Sample Question Paper for Class 9 HP Board

Q.1 If $x^2 + kx + 6 = (x + 2)(x + 3)$ for all x, the value of k is
(A) 1 (B) -1 (C) 5 (D) 3

Q.2 $p(x)= 2x^4 – 3x^3 + 2x^2 + 2x -1$ is divided by (x-2) and $q(x)= 3x^3 – 2x^2 + x -1$ is divided by (x-1). So, twice the sum of the remainders is:

(A) 21 (B) 35 (C)54 (D) 40

Q.3 In ;ABC and ;DEF, AB = DF and ∠A = ∠D. The two triangles will be congruent by SAS axiom if:
(A) BC = EF (B) AC = DE (C) BC = DE (D) AC = EF

Q. 4 If a straight line falling on two straight lines makes the interior angles on the same side of it, whose sum is 120°, then the two straight lines, if produced indefinitely, meet on the side on which the sum of angles is

(A) less than 120°
(B) (B) greater than 120.
(C) (C) is equal to 120°
(D) (D) greater than 180°

Q.5 The lengths of a triangle are 6 cm, 8 cm and 10 cm. Then the length of perpendicular from the opposite vertex to the side whose length is 8cm is:

(A) 5 cm
(B) 4 cm
(C) 6 cm
(D) 2 cm

Q.6 If $(\sqrt{5} + \sqrt{6})^2$ = a + b 30 then a and b respectively are
(A) 12 and 2
(B) 5 and 6
(C) 11 and 2
(D) 10 and 2 √ 30

Q.7 The sides of a triangular park are in the ratio of 2: 6: 7 and its perimeter is 300 m. Then its area is:
(A) 154 57 cm^2
(B) 215 45 cm^2
(C) 340 56 cm^2
(D) 300 55 cm^2

Q.8 The area of a rectangle is $x^2 +9x+14$, what are the dimensions of rectangle if x=2.
Options:
(A)14 and 2
(B)6 and -6
(C)9 and 4
(D)18 and 2
Section – B

Q.9 Evaluate:
$\sqrt[3]{(343)}^{-2}$

Q.10 In the fig.1, sides QP and RQ of ;PQR are produced to points S and T

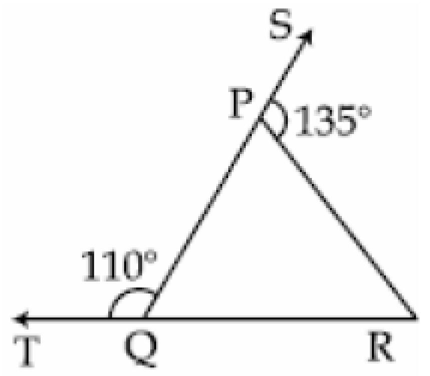


Fig. 1

respectively. If ∠SPR = 135° and ∠PQT = 110°, find ∠PQR

Q.11 Factorise: $7\sqrt{2}x^2 - 10x - 4\sqrt{2}$

Q.12 If a + b + c = 7 and ab + bc + ca = 20, find the value of $a^2 + b^2 + c^2$.

Q.13 In fig.2, AB||CD then find the value of x.

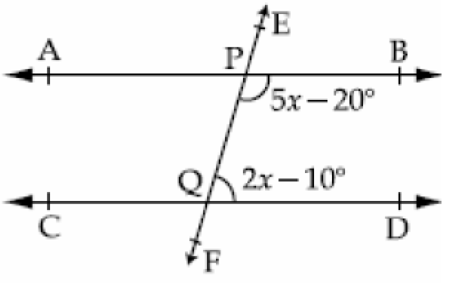
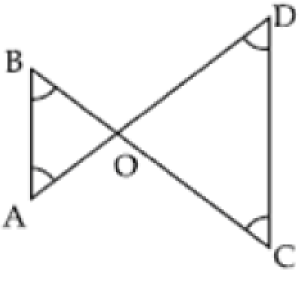


Fig. 2

OR

In fig, ∠B < ∠A and ∠C < ∠D show that AD < BC.



Q.14 See fig.4, and write the following:

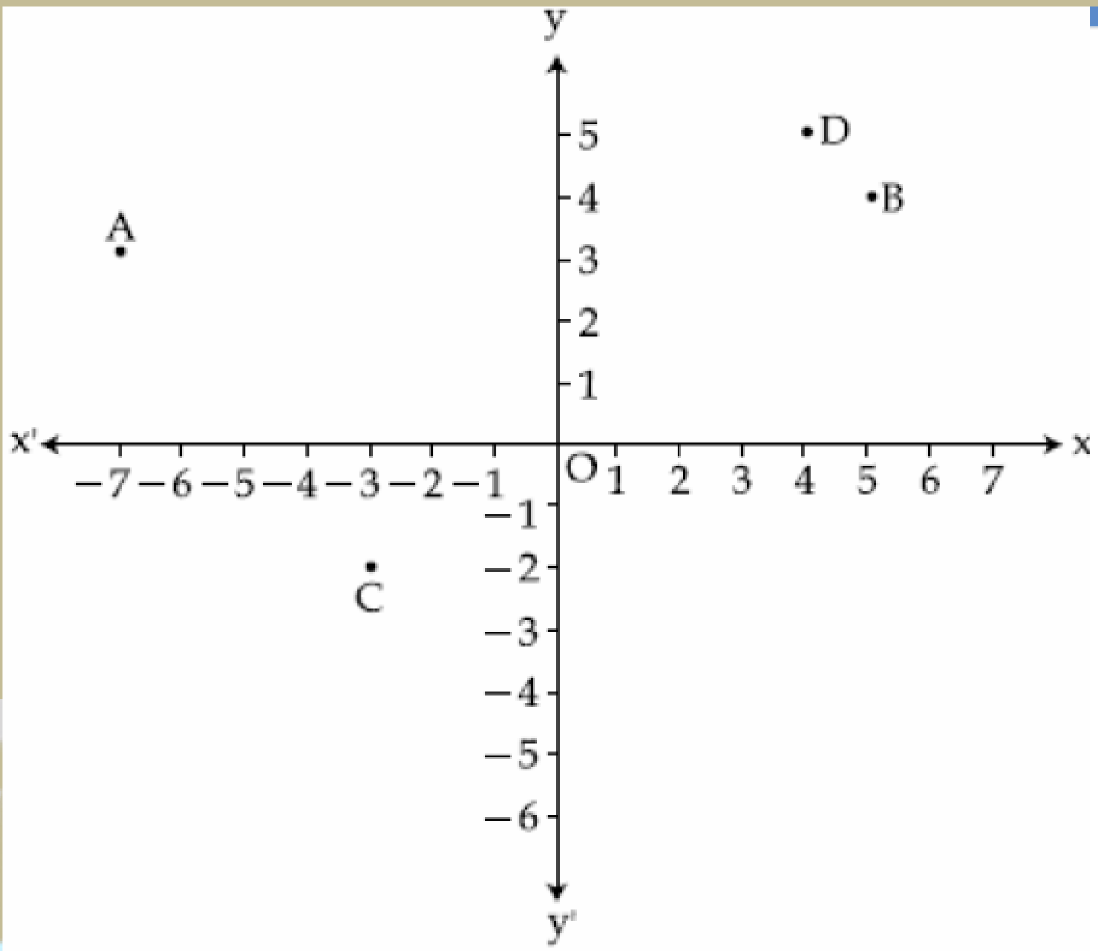


Fig. 4

(i) Co – ordinates of point A

(ii) Abscissa of point D

(iii) The point indentified by the co – ordinates (5,4)

(iv) Co – ordinates of point C

Q.15 If $x = (3 + \sqrt{8})$, find the value of $\left(x^2 + \frac{1}{x^2}\right)$.

OR

Express $5.3\overline{47}$ in the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$.

Q.16 Factorize $(x - 3y)^3 + (3y - 7z)^3 + (7z - x)^3$

Q.17 Factorise: $2\sqrt{2}a^3 + 8b^3 - 27c^3 + 18\sqrt{2}abc$.

Q.18 In fig.5, ΔABC, is an isosceles triangle in which AB = AC, side BA is produced to D such that AD = AB. Show that ∠BCD is a right angle.

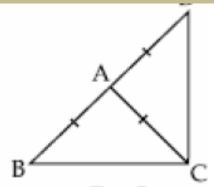


Fig. 5

Q.19 In fig.6, D is a point on side BC of ΔABC such that AD = AC. Show that AB > AD.

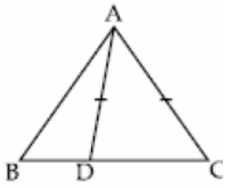


Fig. 6

Q.20 A triangle and a parallelogram have the same base and the same area. If the sides of the triangle are 15 cm, 14 cm and 13 cm and the parallelogram stands on the base 15 cm, find the height of parallelogram.

Q.21 In the fig.7, ∠X = 72°, ∠XZY = 46°. If YO and ZO are bisectors of ∠XYZ and ∠XZY respectively of ΔXYZ, find ∠OYZ and ∠YOZ.

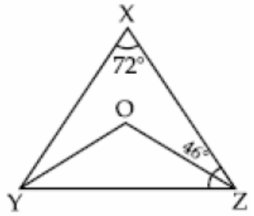


Fig. 7

Or

In fig.8, AD and CE are the angle bisectors of ∠A and ∠C respectively. If ∠ABC = 90° then find ∠AOC.

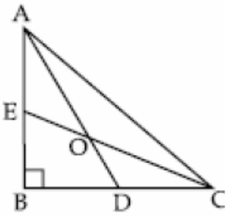


Fig. 8

Q.22 In ΔABC, BE and CF are altitudes on the sides AC and AB respectively such that BE = CF. Using RHS congruency rule, prove that AB = AC.

SOLUTIONS

SECTION – A

1. (C)
Roots=-2,-3
We know that, sum of roots=-b/a
=>(-2)+(-3)=-k
=>k=5 (1)

2. (D)
The remainder theorem tells us that if a polynomial p(x) is divided by (x-a) then the remainder is equal to p(a).
So, remainder when p(x) is divided by (x-2) is p(2) and when q(x) is divided by x-1 is q(1).
p(2) = 32-24+8+4-1 = 19
q(1) = 3-2+1-1 = 1
So, 2 x [sum of the remainders] = 2 x [19+1] = 2 x [20] = 40

(1)

3. (B)
Two triangles will be congruent by SAS axiom if 2 sides and the included angle of one triangle are equal to the two sides and the included angle of the other triangle.
So,AC=DE. (1)

4. (C)

According to 5^{th} postulate of Euclid "if the sum of the two angles marked is less than 180 degrees then lines will eventually intersect on that side on which the sum of angles is less than two right angles.

Here the sum of the two interior angles is 120° which is less than two right angles.

Hence, the two lines will meet on the side where the sum if equal to 120°. (1)

5. (C)
The area of a triangle by heron's formula = $\sqrt{s(s-a)(s-b)(s-c)}$ (1/2)
And area of a triangle = ½ × Base × Altitude.

$$\sqrt{s(s-a)(s-b)(s-c)} = \frac{1}{2} \times \text{Base} \times \text{Altitude}$$

$$s = \frac{a+b+c}{2} = \frac{6+8+10}{2} = 12$$

$$\sqrt{12(12-6)(12-8)(12-10)} = \frac{1}{2} \times 8 \times \text{Altitude}$$

Therefore, Altitude = 6 cm (1/2)

6. (C)

Apply the formula of $(a + b)^2$

$$(\sqrt{5}+\sqrt{6})^2 = 5+6+2\sqrt{30}$$
$$= 11+2\sqrt{30}$$

On compairing $a+b\sqrt{30}$ & $11+2\sqrt{30}$

We get,
A = 11 & b = 2

7. (D)

s = perimeter/2 =150
Perimeter= 300 = 15x
x = 20
Then, a = 2x20=40
b = 6x20=120
c =7x20=140

Area of triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{150(150-40)(150-120)(150-140)}$

$= \sqrt{150(110)(30)(10)} = 300\sqrt{55}\ cm^2$

8. (C)

$x^2+9x+14$

$=x^2+7x+2x+14$

$=x(x+7)+2(x+7)$

$=(x+2)(x+7)$

So the dimensions are (x+2) and (x+7).
So, by substituting x=2,
We get the dimensions to be 9 and 4.

SECTION – B

9. $\sqrt[3]{(343)^2}$

$= (343)^{-2/3}$

$= [(7)^3\}^{-2/3}$

$= 7^{3 \times -2/3}$

$= 7^{-2} = \frac{1}{49}$

10. $\angle SPR + \angle QPR = 180^\circ$ (Linear Par)

$\Rightarrow \angle 130^\circ + \angle QPR = 180^\circ$

$= \angle QPR = 450^\circ$

In $\triangle PQR$

$\angle TQP = \angle QPR + \angle PRQ$ [Exterior angle property]

$110 = 45 + \angle PRQ$

$\Rightarrow \angle PRQ = 110 - 45 = 65^\circ$

11. $7\sqrt{2}\ x^2 - 10x - 4\sqrt{2}$

$\Rightarrow 7\sqrt{2}\ x^2 - 14x + 4x - 4\sqrt{2}$

$= 7\sqrt{2}\ (x - \sqrt{2}) + 4(x - \sqrt{2})$

$= (7\sqrt{2}x + 4)(x - \sqrt{2})$

12. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

12. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

$(7)^2 = a^2 + b^2 + c^2 + 2(20)$

$49 = a^2 + b^2 + c^2 + 40$

$\therefore a^2 + b^2 + c^2 = 49 - 40 = 9$ Ans

13. Since AB || CD and EF is the transversal

$\therefore \angle BPQ + \angle PQD = 180^\circ$ [Consecutive interior angles are supplementary]

$= 5x - 20 + 2x - 10 = 180^\circ$

$= 7x - 30 = 180^\circ$

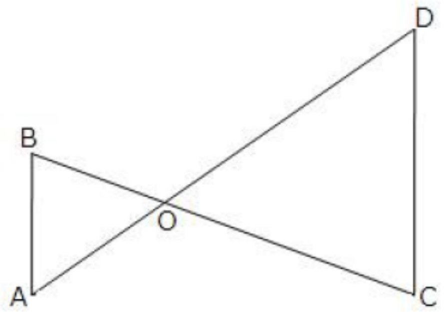
$= x = 30^\circ$ ans

OR

In $\triangle AOB$, $\angle B < \angle A$ (given)

OA < OB (sides opposite to larger angles in longer).....(i)

In $\triangle DOC$



$\angle C < \angle D$

$\Rightarrow$ OD < OC ...(ii)

Adding (i) and (ii)

OA + OD < OB + OC

$\Rightarrow$ AD < BC

14. (i) Coordinates of A are (-7,3)

(ii) Abscissa of point D is 4.

(iii) Point is B.

(iv) Coordinates of C are (-3,-2)

Section – C

15.

$x = \left(3 + \sqrt{8}\right)$

$\frac{1}{x} = \frac{1}{\left(3 + \sqrt{8}\right)}$

$$\frac{1}{x} = \frac{1}{(3+\sqrt{8})} \times \frac{(3-\sqrt{8})}{(3-\sqrt{8})}$$

$$= \frac{(3-\sqrt{8})}{\left(3^2-(\sqrt{8})^2\right)} = \frac{(3-\sqrt{8})}{(9-8)} = (3-\sqrt{8})$$ (1Mark)

$$x + \frac{1}{x} = (3+\sqrt{8}) + (3-\sqrt{8}) = 6$$

$$\left(x+\frac{1}{x}\right)^2 = 6^2 = 36$$ (1Mark)

$$x^2 + \frac{1}{x^2} = \left(x+\frac{1}{x}\right)^2 - 2x.\frac{1}{x} = \left(x+\frac{1}{x}\right)^2 - 2$$

$$= 36 - 2 = 34$$ (1Mark)

OR

Let $x = 5.3\overline{47} = 5.34747 \ldots(1)$ (½)

Multiplying (i) by 10,we get

$10x = 53.4747 \ldots(ii)$ (½)

Multiplying (ii) by 100, we get

$1000x=5347.47\ldots..(iii)$ (1/2)

Subtracting (ii) from (iii),we get

$1000x - 10x = 5347.47 \ldots - 53.47\ldots$ (½)

$990x = 5294$

$x = \frac{5294}{990} = \frac{2647}{495}$ (½)

$\therefore 5.3\overline{47} = \frac{2647}{495}$ ans (½)

16. Let $a = x - 3y$, $b = 3y - 7z$, $c = 7z - x$ (½)

$a + b + c = x - 3y + 3y - 7z + 7z - x = 0$ (½)

Since $a + b + c = 0$. Therefore,$a^3 + b^3 + c^3 = 3abc$ (1)

Hence $(x - 3y)^3 + (3y - 7z)^3 + (7z - x)^3 = 3(x - y)(3y - 7z)(7z - x)$ ans (1)

17. $2\sqrt{2}a^3 + 8b^3 - 27c^3 + 18\sqrt{2}\ abc$

$= (\sqrt{2}a)^3 + (2b)^3 + (-3)^3 - 3(\sqrt{2}a)(2b)(-3c)$ (1)

$= (\sqrt{2}a + 2b - 3c)\left[(\sqrt{2}a)^2 + (2b)^2 + (-3c)^2 - (\sqrt{2}a)(2b) - (2b)(-3c) - (-3c)(\sqrt{2}a)\right]$ (1

$\because a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$ (½)

$= (\sqrt{2}a + 2b - 3c)(2a^2 + 4b^2 + 9c^2 - 2\sqrt{ab} + 6bc + 3\sqrt{2}\ ca)$ Ans (½)

18. Proof : AB = AC (Given)

AD = AB (Given)

$\therefore$ AD = AC [Line segments equal to same line segments are equal] (½)

In $\triangle$ ABC

AB = AC $\Rightarrow \angle B = \angle ACB$ ----(i) [angle opposite equal sides are equal] (½)

In $\triangle ACD$
$AC = AD \Rightarrow \angle D = \angle ACD$ – (ii) [angle opposite equal sides are equal] (½)
Adding (i) & (ii) we have
$\angle B + \angle D = \angle ACB + \angle ACD$
$= \angle C$ ...(iii) (½)
In $\triangle BCD$
$\angle B + \angle C + \angle D = 180^\circ$ (Angle sum property)
$\Rightarrow \angle C + \angle C = 180^\circ$
$\Rightarrow 2\angle C = 180^\circ$
$\Rightarrow \angle C = 90^\circ$ (1)

19. In $\triangle ADC$, $AD = AC$ (Given)
$\Rightarrow \angle ADC = \angle ACD$ – (i) [angle opposite equal sides are equal] (½)
$\angle ADC > \angle ABD$ – (ii)[exterior angle is greater than interior opposite angle] (½)
From (i) and (ii)
$\angle ACD > \angle ABD$ (½)
i.e $\angle ACB > \angle ABC$ (½)
i.e In $\triangle ABC$ $\angle C > \angle B$
$\Rightarrow AB > AC$ [sides opp greater angle is longer] (½)
$\Rightarrow AB > AD$ [$\because$ $AC = AD$] (½)

20. Area of triangle
$a = 15, b = 14, c = 13$
$s = \frac{a+b+c}{2} = \frac{15+14+13}{2} = 21$ cm (½)

Area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$ (½)
$= \sqrt{21 \times 6 \times 7 \times 8}$
$= 84 \text{ cm}^2$
By the given condition
Area of parallelogram = area of triangle
base $\times$ height = 84 (½)
15 $\times$ height = 84
Height $= \frac{84}{15} = 5.6$ cm
$\therefore$ Height of parallelogram is 5.6 cm (½)

21. In $\triangle XYZ$
$\angle X + \angle Y + \angle Z = 180^\circ$
$72^\circ + \angle Y + 46^\circ = 180^\circ$ (1)
$\angle Y = 62^\circ$
$\angle OYZ = \frac{1}{2} \angle Y$ [$\because$ OY is bisector of $\angle Y$]
$\therefore \angle OYZ = \frac{1}{2} \times 62^\circ = 31^\circ$ (½)
$\angle OZY = \frac{1}{2} \angle Z$ [$\because$ OZ is bisector of $\angle Z$]
$= \frac{1}{2} \times 46^\circ = 23^\circ$ (½)

In $\triangle$ OYZ
$\angle OYZ + \angle YOZ + \angle OZY = 180^\circ$ [Angle sum property]
$31^\circ + \angle YOZ + 23^\circ = 180^\circ$
$\angle YOZ = 126^\circ$

OR

$\angle DAC = \frac{1}{2} \angle A$ [$\because$ AD is bisector of $\angle A$]

$\Rightarrow \angle OAC = \frac{1}{2} \angle A$ --- (i) [$\because \angle OAC = \angle DAC$]

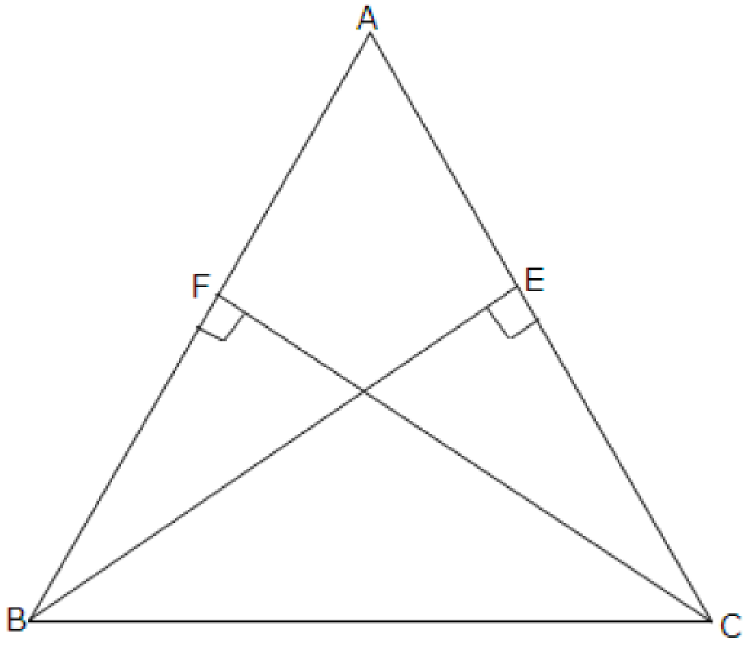
$\angle ECA = \frac{1}{2} \angle C$ [$\because$ CE is angle bisector of $\angle C$]

$\Rightarrow \angle OCA = \frac{1}{2} \angle C$ ---(ii) [$\because \angle OCA = \angle ECA$]

In $\triangle$ ABC
$\angle A + \angle B + \angle C = 180^\circ$ (Angle sum property)
$\angle A + \angle C + 90^\circ = 180^\circ$
$\angle A + \angle C = 90^\circ$
$\frac{1}{2} \angle A + \frac{1}{2} \angle C = 45^0$ --- (iii)

$\Rightarrow \angle OAC + \angle OCA = 45^0$ --- (iv)
In $\triangle$ OAC
$\angle AOC + \angle OAC + \angle OCA = 180^\circ$ (Anre sum property)
$\angle AOC + 45^\circ = 180^\circ$
$\angle AOC = 135^\circ$ ans

22. In rt $\triangle$BEC & CFB
$\angle BEC = \angle CFB$ (90° each)
BE = CF (given)
BC = BC (Common)



$\therefore \Delta BEC \cong \Delta CFB$ (RHS congruence)

$\angle BCE = \angle CBF$ (CPCT)

=> $\angle BCA = \angle CBA$ (same angle)

In ΔABC

$\angle BCA = \angle CBA$ Proved

AB = AC [sides opposite equal angles are equal]