angles is 10°, find the three angles.

Answer

Given that,

The difference between two consecutive angles is 10^o.

Let, x, x + 10 and x + 20 be the consecutive angles differ by 10^o.

We know that,

$x + x + 10 + x + 20 = 180^o$

$3x + 30^o = 180^o$

$3x = 180^o - 30^o$

$3x = 150^o$

$x = 50^o$

Therefore, the required angles are:

$x = 50^o$

$x + 10 = 50^o + 10^o$

$= 60^o$

$x + 20 = 50^o + 20^o$

$= 70^o$

The difference between two consecutive angles is 10^o then three angles are 50^o, 60^o and 70^o.

5. Question

Two angles of a triangle are equal and the third angle is greater than each of those angles by 30°. Determine all the angles of the triangle.

Answer

Given that,

Two angles are equal and third angle is greater than each of those angles by 30^o.

Let, x, x, $x + 30^o$ be the angles of the triangle.

We know that,

Sum of all angles of triangle is 180^o

$x + x + x + 30^o = 180^o$

$3x + 30^o = 180^o$

$3x = 180^o - 30^o$

$3x = 150^o$

$x = 50^o$

Therefore,

The angles are:

$x = 50^o$

$x = 50^o$

$x + 30^o = 50^o + 30^o$

$= 80^o$

Therefore, the required angles are 50^o, 50^o, 80^o.

6. Question

If one angle of a triangle is equal to the sum of the other two, show that the triangle is a right triangle.

Answer

If one of the angle of a triangle is equal to the sum of other two.

i.e. $\angle B = \angle A + \angle C$

Now, in ΔABC

Sum of all angles of triangle is 180^o

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

$\angle B + \angle B = 180^o$ [Therefore, $\angle A + \angle C = \angle B$]

$2\angle B = 180^o$

$\angle B = 90^o$

Therefore, ABC is right angled triangle.

7. Question

ABC is a triangle in which $\angle A = 72°$, the internal bisectors of angles B and C meet in O. Find the magnitude of $\angle BOC$.

Answer

Given,

ABC is a triangle

$\angle A = 72^o$ and internal bisectors of B and C meet O.

In ΔABC

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

$72^o + \angle B + \angle C = 180^o$

$\angle B + \angle C = 180^o - 72^o$

$\angle B + \angle C = 108^o$

Divide both sides by 2, we get

$\frac{\angle B}{2} + \frac{\angle C}{2} = \frac{108}{2}$

$\frac{\angle B}{2} + \frac{\angle C}{2} = 54^o$

$\angle OBC + \angle OCB = 54^o$ (i)

Now, in ΔBOC

$\angle OBC + \angle OCB + \angle BOC = 180^o$

$54^o + \angle BOC = 180^o$ [Using (i)]

$\angle BOC = 180^o - 54^o$

$= 126^o$

8. Question

The bisectors of base angles of a triangle cannot enclose a right angle in any case.

Answer

In ΔABC sum of all angles of a triangle is 180^o

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

Divide both sides by 2, we get

$\frac{1}{2}\angle A + \frac{1}{2}\angle B + \frac{1}{2}\angle C = 180^o$

$\frac{1}{2}\angle A + \angle OBC + \angle OCB = 90^o$ [Therefore, OB, OC bisects $\angle B$ and $\angle C$]

$\angle OBC + \angle OCB = 90^o - \frac{1}{2}\angle A$

Now, in ΔBOC

$\angle BOC + \angle OBC + \angle OCB = 180^o$

$\angle BOC + 90^o - \frac{1}{2}\angle A = 180^o$

$\angle BOC = 90^o - \frac{1}{2}\angle A$

Hence, bisector open base angle cannot enclose right angle.

9. Question

If the bisectors of the base angles of a triangle enclose an angle of 135°, prove that the triangle is a right triangle.

Answer

Given bisector og the base angles of a triangle enclose an angle of 135^o

i.e. $\angle BOC = 135^o$

But,

$135^o = 90^o + \frac{1}{2}\angle A$

$\frac{1}{2}\angle A = 135^o - 90^o$

$\angle A = 45^o$ (2)

$= 90^o$

Therefore, ΔABC is right angled triangle right angled at A.

10. Question

In a Δ ABC, $\angle ABC = \angle ACB$ and the bisectors of $\angle ABC$ and $\angle ACB$ intersect at O such that $\angle BOC$ = 120°. Shoe that $\angle A = \angle B = \angle C$ = 60°.

Answer

Given,

$In\ \Delta ABC$

$\angle$ ABC = $\angle$ ACB

Divide both sides by 2, we get

$\frac{1}{2}\angle ABC = \frac{1}{2}\angle ACB$

$\angle OBC = \angle OCB$ [Therefore, OB, OC bisects $\angle B$ and $\angle C$]

Now,

$\angle BOC = 90^o + \frac{1}{2}\angle A$

$120^o - 90^o = \frac{1}{2}\angle A$

$30^o * 2 = \angle A$

$\angle A = 60^o$

Now in ΔABC

$\angle A + \angle ABC + \angle ACB = 180^o$ [Sum of all angles of a triangle]

$60^o + 2\angle ABC = 180^o$ [Therefore, $\angle ABC = \angle ACB$]

$2\angle ABC = 180^o - 60^o$

$2\angle ABC = 120^o$

$\angle ABC = 60^o$

Therefore, $\angle ABC = \angle ACB = 60^o$

Hence, proved

11. Question

Can a triangle have:

(i) Two right angles?

(ii) Two obtuse angles?

(iii) Two acute angles?

(iv) All angles more than 60°?

(v) All angles less than 60°?

(vi) All angles equal to 60°?

Justify your answer in each case.

Answer

(i) No, two right angles would up to 180^{o} so the third angle becomes zero. This is not possible. Therefore, the triangle cannot have two right angles.

(ii) No, a triangle can't have two obtuse angles as obtuse angle means more than 90^{o}. So, the sum of the two sides exceeds more than 180^{o} which is not possible. As the sum of all three angles of a triangle is 180^{o}.

(iii) Yes, a triangle can have two acute angle as acute angle means less than 90^{o}.

(iv) No, having angles more than 60^{o} make that sum more than 180^{o} which is not possible as the sum of all angles of a triangle is 180^{o}.

(v) No, having all angles less than 60^{o} will make that sum less than 180^{o} which is not possible as the sum of all angles of a triangle is 180^{o}.

(vi) Yes, a triangle can have three angles equal to 60^{o} as in this case the sum of all three is equal to 180^{o} which is possible. This type of triangle is known as equilateral triangle.

12. Question

If each angle of a triangle is less than the sum of the other two, show that the triangle is acute angled.

Answer

Given,

Each angle of a triangle is less than the sum of the other two.

Therefore,

$\angle A + \angle B + \angle C$

$\angle A + \angle A < \angle A + \angle B + \angle C$

$2\angle A < 180^{o}$ [Sum of all angles of a triangle]

$\angle A = 90^{o}$

Similarly,

$\angle B < 90^{o}$ and $\angle C < 90^{o}$

Hence, the triangle is acute angled.

Exercise 9.2

1. Question

The exterior angles, obtained on producing the base of a triangle both ways are 104° and 136°. Find all the angles of the triangle.

Answer

Let, ABC be a triangle and base BC produced to both sides. Exterior angles are $\angle ABD$ and $\angle ACE$.

$\angle ABD = 104^{o}$

$\angle ACE = 136^{o}$

$\angle ABD + \angle ABC = 180^{o}$ (Linear pair)

$104^{o} + \angle ABC = 180^{o}$

$\angle ABC = 180^{o} – 104^{o}$

$= 76^{o}$

$\angle ACE + \angle ACB = 180^{o}$

$136^{o} + \angle ACB = 180^{o}$

$\angle ACB = 180^o - 136^o$

$= 44^o$

In ΔABC

$\angle A + \angle ABC + \angle ACB = 180^o$

$\angle A + 76^o + 44^o = 180^o$

$\angle A + 120^o = 180^o$

$\angle A = 180^o - 120^o$

$= 60^o$

Thus, angles of triangle are 60^o, 76^o and 44^o.

2. Question

In a ΔABC, the internal bisectors of $\angle B$ and $\angle C$ meet at P and the external bisectors of $\angle B$ and $\angle C$ meet at Q. Prove that $\angle BPC + \angle BQC = 180°$.

Answer

Given that ABC is a triangle.

BP and CP are internal bisector of $\angle B$ and $\angle C$ respectively

BQ and CQ are external bisector of $\angle B$ and $\angle C$ respectively.

External $\angle B = 180^o - \angle B$

External $\angle C = 180^o - \angle C$

In ΔBPC

$\angle BPC + \frac{1}{2}\angle B + \frac{1}{2}\angle C = 180^o$

$\angle BPC = 180^o - \frac{1}{2}(\angle B + \angle C)$ (i)

In ΔBQC

$\angle BQC + \frac{1}{2}(180^o - \angle B) + \frac{1}{2}(180^o - \angle C) = 180^o$

$\angle BQC + 180^o - \frac{1}{2}(\angle B + \angle C) = 180^o$

$\angle BPC + \angle BQC = 180^o$ [From (i)]

Hence, proved

3. Question

In Fig. 9.30, the sides BC, CA and AB of a $\Delta\, ABC$ have been produced to D, E and F respectively. If $\angle ACD = 105°$ and $\angle EAF = 45°$, find all the angles of the $\Delta\, ABC$.

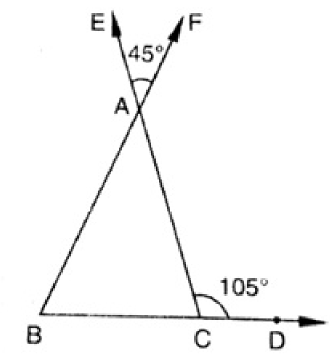


Fig. 9.30

Answer

Given,

∠ACD = 105^o

∠EAF = 45^o

∠EAF = ∠BAC (Vertically opposite angle)

∠BAC = 45^o

∠ACD + ∠ACB = 180^o (Linear pair)

105^o + ∠ACB = 180^o

∠ACB = 180^o – 105^o

= 75^o

In ΔABC

∠BAC + ∠ABC + ∠ACB = 180^o

45^o + ∠ABC + 75^o = 180^o

∠ABC = 180^o – 120^o

= 60^o

Thus, all three angles of a triangle are 45^o, 60^o and 75^o.

4. Question

Compute the value of x in each of the following figures:

(i)

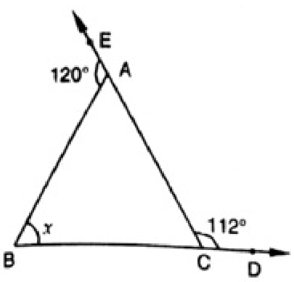


Fig. 9.31

(ii)

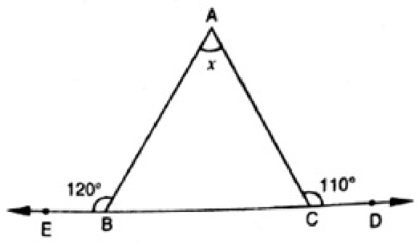


Fig. 9.32

(iii)

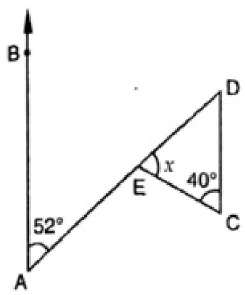


Fig. 9.33

(iv)

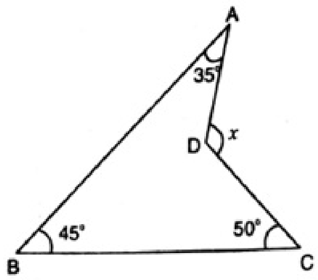


Fig. 9.34

Answer

(i) ∠DAC + ∠BAC = 180^o (Linear pair)

120^o + ∠BAC = 180^o

∠BAC = 180^o – 120^o

= 60^o

And,

∠ACD + ∠ACB = 180^o

112^o + ∠ACB = 180^o

∠ACB = 68^o

In ΔABC,

∠BAC + ∠ACB + ∠ABC = 180^o

60^o + 68^o + x = 180^o

128^o + x = 180^o

x = 180^o – 128^o

= 52^o

(ii) $\angle ABE + \angle ABC = 180^o$ (Linear pair)

$120^o + \angle ABC = 180^o$

$\angle ABC = 60^o$

$\angle ACD + \angle ACB = 180^o$ (Linear pair)

$110^o + \angle ACB = 180^o$

$\angle ACB = 70^o$

In ΔABC

$\angle A + \angle ACB + \angle ABC = 180^o$

$x + 70^o + 60^o = 180^o$

$x + 130^o = 180^o$

$x = 50^o$

(iii) AB ∥ CD and AD cuts them so,

$\angle BAE = \angle EDC$ (Alternate angles)

$\angle EDC = 52^o$

In ΔEDC

$\angle EDC + \angle ECD + \angle CEO = 180^o$

$52^o + 40^o + x = 180^o$

$92^o + x = 180^o$

$x = 180^o - 92^o$

$= 88^o$

(iv) Join AC

In ΔABC

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

$(35^o + \angle 1) + 45^o + (50^o + \angle 2) = 180^o$

$130^o + \angle 1 + \angle 2 = 180^o$

$\angle 1 + \angle 2 = 50^o$

In ΔDAC

$\angle 1 + \angle 2 + \angle D = 180^o$

$50^o + x = 180^o$

$x = 180^o - 50^o$

$= 130^o$

5. Question

In Fig. 9.35, *AB* divides $\angle DAC$ in the ratio 1: 3 and *AB* = *DB*. Determine the value of *x*.

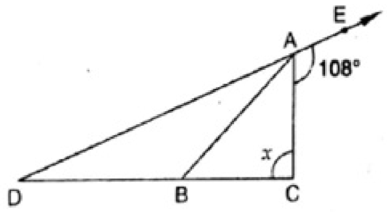


Fig. 9.35

Answer

Given,

AB divides ∠DAC in the ratio 1: 3

∠DAB: ∠BAC = 1: 3

∠DAC + ∠EAC = 180°

∠DAC + 108° = 180°

∠DAC = 180° – 108°

= 72°

∠DAB = $\frac{1}{4}$ * 72° = 18°

∠BAC = $\frac{3}{4}$ * 72° = 54°

In ΔADB

∠DAB + ∠ADB + ∠ABD = 180°

18° + 18° + ∠ABD = 180°

36° + ∠ABD = 180°

∠ABD = 180° – 36°

= 144°

∠ABD + ∠ABC = 180° (Linear pair)

144° + ∠ABC = 180°

∠ABC = 180° – 144°

= 36°

In ΔABC

∠BAC + ∠ABC + ∠ACB = 180°

54° + 36° + x = 180°

90° + x = 180°

x = 180° – 90°

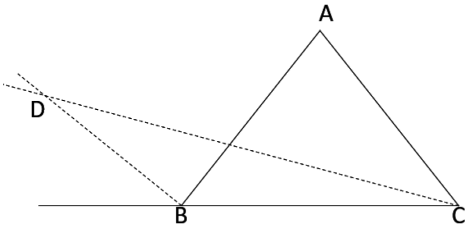
= 90°

Thus, x = 90°

6. Question

ABC is a triangle. The bisector of the exterior angle at *B* and the bisector of ∠*C* intersect each other at *D*. Prove that $\angle D = \frac{1}{2}\angle A$.

Answer



Exterior ∠B = (180° - ∠B)

Exterior ∠C = (180° - ∠C)

In ΔABC

∠A + ∠B + ∠C = 180°

$\frac{1}{2}$(∠A + ∠B + ∠C) = 180°

$\frac{1}{2}$(∠B + ∠C) = 180° - $\frac{1}{2}$∠A (i)

In ΔDBC

∠D + ∠DBC + ∠DCB = 180°

∠D + {180° - $\frac{1}{2}$(180° - ∠B) - ∠B} + {180° - $\frac{1}{2}$(180° - ∠C) - ∠C} = 180°

∠D + 360° – 90° – 90° – ($\frac{1}{2}$∠B + $\frac{1}{2}$∠C) = 180°

∠D + 180° – 90° - $\frac{1}{2}$∠A = 180°

∠D = $\frac{1}{2}$∠A

Hence, proved

7. Question

In Fig. 9.36, AC $\perp$ *CE* and $\angle A : \angle B : \angle C$ = 3:2:1, find the value of $\angle ECD$.

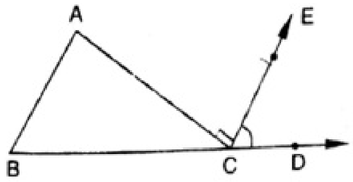


Fig. 9.36

Answer

Given,

AC is perpendicular to CE

∠A: ∠B: ∠C = 3: 2: 1

Let,

∠A = 3k

∠B = 2k

∠C = k

∠A + ∠B + ∠C = 180°

3k + 2k + k = 180°

$6k = 180^o$

$k = 30^o$

Therefore,

$\angle A = 3k = 90^o$

$\angle B = 2k = 60^o$

$\angle C = k = 30^o$

Now,

$\angle C + \angle ACE + \angle ECD = 180^o$ (Linear pair)

$30^o + 90^0 + \angle ECD = 180^o$

$\angle ECD = 180^o - 120^o$

$= 60^o$

8. Question

In Fig. 9.37, $AM \perp BC$ and AN is the bisector of $\angle A$. If $\angle B = 65°$ and $\angle C = 33°$, find $\angle MAN$.

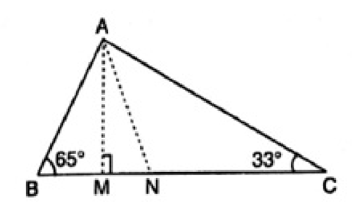


Fig. 9.37

Answer

Given,

AM perpendicular to BC

AN is bisector of $\angle A$

Therefore, $\angle NAC = \angle NAB$

In ΔABC

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

$\angle A + 65^o + 33^o = 180^o$

$\angle A = 180^o - 98^o$

$= 82^o$

$\angle NAC = \angle NAB = 41^o$ (Therefore, AN is bisector of $\angle A$)

In ΔAMB

$\angle AMB + \angle MAB + \angle ABM = 180^o$

$90^o + \angle MAB + 65^o = 180^o$

$\angle MAB + 155^o = 180^0$

$\angle MAB = 25^o$

Therefore,

$\angle MAB + \angle MAN = \angle BAN$

$25^{o} + \angle MAN = 41^{o}$

$\angle MAN = 41^{o} - 25^{o}$

$= 16^{o}$

9. Question

In a Δ ABC, AD bisects $\angle A$ and $\angle C > \angle B$. Prove that $\angle ADB > \angle ADC$.

Answer

Given,

AB bisects $\angle$A ($\angle$DAB = $\angle$DAC)

$\angle C > \angle B$

In ΔADB,

$\angle ADB + \angle DAB + \angle B = 180^{o}$ (i)

In ΔADC,

$\angle ADC + \angle DAC + \angle C = 180^{o}$ (ii)

From (i) and (ii), we get

$\angle ADB + \angle DAB + \angle B = \angle ADC + \angle DAC + \angle C$

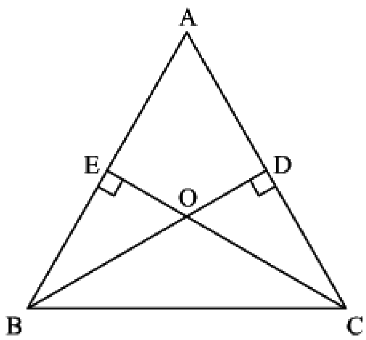
$\angle ADB > \angle ADC$ (Therefore, $\angle C > \angle B$)

Hence, proved

10. Question

In Δ ABC, $BD \perp AC$ and $CE \perp AB$. If BD and CE intersect at O, prove that $\angle BOC = 180° - A$.

Answer



Given,

BD perpendicular to AC

And,

CE perpendicular to AB

In ΔBCE

$\angle E + \angle B + \angle ECB = 180^{o}$

$90^{o} + \angle B + \angle ECB = 180^{o}$

$\angle B + \angle ECB = 90^{o}$

$\angle B = 90^{o} - \angle ECB$ .....(i)

In ΔBCD

$\angle D + \angle C + \angle DBC = 180^o$

$90^o + \angle C + \angle DBC = 180^o$

$\angle C + \angle DBC = 90^o$

$\angle C = 90^o - \angle DBC$ .....(ii)

Adding (i) and (ii), we get

$\angle B + \angle C = 180^o (\angle ECB + \angle DBC)$

$\angle 180^o - \angle A = 180^o (\angle ECB + \angle DBC)$

$\angle A = \angle ECB + \angle DBC$

$\angle A = \angle OCB + \angle OBC$ (Therefore, $\angle ECB = \angle OCB$ and $\angle DCB = \angle OCB$) .... (iii)

In ΔBOC

$\angle BOC + (\angle OBC + \angle OCB) = 180^o$

$\angle BOC + \angle A = 180^o$ [From (iii)]

$\angle BOC = 180^o - \angle A$

Hence, proved

11. Question

In Fig. 9.38, AE bisects $\angle CAD$ and $\angle B = \angle C$. Prove that $AE || BC$.

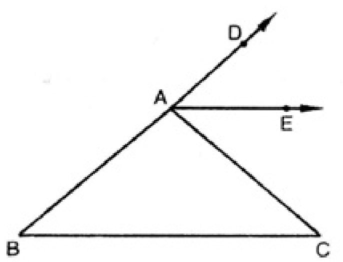


Fig. 9.38

Answer

Given,

AE bisects $\angle CAD$

$\angle B = \angle C$

In ΔABC

$\angle CAD = \angle B + \angle C$

$\angle CAD = \angle C + \angle C$

$\angle CAD = 2\angle C$

$\angle 1 + \angle 2 = 2\angle C$ (Therefore, $\angle CAD = \angle 1 + \angle 2$)

$\angle 2 + \angle 2 = 2\angle C$ (Therefore, AE bisects $\angle CAD$)

$2\angle 2 = 2\angle C$

$\angle 2 = \angle C$ (Alternate angles)

Therefore, AE ∥ BC

Hence, proved

12. Question

In Fig. 9.39, $AB||DE$. Find $\angle ACD$.

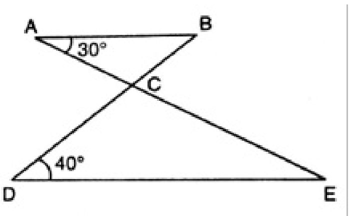


Fig. 9.39

Answer

Since,

AB ∥ DE

∠ABC = ∠CDE (Alternate angles)

∠ABC = 40^o

In ΔABC

∠A + ∠B + ∠ACB = 180^o

30^o + 40^o + ∠ACB = 180^o

∠ACB = 180^o – 70^o

= 110^o (i)

Now,

∠ACD + ∠ACB = 180^o (Linear pair)

∠ACD + 110^o = 180^o [From (i)]

∠ACD = 180^o – 110^o

= 70^o

Hence, ∠ACD = 70^o.

13. Question

Which of the following statements are true (T) and which are false (F).

(i) Sum of the three angles of a triangle is 180°.

(ii) A triangle can have two right angles.

(iii) All the angles of a triangle can be less than 60°.

(iv) All the angles of a triangle can be greater than 60°.

(v) All the angles of a triangle can be equal to 60°.

(vi) A triangle can have two obtuse angles.

(vii) A triangle can have at most one obtuse angles.

(viii) If one angle of a triangle is obtuse, then it cannot be a right angled triangle.

(ix) An exterior angle of a triangle is led than either of its interior opposite angles.

(x) An exterior angle of a triangle is equal to the sum of the two interior opposite angles.

(xi) An exterior angle of a triangle is greater than the opposite interior angles.

Answer

(i) True

(ii) False

(iii) False

(iv) False

(v) True

(vi) False

(vii) True

(viii) True

(ix) False

(x) True

(xi)True

14. Question

Fill in the blanks to make the following statements true :

(i) Sum of the angles of a triangle is ……

(ii) An exterior angle of a triangle is equal to the two …… opposite angles.

(iii) An exterior angle of a triangle is always …..than either of the interior opposite angles.

(iv) A triangle cannot have more than ….right angles.

(v) A triangles cannot have more than ….. obtuse angles.

Answer

(i) 180^o

(ii) Interior

(iii) Greater

(iv) One

(v) One

CCE - Formative Assessment

1. Question

Define a triangle.

Answer

A plane figure with three straight sides and three angles.

2. Question

Write the sum of the angles of an obtuse triangle.

Answer

A triangle where one of the internal angles is obtuse (greater than 90 degrees) is called an obtuse triangle. The sum of angles of obtuse triangle is also 180°.

3. Question

In $\Delta\ ABC$, if $\angle B = 60°$, $\angle C = 80°$ and the bisectors of angles $\angle ABC$ and $\angle ACB$ meet at a point O, then find the measure of $\angle BOC$.

Answer

In ΔBOC,

$\angle$BOC + $\angle$OCB + $\angle$OBC = 180°

$\angle$BOC + 1/2 × (80) + 1/2 × (40) = 180°

$\angle$BOC = 180° -70°

$\angle$BOC = 110°

14. Question

If the angles of a triangle are in the ratio 2: 1: 3, then find the measure of smallest angle.

Answer

Let,

$\angle$1 = 2k, $\angle$2 = k and $\angle$3 = 3k

$\angle$1 + $\angle$2 + $\angle$3 = 180°

6k = 180

k = 30°

Therefore, minimum angle be $\angle$2 = k = 30°.

5. Question

If the angles *A, B* and *C* of Δ *ABC* satisfy the relation *B* – *A* = *C* – *B*, then find the measure of $\angle$*B.*

Answer

Given,

In ΔABC,

B - A = C - B

B + B = A + C

2B = A + C (i)

Now,

A + B + C = 180°

B = 180 - (A + C) (ii)

Using (i) in (ii), we get

B = 180 - 2B

3B = 180°

B = 60°

6. Question

In Δ *ABC*, if bisectors of $\angle$*ABC* and $\angle$*ACB* intersect at *O* angle of 120°, then find the measure of $\angle$*A*.

Answer

In ΔBQC

$\angle$BOC + $\angle$OBC + $\angle$OCB = 180°

$120^{o} + \frac{1}{2}\angle B + \frac{1}{2}\angle C = 180^{o}$

$\frac{1}{2}(\angle B + \angle C) = 60^o$

$\angle B + \angle C = 120^o$ (i)

In ΔABC

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

$\angle A + 120^o = 180^o$ [From (i)]

$\angle A = 60^o$

7. Question

State exterior angle theorem.

Answer

If a side of a triangle is produced, the exterior angle so formed is equal to the sum of the two interior opposite angles.

8. Question

If the side *BC* of Δ *ABC* is produced on both sides, then write the difference between the sum of the exterior angles so formed and $\angle A$.

Answer

Given that,

BC produced on both sides

We know that,

$\angle A + \angle ABC + \angle ACB = 180^o$ (i)

$\angle ABD = \angle A + \angle ACB$ (Exterior angle theorem) (ii)

$\angle ACE = \angle A + \angle ABC$ (Exterior angle theorem) (iii)

Adding (ii) and (iii), we get

$\angle ABD + \angle ACE = \angle A + (\angle A + \angle ACB + \angle ACB)$

$\angle ABD + \angle ACE = \angle A + 180^o$

$(\angle ABD + \angle ACE) - \angle A = 180^o$

Thus, between the sum of the exterior angles so formed and $\angle A$ is 180^o.

9. Question

In a triangle *ABC*, if *AB* = *AC* and AB is produced to *D* such that *BD* = *BC*, find $\angle ACD : \angle ADC$.

Answer

Given,

AB = AC and,

BD = BC

$\angle 2 = \angle 3$ (Since, AB = AC)

$\angle 4 = \angle 5$ (Since, BD = BC)

$\frac{\angle ACD}{\angle ADC} = \frac{\angle 3 + \angle 4}{\angle 5}$ (i)

In ΔBDC

$\angle 2 = \angle 4 + \angle 5$

$\angle 2 = 2\angle 4$ (Since, $\angle 4 = \angle 5$)

$\angle 3 = 2\angle 4$ (Since, $\angle 3 = \angle 2$)

$\frac{\angle ACD}{\angle ADC} = \frac{\angle 3 + \frac{\angle 3}{2}}{\frac{\angle 3}{2}}$

$= \frac{3}{1}$

Thus, $\angle ACD : \angle ADC = 3 : 1$

10. Question

The sum of two angles of a triangle is equal to its third angle. Determine the measure of the third angle.

Answer

Let,

$\angle 1$, $\angle 2$ and $\angle 3$ be the angles of a triangle.

$\angle 1 + \angle 2 = \angle 3$ (Given) (i)

We know that,

$\angle 1 + \angle 2 + \angle 3 = 180^o$

$\angle 3 + \angle 3 = 180^o$ [From (i)]

$2\angle 3 = 180^o$

$\angle 3 = 90^o$

Thus, third angle is 90^o.

11. Question

In Fig. 9.40, if $AB || CD$, $EF || BC$, $\angle BAC = 65°$ and $\angle DHF = 35°$, find $\angle AGH$.

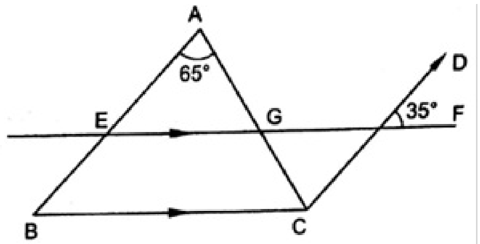


Fig. 9.40

Answer

Given,

AB ∥ CD and,

EF ∥ BC

$\angle BAC = 65^o$ and $\angle DHF = 35^o$

$\angle BAC = \angle ACD$ (Alternate angles)

$\angle ACD = 65^o$

$\angle DHF = \angle GHC$ (Vertically opposite angles)

$\angle GHC = 35^o$

In ΔGHC

$\angle GCH + \angle GHC + \angle HGC = 180^o$

$65^o + 35^o + \angle HGC = 180^o$

$\angle HGC = 80^o$

$\angle AGH + \angle HGC = 180^o$ (Linear pair)

$\angle AGH + 80^o = 180^o$

$\angle AGH = 100^o$

12. Question

In Fig. 9.41, if *AB* || *DE* and *BD* || *FG* such that $\angle FGH = 125°$ and $\angle B = 55°$, find *a* and *y*.

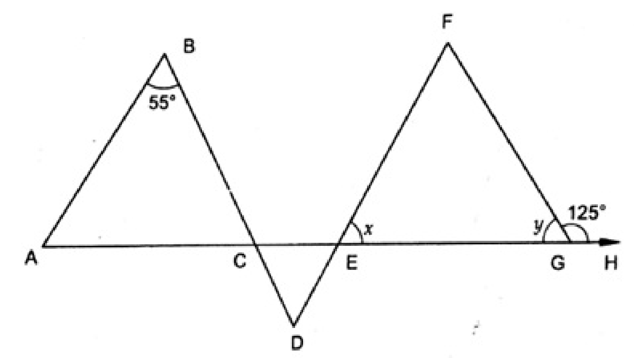


Fig. 9.41

Answer

Given,

AB || *DE* and,

BD || *FG*

$\angle FGH + \angle FGE = 180^o$ (Linear pair)

$125^o + y = 180^o$

$y = 55^o$

$\angle ABC = \angle BDE$ (Alternate angles)

$\angle BDF = \angle EFG = 55^o$ (Alternate angles)

$\angle EFG + \angle FEG = 125^o$ (By exterior angle theorem)

$55^o + \angle FEG = 125^o$

$\angle FEG = x = 70^o$

Thus, $x = 70^o$ and $y = 55^o$.

13. Question

In Fig. 9.42, side *BC* of Δ *ABC* is produced to point *D* such that bisectors of $\angle ABC$ and $\angle ACD$ meet at a point *E*. If $\angle BAC = 68°$, find $\angle BEC$.

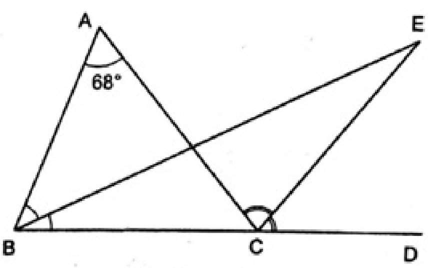


Fig. 9.42

Answer

By exterior angle theorem,

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

$\angle ACD = 68^{o} + \angle B$

$\frac{1}{2}\angle ACD = 34^{o} + \frac{1}{2}\angle B$

$34^{o} = \frac{1}{2}\angle ACD - \angle EBC$ (i)

Now,

In ΔBEC

$\angle ECD = \angle EBC + \angle E$

$\angle E = \angle ECD - \angle EBC$

$\angle E = \frac{1}{2}\angle ACD - \angle EBC$ (ii)

From (i) and (ii), we get

$\angle E = 34^{o}$

1. Question

If all the three angles of a triangle are equal, then each one of them is equal to

A. 90°

B. 45°

C. 60°

D. 30°

Answer

Let,

A, B and C be the angles of ΔABC

A = B = C (Given)

We know that,

$\angle A + \angle B + \angle C = 180^{o}$

$\angle A + \angle A + \angle A = 180^{o}$

$3\angle A = 180^{o}$

$\angle A = 60^{o}$

Therefore,

$\angle A = \angle B = \angle C = 60^{o}$

Thus, each angle is equal to 60^{o}.

2. Question

If two acute angles of a right triangle are equal, then each is equal to

A. 30°

B. 45°

C. 60°

D. 90°

Answer

Given that the triangle is acute.

So, ∠1, ∠2 and ∠3 be the angles of the triangle.

$\angle 1 = 90^{o}$ (Given)

$\angle 2 = \angle 3$

We know that,

$\angle 1 + \angle 2 + \angle 3 = 180^{o}$

$90^{o} + \angle 2 + \angle 2 = 180^{o}$

$2\angle 2 = 180^{o} - 90^{o}$

$\angle 2 = 45^{o}$

Therefore, $\angle 2 = \angle 3 = 45^{o}$

Thus, each acute angle is equal to 45^{o}.

3. Question

An exterior angle of a triangle is equal to 100° and two interior opposite angles are equal, each of these angles is equal to

A. 75°

B. 80°

C. 40°

D. 50°

Answer

Let, ∠1 and ∠2 be two opposite interior angles and ∠3 be exterior angle.

According to question,

$\angle 1 + \angle 2 = \angle 3$

$\angle 1 + \angle 1 = 100^{o}$

$2\angle 1 = 100^{o}$

$\angle 1 = 50^{o}$

Therefore, $\angle 1 = \angle 2 = 50^{o}$

Thus, of these angles is equal to 50^{o}.

4. Question

If one angle of a triangle is equal to the sum of the other two angles, then the triangle is

A. An isosceles triangle

B. An obtuse triangle

C. An equilateral triangle

D. A right triangle

Answer

A right triangle

5. Question

Side *BC* of a triangle *ABC* has been produced to a point *D* such that $\angle ACD = 120°$. If $\angle B = \frac{1}{2}\angle A$, *then* $\angle A$ is equal to

A. 80°

B. 75°

C. 60°

D. 90°

Answer

By exterior angle theorem:

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

$120^o = \angle A + \frac{1}{2}\angle A$

$120^o = \frac{2\angle A + \angle B}{2}$

$240^o = 3\angle A$

$\angle A = 80^o$

6. Question

In Δ *ABC* $\angle B = \angle C$ and ray *AX* bisects the exterior angle $\angle DAC$. If $\angle DAX = 70°$, then $\angle ACB =$

A. 35°

B. 90°

C. 70°

D. 55°

Answer

AX bisects ∠DAC

$\angle CAD = 2 * \angle DAC$

$\angle CAD = 2 * 70^o$

$= 140^o$

By exterior angle theorem,

$\angle CAD = \angle B + \angle C$

$140^o = \angle C + \angle C$ (Therefore, $\angle B = \angle C$)

$140^o = 2\angle C$

$\angle C = 70^o$

Therefore, $\angle C = \angle ACB = 70^o$

7. Question

In a triangle, an exterior angle at a vertex is 95° and its one of the interior opposite angle is 55°, then the measure of the other interior angle is

A. 55°

B. 85°

C. 40°

D. 9.0°

Answer

We know that,

In a triangle an exterior angle is equal to sum of two interior opposite angle.

Let, the required interior opposite angle be x.

$x + 55^o = 95^o$

$x = 95^o - 55^o$

$= 40^o$

Thus, other interior angle is 40^o.

8. Question

If the sides of a triangle are produced in order, then the sum of the three exterior angles so formed is

A. 90°

B. 180°

C. 270°

D. 360°

Answer

Let, ABC be a triangle and AB, BC and AC produced to D, E and F respectively.

$\angle A + \angle B + \angle C = 180^o$ (i)

$\angle CBD = \angle C + \angle A$ (Exterior angle theorem) (ii)

$\angle ACE = \angle A + \angle B$ (Exterior angle theorem) (iii)

$\angle BAF = \angle B + \angle C$ (Exterior angle theorem) (iv)

Adding (ii), (iii) and (iv) we get

$\angle CBD + \angle ACE + \angle BAF = 2\angle A + 2\angle B + 2\angle C$

$\angle CBD + \angle ACE + \angle BAF = 2 (\angle A + \angle B + \angle C)$

$\angle CBD + \angle ACE + \angle BAF = 2 * 180^o$

$\angle CBD + \angle ACE + \angle BAF = 360^o$

Thus, sum of all three exterior angles is 360^o.

9. Question

In Δ ABC, if $\angle A = 100°$ AD bisects $\angle A$ and AD⊥BC. Then, $\angle B =$

A. 50°

B. 90°

C. 40°

D. 100°

Answer

Given,

AD perpendicular to BC

$\angle A = 100^o$

In ΔADB,

$\angle ADB + \angle B + \angle DAC = 180^o$

$90^o + \angle B + \frac{1}{2}\angle A = 180^o$

$\angle B + \frac{1}{2} * 100^o = 180^o - 90^o$

$\angle B + 50^o = 90^o$

$\angle B = 40^o$

10. Question

An exterior angle of a triangle is 108° and its interior opposite angles are in the ratio 4 : 5. The angles of the triangle are

A. 48°, 60°, 72°

B. 50°, 60°, 70°

C. 52°, 56°, 72°

D. 42°, 60°, 76°

Answer

Let $\angle 1$, $\angle 2$ and $\angle 3$ be the angles of the triangle and $\angle 4$ be its exterior angle.

$\angle 4 = 108^0$ (Given)

$\angle 1 : \angle 2 = 4 : 5$ (Given)

Let, $\angle 1 = 4k$

$\angle 2 = 5k$

Now,

$\angle 1 + \angle 2 = 108^o$ (Exterior angle theorem)

$4k + 5k = 108^o$

$9k = 108^o$

$k = 12^o$

Thus,

$\angle 1 = 4 * 12 = 48^o$

$\angle 2 = 5 * 12 = 60^o$

We know that,

$\angle 1 + \angle 2 + \angle 3 = 180^o$

$48^o + 60^o + \angle 3 = 180^o$

$108^o + \angle 3 = 180^o$

$\angle 3 = 180^o - 108^o$

$= 72^o$

Thus, angles of triangle are 48^o, 60^o, 72^o.

11. Question

In a Δ *ABC*, If $\angle A$ = 60°, $\angle B$ =80° and the bisectors of $\angle B$ and $\angle C$ meet at *O*, then $\angle BOC$=

A. 60°

B. 120°

C. 150°

D. 30°

Answer

In ΔABC

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

$60^o + \angle B + \angle C = 180^o$

$\angle B + \angle C = 120^o$

$\frac{1}{2}\angle B + \frac{1}{2}\angle C = 60^o$ (i)

$In\ \Delta BOC$

$\angle BOC + \angle OBC + \angle OCB = 180^o$

$\angle BOC + \frac{1}{2}\angle B + \frac{1}{2}\angle C = 180^o$

$\angle BOC + \frac{1}{2}(\angle B + \angle C) = 180^o$

$\angle BOC + 60^o = 180^o$ [From (i)]

$\angle BOC = 120^o$

12. Question

If the bisectors of the acute angles of a right triangle meet at *O*, then the angle at *O* between the two bisectors is

A. 45°

B. 95°

C. 135°

D. 90°

Answer

Let ABC is an acute angled triangle.

$\angle B = 90^o$

We know that,

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

$\angle A + 90^o + \angle C = 180^o$

$\angle A + \angle C = 90^o$ (i)

In ΔAOC

$\angle AOC + \angle ACD + \angle CAD = 180^o$

$\angle AOC + \frac{1}{2}\angle C + \frac{1}{2}\angle A = 180^o$

$\angle AOC + \frac{1}{2}(\angle A + \angle C) = 180^o$

$\angle AOC + \frac{1}{2} * 90^o = 180^o$ [From (i)]

$\angle AOC + 45^o = 180^o$

$\angle AOC = 180^o - 45^o$

$= 135^o$

Thus, the angle at O between two bisectors is equal to 135^o.

13. Question

Line segments AB and CD intersect at O such that $AC \parallel DB$. If $\angle CAB = 45°$ and $\angle CDB = 55°$, then $\angle BOD =$

A. 100°

B. 80°

C. 90°

D. 135°

Answer

AC ∥ BD

$\angle CAD = 45^o$

$\angle CDB = 55^o$

$\angle 2 = \angle CAD$ (Alternate angle)

$\angle 2 = 45^o$

In ΔBOD

$\angle BOD + \angle 2 + \angle CDB = 180^o$

$\angle BOD + 45^o + 55^o = 180^o$

$\angle BOD + 100^o = 180^o$

$\angle BOD = 180^o - 100^o$

$= 80^o$

14. Question

The bisectors of exterior angles at B and C of ΔABC meet at O, if $\angle A = x°$, then $\angle BOC =$

A. $90° + \frac{x^o}{2}$

B. $90° - \frac{x^o}{2}$

C. $180° + \frac{x^o}{2}$

D. $180° - \frac{x^o}{2}$

Answer

$\angle OBC = 180^o - \angle B - \frac{1}{2}(180^o - \angle B)$

$\angle OBC = 90^o - \frac{1}{2}\angle B$

And,

$\angle OCB = 180^o - \angle C - \frac{1}{2}(180^o - \angle C)$

$\angle OCB = 90^o - \frac{1}{2}\angle C$

In ΔBOC

$\angle BOC + \angle OCB + \angle OBC = 180^o$

$\angle BOC + 90^o - \frac{1}{2}\angle C + 90^o - \frac{1}{2}\angle B = 180^o$

$\angle BOC = \frac{1}{2}(\angle B + \angle C)$

$\angle BOC = \frac{1}{2}(180^o - \angle A)$ [From ΔABC]

$\angle BOC = 90^o - \frac{1}{2}\angle A$

$\angle BOC = 90^o - \frac{x}{2}$

15. Question

In Δ *ABC*, $\angle A$=50° and *BC* is produced to a point *D*. If the bisectors of $\angle ABC$ and $\angle ACD$ meet at *E*, then $\angle E$ =

A. 25°

B. 50°

C. 100°

D. 75°

Answer

In Δ *ABC*

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

$50^o + \angle B + \angle C = 180^o$

$\angle B + \angle C = 180^o - 50^o$

$\angle B + \angle C = 10^o$ (i)

In ΔBEC

$\angle E + \angle BCE + \angle EBC = 180^o$

$\angle E + 180^o - (\frac{1}{2}\angle ACD) + \frac{1}{2}\angle B = 180^o$ (ii)

By exterior angle theorem,

$\angle ACD = 50^o + \angle B$

Putting value of $\angle ACD$ in (ii), we get

$\angle E + 180^o - \frac{1}{2}(50^o + \angle B) + \frac{1}{2}\angle B = 180^o$

$\angle E - 25^o - \frac{1}{2}\angle B + \frac{1}{2}\angle B = 0$

$\angle E - 25^o = 0$

$\angle E = 25^o$

16. Question

The side *BC* of Δ *ABC* is produced to a point *D*. The bisector of $\angle A$ meets side *BC* in *L*, If $\angle ABC$ = 30° and $\angle ACD$ = 115°, then $\angle ALC$ =

A. 85°

B. $72\frac{1}{2}°$

C. 145°

D. None of these

Answer

Given,

∠ABC = 30^o

∠ACD = 115^o

By exterior angle theorem,

∠ACD = ∠A + ∠B

115^o = ∠A + 30^o

∠A = 85^o

∠ACD + ∠ACL = 180^o (Linear pair)

∠ACL = 65^o

In ΔALC

∠ALC + ∠LAC + ∠ACL = 180^o

∠ALC + $\frac{1}{2}$∠A + 65^o = 180^o

∠ALC = 72.5^o

17. Question

In Fig. 9.43, if $EC||AB$, $\angle ECD = 70°$ and $\angle BDO = 20°$, then $\angle OBD$ is

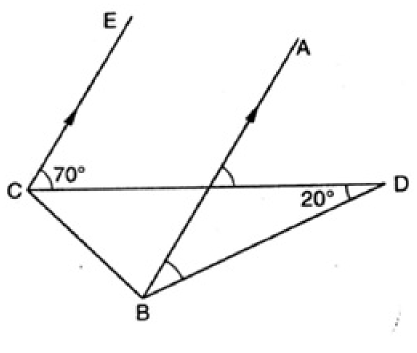


Fig. 9.43

A. 20°

B. 50°

C. 60°

D. 70°

Answer

Given,

EC ∥ AB

∠ECD = 70^o

∠BDO = 20^o

Since,

EC ∥ AB

And, OC cuts them so

∠ECD = ∠1 (Alternate angle)

∠1 = 70^{o}

∠1 + ∠3 = 180^{o} (Linear pair)

∠3 = 110^{o}

In ΔBOD

∠BOD + ∠OBD + ∠BDO = 180^{o}

∠3 + ∠ODB + 20^{o} = 180^{o}

∠ODB = 50^{o}

18. Question

In Fig. 9.44, *x + y =*

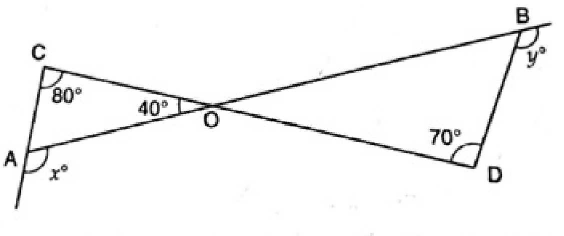


Fig. 9.44

A. 270

B. 230

C. 210

D. 190°

Answer

By exterior angle theorem,

In ΔAOC

∠OCA + ∠AOC = x

x = 80^{o} + 40^{o}

= 120^{o}

∠AOC = ∠DOB (Vertically opposite angle)

∠DOB = 40^{o}

By exterior angle theorem,

In ΔBOD

y = ∠BOD + ∠ODB

= 40^{o} + 70^{o}

= 110^{o}

Now, x + y = 230^{o}

19. Question

If the measures of angles of a triangle are in the ratio of 3 : 4 : 5, what is the measure of the smallest angle of the triangle?

A. 25°

B. 30°

C. 45°

D. 60°

Answer

Let,

∠1, ∠2 and ∠3 be the angles of the triangle which are in the ratio 3: 4: 5 respectively.

∠1 = 3k

∠2 = 4k

∠3 = 5k

We know that,

$\angle 1 + \angle 2 + \angle 3 = 180^o$

$3k + 4k + 5k = 180^o$

$k = 15^o$

So,

$\angle 1 = 3 * 15^o = 45^o$

$\angle 2 = 4 * 15^o = 60^o$

$\angle 3 = 5 * 15^o = 75^o$

Thus, smallest angle is 45^o.

20. Question

In Fig. 9.45, if $AB \perp BC$, then $x =$

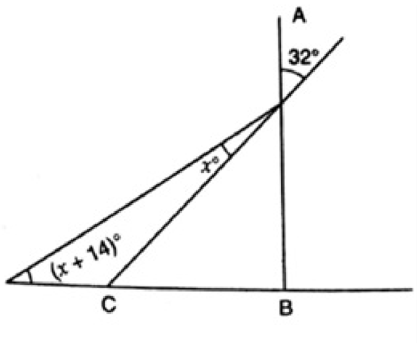


Fig.9.45

A. 18

B. 22

C. 25

D. 32

Answer

Given,

AB is perpendicular to BC so ∠B = 90^{o}

∠CED = 32^{o} (Vertically opposite angles)

In ΔBDE

∠BDE + ∠BED + ∠DBE = 180^{o}

x + 14^{o} + 32^{o} + x + 90^{o} = 180^{o}

2x = 44^{o}

x = 22^{o}

21. Question

In Fig. 9.46, what is *z* in terms of *x* and *y*?

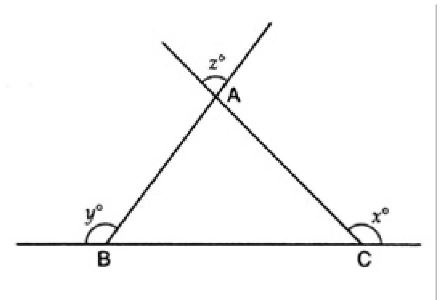


Fig. 9.46

A. *x* + *y* +180

B. *x* + *y* -180

C. 180° - (*x* + *y*)

D. *x*+*y*+360°

Answer

In ΔABC given that,

x = ∠A + ∠B (Exterior angles)

z = ∠A (Vertically opposite angles)

y = ∠A + ∠C (Exterior angles)

We know that,

∠A + ∠B + ∠C= 180^{o}

z + x - ∠A + y - ∠A = 180^{o}

-z = 180^{o} – x – y

z = x + y – 180^{o}

22. Question

In Fig. 9.47, for which value of *x* is $l_1 \parallel l_2$?

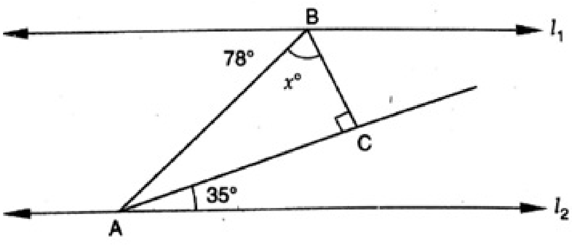


Fig. 9.47

A. 37

B. 43

C. 45

D. 47

Answer

Since,

$l_1 \parallel l_2$

And,

AB cuts them so,

$\angle DBA = \angle BAE = 78^o$

$\angle BAC + 35^o = 78^o$

$\angle BAC = 43^o$

In ΔABC

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

$43^o + x + 90^o = 180^o$

$x = 47^o$

23. Question

In Fig. 9.48, what is *y* in terms of *x*?

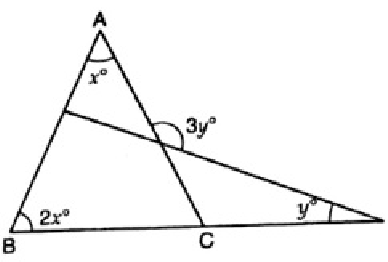


Fig. 9.48

A. $\frac{3}{2}x$

B. $\frac{4}{3}x$

C. x

D. $\frac{3}{4}x$

Answer

In ΔABC

x + 2x + ∠ACB = 180^o

∠ACB = 180^o – 3x (i)

In ΔECD

y + 180^o – 3y + ∠ECD = 180^o

y + 180^o – 3y + 180^o - ∠ACB = 180^o

y = $\frac{3}{2}$x

24. Question

In Fig. 9.49, if $l_1 \parallel l_2$, the value of x is

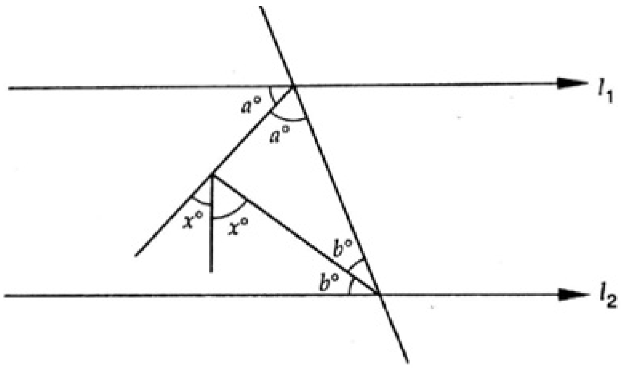


Fig. 9.49

A. 22$\frac{1}{2}$

B. 30

C. 45

D. 60

Answer

Since,

$l_1 \parallel l_2$

And PQ cuts them

∠DPQ + ∠PQE = 180^o (Consecutive interior angles)

a + a + b + b = 180^o

2 (a + b) = 180^o

a + b = 90^o (i)

In ΔAPQ

∠PAQ + a + b = 180^o

∠PAQ = 90^o

∠PAQ + x + x = 180^o (Linear pair)

90^o + 2x = 180^o

x = 45^o

25. Question

In Fig. 9.50, what is value of x?

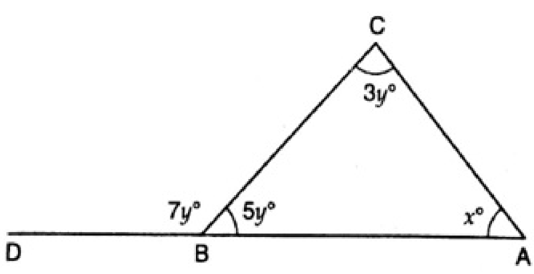


Fig. 9.50

A. 35

B. 45

C. 50

D. 60

Answer

In ΔABC

∠ABC + ∠ACB + ∠CAB = 180^o

5y + 3y + x = 180^o

8y + x = 180^o (i)

∠ABC + ∠CBD = 180^o (Linear pair)

5y + 7y = 180^o

y = 15^o

Putting values of y in (i), we get

8 * 15 + x^o = 180^o

x = 60^o

26. Question

In Δ RST (See Fig. 9.51), what is value of x ?

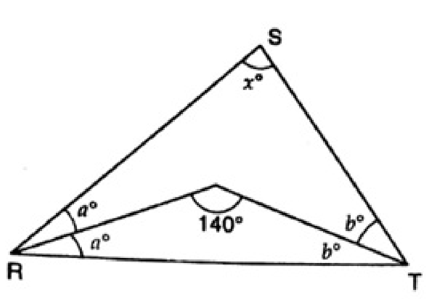


Fig. 9.51

A. 40

B. 90°

C. 80°

D. 100

Answer

In ΔROT

∠ROT + ∠RTO + ∠TRO = 180^{o}

140^{o}+ b + a = 180^{o}

a + b = 40^{o} (i)

In ΔRST

∠RST + ∠SRT + ∠STR = 180^{o}

x + a + a + b + b = 180^{o}

x + 2 (a + b) = 180^{o}

x + 80^{o} = 180^{o}

x = 100^{o}

27. Question

In Fig. 9.52, the value of *x* is

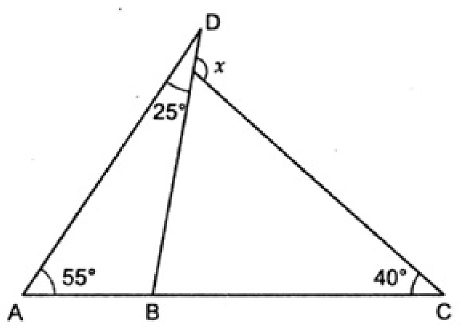


Fig. 9.52

A. 65°

B. 80°

C. 95°

D. 120°

Answer

In ΔABD

∠A + ∠ABD + ∠BDA = 180^{o}

∠ABD = 100^{o}

In ΔEBC

∠EBC + ∠ECB + ∠CEB = 180^{o}

-100^{o} + 40^{o} + ∠CEB = 0^{0}

∠CEB = 60^{o}

∠CEB + ∠CED = 180^{o} (Linear pair)

60^{o} + x = 180^{o}

x = 120^{o}

28. Question

In Fig. 9.53, if *BP*||*CQ* and *AC*=*BC*, then the measure of *x* is

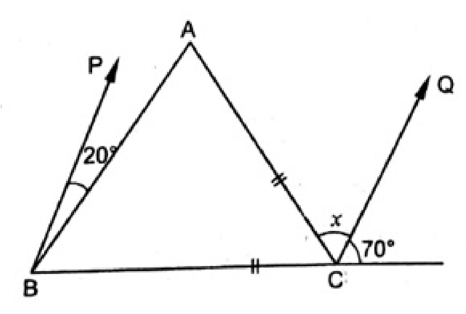


Fig. 9.53

A. 20°

B. 25°

C. 30°

D. 35°

Answer

Given,

BP || CQ

And,

AC ∥ BC

∠A = ∠ABC (Since, AC = BC)

In ΔABC

∠A + ∠B + ∠C = 180^o

∠A + ∠A + ∠C = 180^o

2∠A + ∠C = 180^o (i)

∠ACB + ∠ACQ + ∠QCD = 180^o (Linear pair)

∠ACB + x = 110^o (ii)

∠PBC + ∠BCQ = 180^o (Co. interior angle)

20^o + ∠A + ∠ACB + x = 180^o

∠A = 50^o (iii)

Using (iii) in (i), we get

2 * 50^o + ∠ACB = 180^o

∠ACB = 80^o

Using value of ∠ACB in (ii)l we get

80^o + x = 110^o

x = 30^o

29. Question

In Fig. 9.54, *AB* and *CD* are parallel lines and transversal *EF* intersects them at *P* and *Q* respectively. If

$\angle APR$=25°, $\angle RQC$=30° and $\angle CQF$= 65°, then

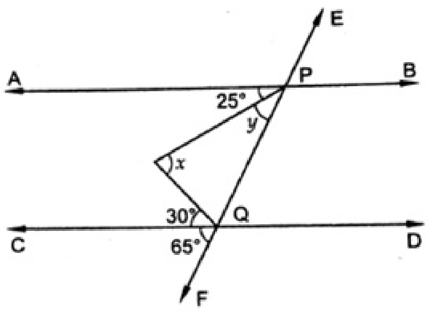


Fig. 9.54

A. $x = 55°$, $y = 40°$

B. $x = 50°$, $y = 45°$

C. $x = 60°$, $y = 35°$

D. $x = 35°$, $y = 60°$

Answer

Given,

AB ∥ CD

And, EF cuts them

So, $30^o + 65^o + \angle PQR = 180^o$

$95^o + \angle PQR = 180^o$

$\angle PQR = 85^o$

$\angle APQ + \angle PQC = 180^o$ (Co. interior angle)

$25^o + y + 85^o + 30^o = 180^o$

$y = 40^o$

In ΔPQR

$\angle PQR + \angle PRQ + \angle QPR = 180^o$

$85^o + x + y = 180^o$

$x = 55^o$

Thus, $x = 55^o$ and $y = 40^o$

30. Question

The base BC of triangle ABC is produced both ways and the measure of exterior angles formed are 94° and 126°. Then, $\angle BAC$=

A. 94°

B. 54°

C. 40°

D. 44°

Answer

Given,

$\angle ABD = 94^o$ and

$\angle ACE = 126^o$

$\angle ABD + \angle ABC = 180^o$ (Linear pair)

$\angle ABC = 86^o$ (i)

$\angle ACE + \angle ACB = 180^o$ (Linear pair)

$\angle ACB = 54^o$ (ii)

In ΔABC

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

$86^o + 54^o + \angle BAC = 180^o$

$\angle BAC = 40^o$