Success Key Worksheet

Std: Class 10 (Eng.& Semi) | **Ch.1 Similarity (Worksheet 1)** | **Time: 1 Hr.**

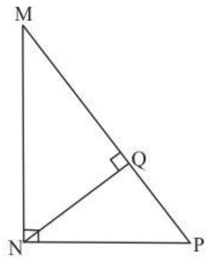
Date: | **Subject: Mathematics-2** | **Max Marks: 20**

Q.1) Choose the correct alternative answer for each of the following question: **3**

1) The lengths of sides of triangle are x cm, (x + 1) cm and (x + 2) cm, the value of x when triangle is right angled is_____.
   (a) 5cm (b) 4cm (c) 3cm (d) 6cm
2) Which of the listed side lengths CAN be sides of a right triangle?
   (a) 7,8,9 (b) 4,5,6 (c) 3,4,5 (d) 6,7,8
3) Adjacent sides of a parallelogram are 11 cm and 17 cm. It's one diagonal is 26 cm. Find its other diagonal.
   (a) 14 cm (b) 12 cm (c) 12 m (d) 14 m

Q.2) Solve the following sub-question: **3**

1) Find the diagonal of a rectangle whose length is 35 cm and breadth is 12 cm.
2) In the figure below, $\angle MNP = 90°$, seg NQ $\perp$ seg MP, MQ = 9, QP = 4, find NQ.



Q.3) Complete and write the following activities: (Any 1) **2**

1) In Δ LMN, l = 5, m = 13, n = 12. State whether Δ LMN is a right angled triangle or not.

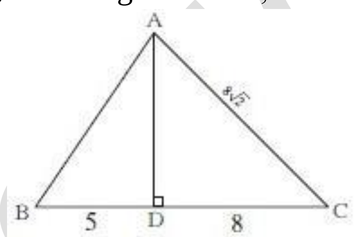
$l = 5$, $m = 13$, $n = 12$

$l^2 = \square$ $m^2 = \square$ $n^2 = \square$

$\therefore m^2 = l^2 + \square$

∴ by converse of Pythagoras theorem Δ LMN is a right angled triangle.

2) In the figure below, In Δ ABC, seg AD $\perp$ seg BC, $\angle C = 45°$, BD = 5 and AC = $8\sqrt{2}$then find AD and BC.



In Δ ADC

$\angle ADC = 90°$, $\angle C = 45°$, $\therefore \angle DAC = 45°$

$AD = DC = \frac{1}{\sqrt{2}} \times \square$ … by 45°−45°−90° theorem

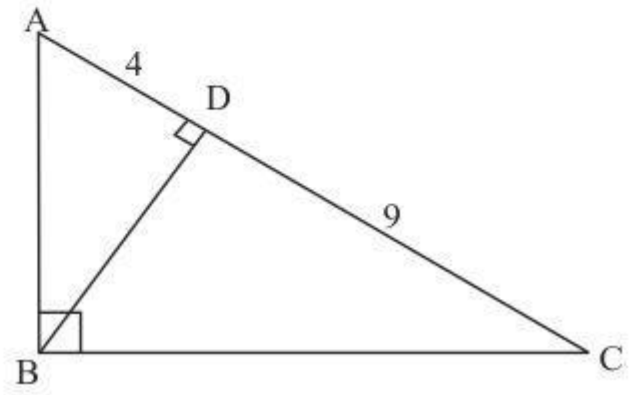
DC = 8 ∴ AD = 8

BC = BD + $\square$

= 5 + $\square$

BC = $\square$

Q.4) Solve the following sub question: (Any 1) **2**

1) Find the side and perimeter of a square whose diagonal is 10 cm.
2) 

   In right-angled Δ ABC, BD $\perp$ AC. If AD = 4, DC = 9, then find BD.

Q.5) Solve the following sub-question: (Any 2) **6**

1) Prove that: In a triangle if the square of one side is equal to the sum of the squares of the remaining two sides, then the triangle is a right angled triangle.
2) Prove that: In a right angled triangle, if the altitude is drawn to the hypotenuse, then the two triangles formed are similar to the original triangle and to each other.
3) In Δ PQR, seg PM is a median, PM = 9 and $PQ^2 + PR^2 = 290$. Find the length of QR.

Q.6) Solve the following question (Challenging que.): (Any 1) **4**

1) In a right-angled triangle with sides a and b and hypotenuse c, the altitude drawn on the hypotenuse is x. Prove that ab = cx.
2) In a right angled ΔABC right angled at C, a point D is taken on AB such that CD is perpendicular to AB

   Prove that : $\frac{1}{AC^2} + \frac{1}{BC^2} = \frac{1}{CD^2}$

Success Key Worksheet

Std: Class 10 (Eng.& Semi) **Ch.1 Similarity** **Time: 1 Hr.**

Worksheet 1(Ans. Key)

Date: **Subject: Mathematics-2** **Max Marks: 20**

Q.1) Choose the correct alternative answer for each of the following question: **3**

1)Ans. (c) 3cm

2)Ans. (c)

$5^2 = 25$ ……….. (i)

$4^2 + 3^2 = 16 + 9 = 25$……….. (ii)

From (i) and (ii)

$5^2 = 4^2 + 3^2$

3)Ans. (b)

DB = 26 cm

So, DO = 13 cm

DO = OB = 13 cm

Using Apollonius Theorem

$AD^2 + AB^2 = 2AO^2 + 2DO^2$

$11^2 + 17^2 = 2AO^2 + 2(13)^2$

$121 + 209 = 2AO^2 + 2(169)$

$410 = 2AO^2 + 338$

$2AO^2 = 410 – 338$

$2OA^2 = 72$

$OA^2 = 36$

OA = 6

AC = 2OA = 2 x 6 = 12

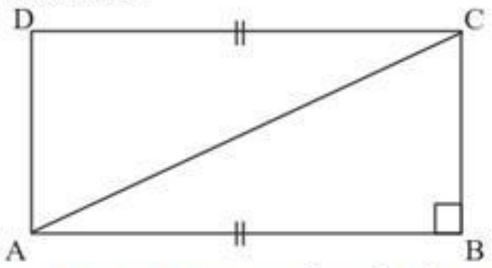
∴ The length of the other diagonal = 12 cm

Q.2) Solve the following sub-question: **3**

1)Ans. Given: 1) □ ABCD is a rectangle

2) AB = 35 cm, BC = 12 cm.

To find: AC



In Δ ABC, ∠ABC = 90° [Angle of a rectangle]

∴ $AC^2 = AB^2 + BC^2$ [Pythagoras theorem]

$= 35^2 + 12^2$

$= 1225 + 144$

$= 1369$

Taking square roots

∴ AC = 37 cm

Length of diagonal of rectangle is 37 cm

2)Ans. In ΔMNP, $\angle MNP = 90°$ [Given]
Seg NQ $\perp$ Hypotenuse MP [Given]
$\therefore NQ^2 = MQ + PQ$ [Geometric mean corollary]
$\therefore NQ^2 = 9 \times 4 = 36$
$\therefore NQ = 6$ units [Taking square roots]

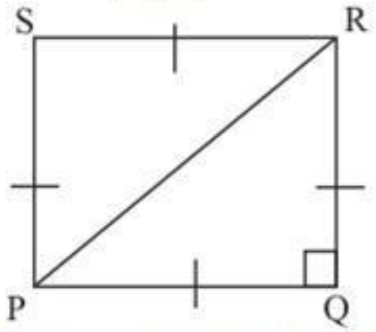
Q.3) Complete and write the following activities: (Any 1) **2**

1)Ans. $l = 5$, $m = 13$, $n = 12$
$l^2 = \boxed{25}$, $m^2 = \boxed{169}$, $n^2 = \boxed{144}$
$\therefore m^2 = l^2 + \boxed{n^2}$
$\therefore$ by converse of Pythagoras theorem Δ LMN is a right angled triangle.

2)ns. In Δ ADC
$\angle ADC = 90°$, $\angle C = 45°$, $\therefore \angle DAC = 45°$
$AD = DC = \frac{1}{\sqrt{2}} \times \boxed{8\sqrt{2}}$ ... by $45°-45°-90°$ theorem
$DC = 8 \quad \therefore AD = 8$
$BC = BD + \boxed{DC}$
$= 5 + \boxed{8}$
$BC = \boxed{13}$

Q.4) Solve the following sub question: (Any 1) **2**

1)Ans. Given: 1. □ PQRS is a Square.
2. PR = 10 cm.
To find: a) PQ b) Perimeter of □ PQRS



PQ = QR ..... 1 [sides of square are equal]
In Δ PQR, $\angle Q = 90°$ [Angle of square is right angle]
$\therefore PR^2 = PQ^2 + QR^2$ [Pythagoras theorem]
$\therefore 10^2 = PQ^2 + PQ^2$ [from 1]
$\therefore 2PQ^2 = 100$
$\therefore PQ^2 = \frac{100}{2}$
$\therefore PQ^2 = 50$

$\therefore PQ = 5\sqrt{2}$ cm Ans.
Perimeter of □ PQRS = 4 x PQ
$4 \times 5\sqrt{2}$
Perimeter of □PQRS = $20\sqrt{2}$ cm

2)ns. AD = 4, DC = 9

$\therefore$ BD = $\sqrt{AD \times DC}$ [Geometric Mean Theorem]

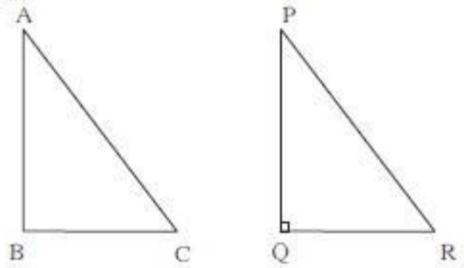
$\sqrt{4 \times 9} = \sqrt{36} = 6$ units

BD = 6 units

Q.5) Solve the following sub-question: (Any 2) **6**

1)Ans. **Given :** In Δ ABC, $AC^2 = AB^2 + BC^2$

To prove : $\angle$ ABC = 90°



Construction : Draw Δ PQR such that, AB = PQ, BC = QR , $\angle$ PQR = 90°.

Proof : In Δ PQR, $\angle$ Q = 90°

$PR^2 = PQ^2 + QR^2$ .... (Pythagoras theorem)

$= AB^2 + BC^2$ .... (construction) ......(I)

$= AC^2$ .... (given) ......(II)

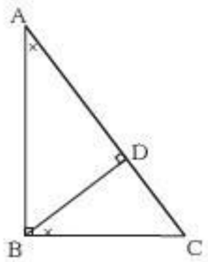
$\therefore PR^2 = AC^2$

$\therefore$ PR = AC .... (III)

$\therefore \Delta ABC \cong \Delta PQR$ .... (SSS test)

$\therefore \angle ABC = \angle PQR = 90°$

2)Ans.



Given : In Δ ABC, $\angle$ ABC = 90°,

seg BD $\perp$ seg AC, A–D–C

To prove: $\Delta ADB \sim \Delta ABC$

$\Delta BDC \sim \Delta ABC$

$\Delta ADB \sim \Delta BDC$

Proof : In Δ ADB and Δ ABC

$\angle DAB \cong \angle BAC$ ...(common angle)

$\angle$ ADB $\cong \angle$ ABC ... (each 90°)

$\Delta ADB \sim \Delta ABC$ ... (AA test)... (I)

In Δ BDC and Δ ABC

$\angle BCD \cong \angle$ ACB .....(common angle)

$\angle BDC \cong \angle ABC$ ..... (each 90°)

Δ BDC $\sim \Delta ABC$ ..... (AA test) ... (II)

$\therefore \Delta ADB \sim \Delta$ BDC from (I) and (II) ....(III)

$\therefore$ from (I), (II) and (III), $\Delta ADB \sim \Delta BDC \sim \Delta ABC$ ....(transitivity)

3)Ans.

Given: In Δ PQR,

PM is a median

QM = MR

PM = 9

$PQ^2 + PR^2 = 290$

To Find: Length of QR

Proof:

Δ PMQ = $PM^2 + QM^2 = PQ^2$ (Pythagoras Theorem)

Δ PMR = $PM^2 + MR^2 = PR^2$ (Pythagoras Theorem)

$2PM^2 + (QM^2 + MR^2) = PQ^2 + PR^2$

Given (QM = MR)

$2PM^2 + 2QM^2 = PQ^2 + PR^2$

$2 \times 81 + 2QM^2 = 290$

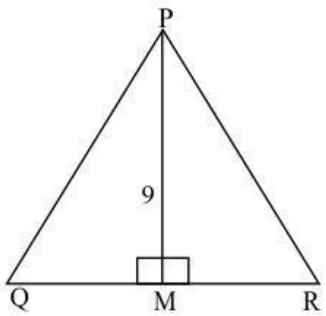
$2QM^2 = 290 - 162$

$= 128$

$QM^2 = 64$

QM = 8

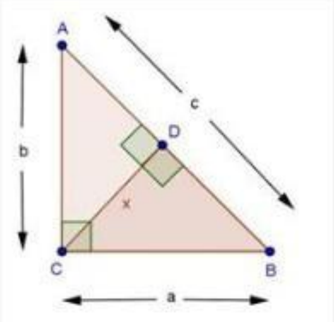
PM median – 2QM = QR = 16



Q.6) Solve the following question (Challenging que.): (Any 1) **4**

1)Ans.

We have: $\angle C = 90^\circ$ and $CD \perp AB$



In ΔACB and ΔCDB

$\angle B = \angle B$ [Common]

$\angle ACB = \angle CDB$ [Each 90°]

Then, $\Delta ACB \sim \Delta CDB$ [By AA similarity]

$\therefore \frac{AC}{CD} = \frac{AB}{CB}$ [Corresponding parts of similar Δ are proportional]

$\Rightarrow \frac{b}{x} = \frac{c}{a}$

$\Rightarrow ab = cx$

2)Ans.

In ΔABC,

Area of Triangle $= \frac{1}{2} \times \text{base} \times \text{height}$

$$\left.\begin{aligned} A(\Delta ABC) &= \frac{1}{2} \times BC \times AC \\ A(\Delta ABC) &= \frac{1}{2} \times AB \times CD \end{aligned}\right\} \quad \text{---(i)}$$

$\frac{1}{2} \times BC \times AC = \frac{1}{2} \times AB \times CD$ ---[From (i)]

$\therefore \quad BC \times AC = AB \times CD$

$\therefore \quad \frac{1}{CD} = \frac{AB}{BC \times AC}$ ---[Dividing both sides by $(BC \times AC)$]

$\therefore \quad \frac{1}{CD^2} = \frac{AB^2}{BC^2 \times AC^2}$ ---(ii) [Squaring both sides]

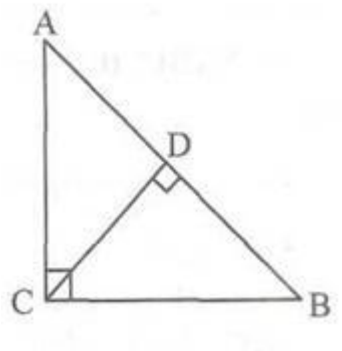
In ΔABC, $\angle C = 90°$

$AB^2 = AC^2 + BC^2$ --(iii) [By Pythagoras theorem]

$\therefore \quad \frac{1}{CD^2} = \frac{AC^2 + BC^2}{BC^2 \times AC^2}$ ---[From (ii) and (iii)]

$\therefore \quad \frac{1}{CD^2} = \frac{1}{BC^2} + \frac{1}{AC^2}$

$\therefore \quad \frac{1}{AC^2} + \frac{1}{BC^2} = \frac{1}{CD^2}$



Success Key Worksheet

Std: Class 10 (Eng.& Semi) **Ch.1 Similarity** **Time: 1 Hr.**

(Worksheet 2)

Date: **Mathematics-2** **Marks: 20**

Q.1) Choose the correct alternative answer for each of the following question: **4**

1. In an equilateral triangle ABC, if AD ⊥ BC, then______________

(a) $2AB^2 = 3AD^2$ (b) $4AB^2 = 3AD^2$ (c) $3AB^2 = 4AD^2$ (d) $3AB^2 = 2AD^2$

2. The length of the hypotenuse of an isosceles right triangle whose one side is $4\sqrt{2}$ cm is _____

(a) 12 cm (b) 8 cm (c) $8\sqrt{2}$ cm (d) $12\sqrt{2}$ cm

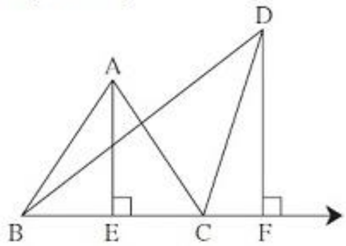
3. A man goes 24 m due west and then 7 m due north. How far is he from the starting point ?

(a) 31 m (b) 17 m (c) 25 m (d) 26 m

Q.2) Solve the following sub-question: **2**

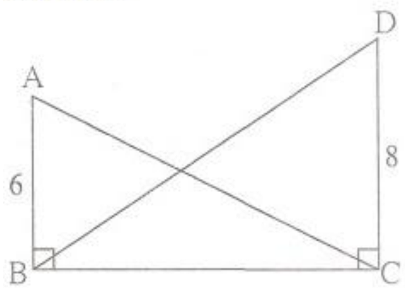
1. In below figure AE ⊥ seg BC, seg DF ⊥ line BC, AE = 4, DF = 6, then find

$\frac{A(\Delta ABC)}{A(\Delta DBC)}$.



2. In the figure given below, ∠ABC = ∠DCB = 90° AB = 6, DC = 8 then

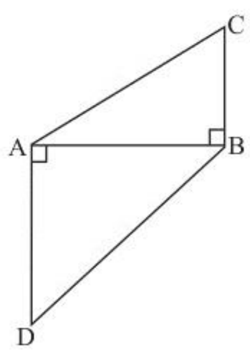
$\frac{A(\Delta ABC)}{A(\Delta DCB)} = ?$



Q.3) Complete and write the following activities: (Any 1) **2**

1. In figure given below BC ⊥ AB, AD ⊥ AB, B = 4, AD = 8, then find

$\frac{A(\Delta ABC)}{A(\Delta ADB)}$



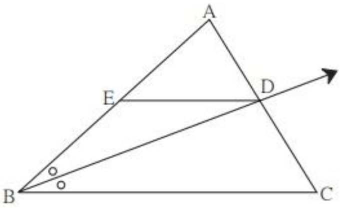
$$\frac{A(\Delta ABC)}{A(\Delta ADB)} = \frac{\square}{AD}$$

[Triangles with $\square$]

$$\frac{A(\Delta ABC)}{A(\Delta ADB)} = \square$$

$$\therefore \frac{A(\Delta ABC)}{A(\Delta ADB)} = \square$$

2. In ΔABC, ray BD bisects ∠ABC. A-D-C, side DE || side BC, A-E-B then prove that,



In Δ ABC, ray BD bisects ∠ B.

$\therefore \frac{AB}{BC} = \square$ . . (I)(Angle bisector theorem)

In Δ ABC, DE || BC

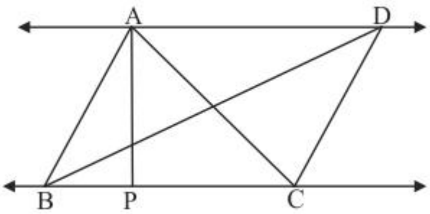
$\square = \frac{AD}{DC}$ . . . . . (II) (. . . . .)

$\frac{AB}{\square} = \frac{\square}{EB}$ . . . . . . from (I) and (II)

Q.4) Solve the following subquestion: (Any 1) **2**

1. Base of a triangle is 9 and height is 5. Base of another triangle is 10 and height is 6. Find the ratio of areas of these triangles.

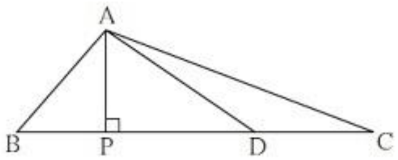
2. In the figure given below, AP ⊥ BC, AD ∥ BC, then find A(Δ ABC) : A(Δ BCD).



Q.5) Complete and write the following activities: (Any 1) **3**

1. In Δ ABC point D on side BC is such that DC = 6, BC = 15. Find A(Δ ABD) : A(Δ ABC) and A(Δ ABD) : A(Δ ADC) .

: Point A is common vertex of Δ ABD, Δ ADC and Δ ABC and their bases are collinear. Hence, heights of these three triangles are equal



BC = 15, DC = 6 ∴ BD = BC − DC = 15 − 6 = $\square$

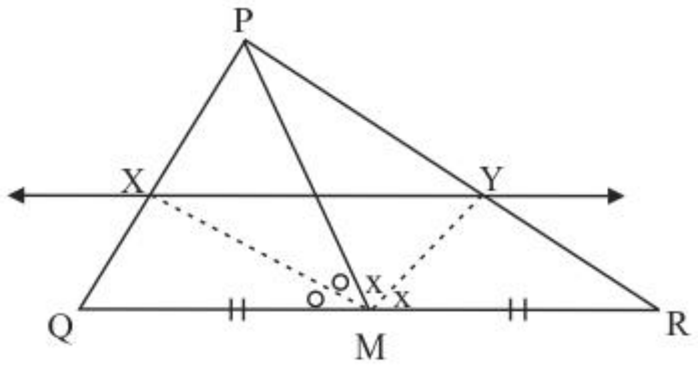
$\frac{A(\Delta ABD)}{A(\Delta ABC)} = \square$ .... heights equal, hence areas proportional to bases.

$= \frac{9}{15} = \square$

$\frac{A(\Delta ABD)}{A(\Delta ADC)} = \frac{BD}{\square}$ .... heights equal, hence areas proportional to bases.

$= \square = \square$

2. In ΔPQR seg PM is a median. Angle bisectors of ∠PMQ and ∠PMR intersect side PQ and side PR in points X and Y respectively. Prove that XY ∥ QR.



Complete the proof by filling in the boxes.

In ΔPMQ, ray MX is bisector of ∠PMQ.

$\therefore \frac{\square}{\square} = \frac{\square}{\square}$ ....(I) theorem of angle bisector.

In ΔPMR, ray MY is bisector of ∠PMR.

$\therefore \frac{\square}{\square} = \frac{\square}{\square}$ ....(II) theorem of angle bisector.

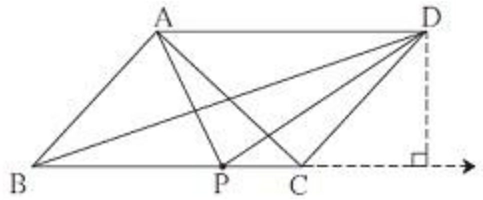
But $\frac{MP}{MQ} = \frac{MP}{MR}$ ...... M is the midpoint QR, hence MQ = MR.

$\therefore \frac{PX}{XQ} = \frac{PY}{YR}$

∴ XY ∥ QR .... Converse of basic proportionality theorem

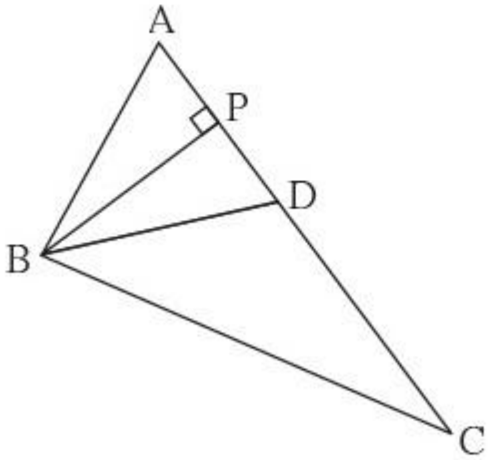
Q.6) Solve the following sub-question: (Any 1) **3**

1. ABCD is a parallelogram. P is any point on side BC. Find two pairs of triangles with equal areas.



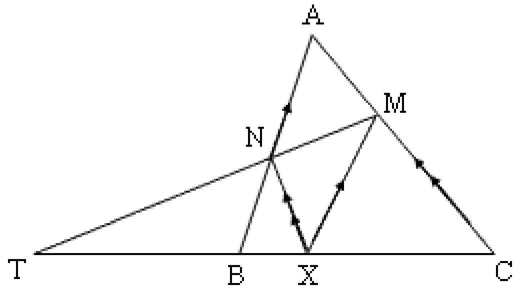
2. In below figure in Δ ABC, point D is on side AC. If AC = 16, DC = 9 and BP ⊥ AC, then find the following ratios.

(i) $\frac{A(\Delta ABD)}{A(\Delta ABC)}$ (ii) $\frac{A(\Delta BDC)}{A(\Delta ABC)}$ (iii) $\frac{A(\Delta ABD)}{A(\Delta BDC)}$

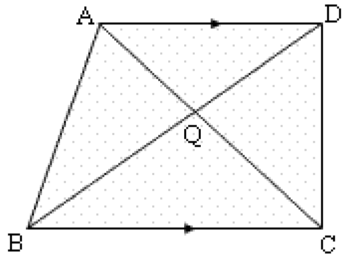


Q.7) Solve the following question (Challenging que.): (Any 1) **4**

1. Let X be any point on side BC of ΔABC, XM and XN are drawn parallel to BA and CA meeting at N and M respectively. MN meets CB produced in T. Prove that $TX^2 = TB \times TC$.



2. In □ ABCD , side BC ∥ side AD. Seg AC and seg BD intersect in point Q. If AQ = 1/3 AC then show that DQ = 1/2 BQ.



Success Key Worksheet

Std: Class 10 (Eng.& Semi) | **Ch.1 Similarity** | **Time: min:1**

(Worksheet 2) Answer Key

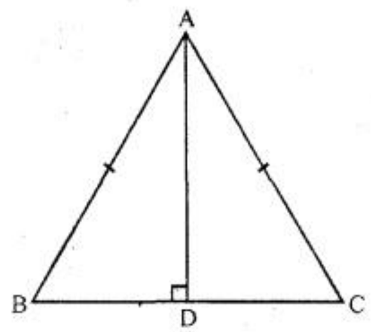
Date: | **Mathematics-2** | **Max Marks: 20**

Q.1) Choose the correct alternative answer for each of the following question: **4**

1) Ans. (c)

In equilateral ΔABC,

$AD \perp BC$



$\therefore$ AD bisects BC at D

Now in right ΔABD,

$\Rightarrow AB^2 = AD^2 + BD^2$ (Pythagoras Theorem)

$\Rightarrow AB^2 = AD^2 + \left(\frac{1}{2}BC\right)^2$ $\left(\because BD = \frac{1}{2}BC\right)$

$\Rightarrow AB^2 = AD^2 + \left(\frac{1}{2}AB\right)^2$ $(\because AB = BC)$

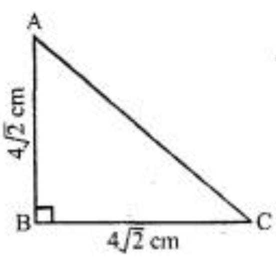
$\Rightarrow AB^2 = AD^2 + \frac{1}{4}AB^2$

$\Rightarrow 4AB^2 = 4AD^2 + AB^2$

$\Rightarrow 4AB^2 - AB^2 = 4AD^2 \Rightarrow 3AB^2 = 4AD^2$ (c)

2) Ans. (b)

In isosceles right ΔABC



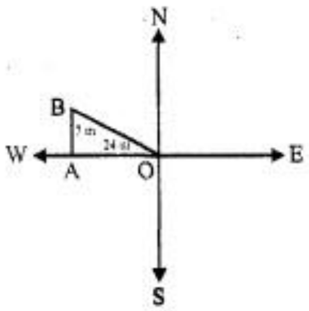
$\angle B = 90^\circ$, $AB = BC = 4\sqrt{2}$

$\therefore AC = \sqrt{2} \times$ equal side

$= \sqrt{2} \times 4\sqrt{2} = 8$ cm (b)

3) Ans. (c)

In the figure, O is starting point OA = 24 m
and AB = 7 m



$\therefore$ By Pythagoras Theorem

$OB^2 = OA^2 + AB^2$

$= (24)^2 + (7)^2 = 576 + 49 = 625 = (25)^2$

$\therefore$ OB = 25 m (c)

Q.2) Solve the following sub-question: **2**

1) Ans. $\frac{A(\Delta ABC)}{A(\Delta DBC)} = \frac{AE}{DF}$ .... bases are equal, hence areas proportional to heights.

$= \frac{4}{6} = \frac{2}{3}$

2) Ans. ΔABC and ΔDCB have common base.

$\therefore \frac{A(\Delta ABC)}{A(\Delta DCB)} = \frac{AB}{DC}$ [Δs with equal base]

$\therefore \frac{A(\Delta ABC)}{A(\Delta DCB)} = \frac{6}{8}$

$\therefore \frac{A(\Delta ABC)}{A(\Delta DCB)} = \frac{3}{4}$

Q.3) Complete and write the following activities: (Any 1) **2**

1) Ans. $\frac{A(\Delta ABC)}{A(\Delta ADB)} = \frac{\boxed{BC}}{AD}$

[Triangles with $\boxed{\text{common base}}$]

$\frac{A(\Delta ABC)}{A(\Delta ADB)} = \boxed{\frac{4}{8}}$

$\therefore \frac{A(\Delta ABC)}{A(\Delta ADB)} = \boxed{\frac{1}{2}}$

2) Ans. In Δ ABC, ray BD bisects $\angle$ B.

$\therefore \frac{AB}{BC} = \frac{\boxed{AD}}{\boxed{DC}}$. . (I)(Angle bisector theorem)

In Δ ABC, DE || BC

$\frac{\boxed{AE}}{\boxed{EB}} = \frac{AD}{DC}$ . . . . . (II) (. . . . .)

$\frac{AB}{\boxed{}} = \frac{\boxed{}}{EB}$ . . . . . . from (I) and (II)

Q.4) Solve the following subquestion: (Any 1) **2**

1) Ans. Let first triangle be Δ_1, its base & height be b_1 & h_1 respectively. Let second triangle be Δ_2, its base & height be b_2 & h_2 respectively.

$B_1 = 9, h_1 = 5, b_2 = 10$ & $h_2 = 6$ [Given]

$$\frac{A(\Delta_1)}{A(\Delta_2)} = \frac{b_1 \times h_1}{b_2 \times h_2}$$

[Property of ratio areas of two triangles]

$$= \frac{9 \times 5}{10 \times 6}$$

$$\therefore \frac{A(\Delta_1)}{A(\Delta_2)} = \frac{3}{4}$$

i.e. $A(\Delta_1) : A(\Delta_2) = 3:4$.

2) Ans. $A(\Delta ABC) = \frac{1}{2} \times BC \times AP$ .... 1 [Formula]

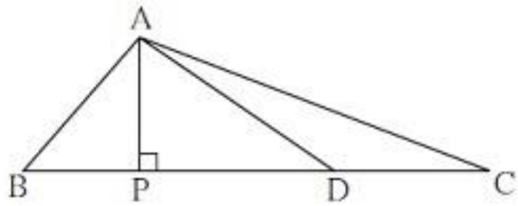
$A(\Delta BCD) = \frac{1}{2} \times BC \times AP$ ...... 2 [Formula]

$\therefore A(\Delta ABC) = A(\Delta BCD)$

$$\therefore \frac{A(\Delta ABC)}{A(\Delta BCD)} = 1$$

Q.5) Complete and write the following activities: (Any 1) **3**

1) Ans. : Point A is common vertex of Δ ABD, Δ ADC and Δ ABC and their bases are collinear. Hence, heights of these three triangles are equal



BC = 15, DC = 6 $\therefore$ BD = BC − DC = 15 − 6 = $\boxed{9}$

$$\frac{A(\Delta ABD)}{A(\Delta ABC)} = \boxed{\frac{BD}{BC}}$$ .... heights equal, hence areas proportional to bases.

$$= \frac{9}{15} = \boxed{\frac{3}{5}}$$

$$\frac{A(\Delta ABD)}{A(\Delta ADC)} = \frac{BD}{\boxed{DC}}$$ .... heights equal, hence areas proportional to bases.

$$= \boxed{\frac{9}{6}} = \boxed{\frac{3}{2}}$$

2) Ans. In ΔPMQ, ray MX is bisector of $\angle PMQ$.

$\therefore \frac{\boxed{PM}}{\boxed{MQ}} = \frac{\boxed{PX}}{\boxed{XQ}}$

...(I) theorem of angle bisector.

In ΔPMR, ray MY is bisector of $\angle PMR$.

$\therefore \frac{\boxed{PM}}{\boxed{MR}} = \frac{\boxed{PY}}{\boxed{YR}}$

.........(II) theorem of angle bisector.

But $\frac{MP}{MQ} = \frac{MP}{MR}$

...... M is the midpoint QR, hence MQ = MR.

$\therefore \frac{PX}{XQ} = \frac{PY}{YR}$

$\therefore$ seg XY $\parallel$ seg QR

.... Converse of basic proportionality theorem

Q.6) Solve the following sub-question: (Any 1) **3**

1) Ans. : $\square$ ABCD is a parallelogram.

$\therefore$ AD $\parallel$ BC and AB $\parallel$ DC

Consider Δ ABC and Δ BDC.

Both the triangles are drawn in two parallel lines. Hence the distance between the two parallel lines is the height of both triangles.

In Δ ABC and Δ BDC, common base is BC and heights are equal.

Hence, $A(\Delta ABC) = A(\Delta BDC)$

In Δ ABC and Δ ABD, AB is common base and and heights are equal.

$\therefore A(\Delta ABC) = A(\Delta ABD)$

2) Ans. : In Δ ABC point P and D are on side AC, hence B is common vertex of Δ ABD, Δ BDC, Δ ABC and Δ APB and their sides AD, DC, AC and AP are collinear. Heights of all the triangles are equal. Hence, areas of these triangles are proportinal to their bases. AC = 16, DC = 9

$\therefore$ AD = 16 − 9 = 7

$\therefore \frac{A(\Delta ABD)}{A(\Delta ABC)} = \frac{AD}{AC} = \frac{7}{16}$ .... triangles having equal heights

$\frac{A(\Delta BDC)}{A(\Delta ABC)} = \frac{DC}{AC} = \frac{9}{16}$ .... triangles having equal heights

$\frac{A(\Delta ABD)}{A(\Delta BDC)} = \frac{AD}{DC} = \frac{7}{9}$ .... triangles having equal heights

Q.7) Solve the following question (Challenging que.): (Any 1) **4**

1) Ans. (1) In ΔTXM, BN $\parallel$ XM

$\frac{\cancel{TN}}{\cancel{NM}} = \frac{BX}{TB}$ (B.P.T.)..... (1)

(2) In ΔTMC, XN $\parallel$ CM

$\frac{\cancel{TN}}{\cancel{NM}} = \frac{TX}{XC}$ (B.P.T.)....... (2)

(3) $\frac{TB}{BX} = \frac{TX}{XC}$ [From (1) & (2)]

$\frac{BX}{TB} = \frac{XC}{TX}$ (invertendo)

$\frac{BX + TB}{TB} = \frac{XC + TX}{TX}$ (componendo)

$\frac{TX}{TB} = \frac{TC}{TX}$

$TX^2 = TB \times TC$

2) Ans. Let 'a' be the first term and 'd' be the common difference of the A.P

Given : $S_p = S_q$

$\therefore \frac{p}{2}[2a + (p - 1) d] = \frac{q}{2}[2a + (q - 1)d]$

$\therefore p(2a+pd-d)=q(2a+qd-d)$

$\therefore 2ap+p^2d-pd=2aq+q^2d-qd$

$\therefore 2ap-2aq+p^2d-q^2d-pd+qd=0$

$\therefore 2a(p-q)+d(p^2-q2)-d(p-q)=0$

$\therefore 2a(p-q)+d(p-q)(p + q)-d(p-q)=0$

$(p - q)[2a + (p + q - 1)d] = 0$

$\therefore (p - q)[2a + (p + q)d - d] = 0$

$\therefore 2a+ (p+q-1)d=0$ .... (i) [Dividing both sides by (p-q)]

To prove $S_{(p+q)} = 0$

$S_{(p+q)} = \frac{p+q}{2}[2a + (p + q - 1)d]$

$\therefore S_{(p+q)} = \frac{p+q}{2}(0)$ [From (i)]

$\therefore S_{(p+q)} = 0$