Heron's Formula

**Task-1: Multiple Choice Questions**

Topic	Heron's Formula
Learning Objective	• To find the area of triangle when the sides of triangle are given. • To find the area of quadrilateral by dividing them into two triangle.
Nature of Task	Content Oriented
Content Coverage	–
Description of Task	Multiple Choice Questions based on Heron's formula To find the area of triangle and the area of other figures like trapezium etc. (Where the Trapezium can be divided into two triangles).
Execution of Task	Student can be given a 15 minutes Multiple Choice Question paper based on above learning objective.
Assessment of Task	One mark for correct answer and zero for incorrect answer.
Follow up	All questions shall be discussed in class after the assessment.

Multiple Choice Questions

1. The sides of a triangle are 3 cm, 4 cm and 5 cm. Its area is

   A. 12 cm^2 B. 15 cm^2 C. 6 cm^2 D. 9cm^2

2. The area of Δ ABC is
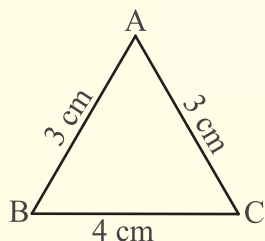
   A. 20 cm^2 B. $4\sqrt{5}$ cm^2 C. $2\sqrt{5}$ cm^2 D. 10 cm^2

3. The area of a triangular sign board of sides 5 cm, 12 cm and 13 cm is

   A. $\dfrac{65}{2}$ cm^2 B. 30 cm^2 C. 60 cm^2 D. 12 cm^2

4. The side of a triangle are in the ratio of 25 : 14 : 12 and its perimeter is 510 m. The greatest side of the triangle is

    A.   120 m   B.   170 m   C.   250 m   D.   270 m

5. The perimeter of a right triangle is 60 cm and its hypotenuse is 26 cm. The other two sides of the triangle are

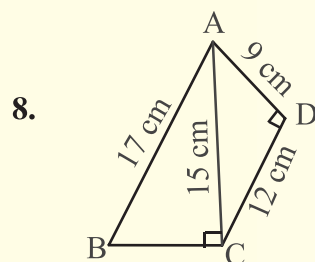   A.   24 cm, 10 cm   B.   25 cm, 9 cm   C.   20 cm,14 cm   D.   26 cm, 8 cm$_2$
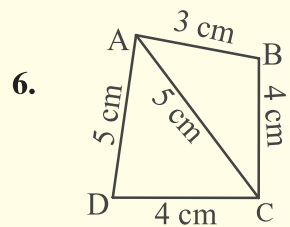
6. The area of quadrilateral ABCD in the adjoining figure is

    A.   15.2 cm^2 B.   14.8 cm^2 C.   15 cm^2 D.   16.4 cm^2
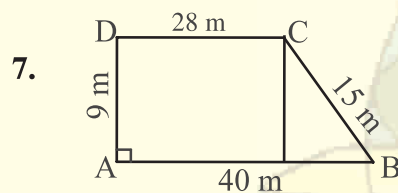
7. The area of trapezium in the adjoining figure is

    A.   286 m^2 B.   306 m^2 C.   316 m^2 D.   296 m^2

8. The area of quadrilateral ABCD in the adjoining figure is

    A.   57 cm^2 B.   95 cm^2 C.   102 cm^2 D.   114 cm^2

Task-2: Oral Questions

Topic	Heron's Formula
Learning Objective	To check the knowledge of basic concepts required for finding the area of triangle
Nature of task	Pre-Content
Description of Task	Students can be asked questions orally individually.
Execution of Task	Students may be asked one by one. If the child is not able to respond, another chance can be given either by changing the question or by giving some hint.
Assessment of Task	Students can be graded for number of correct responses.
Follow up	If any student is not able to respond at first instance, he/she may be given another opportunity i.e. give a days or two time to prepare again and appear for oral assessment test separately.

Suggestive Oral Questions

1.   What is a scalene triangle ?

2.   What is the name given to a Δ whose two sides are equal ? Whose all the side are equal ?

3.   Area of a triangle $= \dfrac{1}{2}$ base $\times$ _____.

4.   When the sum of the squares of the lengths of two sides of a Δ is equal to the square of the length of the third side, it is called a _____triangle.

5.   State the Heron's formula for the area of a triangle ?

6.   What is the semi-perimeter of a triangle ?

7.   Area of a rectangle $=$ length $\times$ _____.

8.   Perimeter of a rectangle $= 2$ (_____$+$ _____).

9.   Area of a rhombus $= \dfrac{1}{2}$ (one diagonal) $\times$ (_____).

10.   The area of a parallelogram $=$ (base) $\times$ (_____).

11.   Area of a trapezium $= \dfrac{1}{2}$ (_____) $\times$ Altitude

12.   Area of an equilateral triangle with sides of length x cm $= \dfrac{\sqrt{3}}{4} \times$ _____.

Task-3: Home Assignment

Topic	Heron's Formula
Learning Objective	• To apply the Heron's formula to the problem of triangle and quadrilateral. • To develop the skill of finding areas.
Nature of task	Post-Content
Description of Task	Students are required to complete Home Assignment in scheduled time.
Execution of Task	Students may be given home assignment sheet containing 8–10 questions. Some questions may be incorporated to help the students to follow the steps in systematic manner or with hints. These questions will benefit students while working independently and without any peer help or teachers' guidance (for example Q. 9, 10, 11 suggested in worksheet).
Assessment of Task	Students will be assessed for punctuality, presentation and accuracy. They shall be appreciated even if they come and discuss the problems with teachers before submission of assignment.

Home Assignments

1.   Find the area of a Δ whose sides are 35 cm, 45 cm and 50 cm

2.   An isosceles triangle has perimeter 30 cm and each of its equal sides is 12 cm. Find its area (Use $\sqrt{15}$ = 3.88)

3.   The measure of one side of a right triangular field is 4.2 m. If the difference of the lengths of hypotenuse and the other is 14m, find the sides of the triangle and its area.
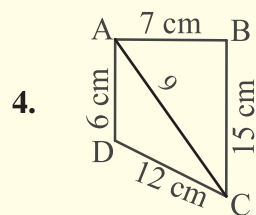
4.   Find the area of the quadrilateral ABCD given in the figure alongside.

5.   The perimeter of a rhombus is 40 cm. If one of its diagonal is 16 cm, find the area of the rhombus.

6.   Two parallel sides of a trapezium are 60 cm and 77 cm and the other sides are 25 cm and 26 cm. Find the area of the trapezium.

7. Find the area of a quadrilateral ABCD in which AD = 24 cm, $\angle$ BAD = 90º and B, C and D from an equilateral Δ of side 26 cm [use $\sqrt{3}$ =1.73]

8. The height of an equilateral triangle measures 9 cm. Find its area, correct to two places of decimals [Take $\sqrt{3}$ = 1.73]

9. Area of triangle - by Heron's formula Practice Worksheet Remember.
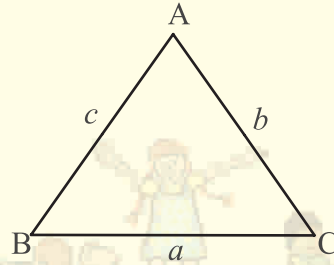
Step 1. Semiperimeter of Δ ABC, $s = \dfrac{a+b+c}{2}$

Step 2. area (Δ ABC) = $\sqrt{s(s-a)(s-b)(s-c)}$

1. Find the area of a triangle lengths of whose sides are 8 cm, 11 cm and 13 cm.

Sol. Step. 1.

$$a = 8 \text{ cm}$$
$$b = 11 \text{ cm}$$
$$c = 13 \text{ cm}$$
$$s = \dfrac{a+b+c}{2} =$$

Step. 2.

$$s - a = \underline{\hspace{4cm}}$$
$$s - b = \underline{\hspace{4cm}}$$
$$s - c = \underline{\hspace{4cm}}$$
$$s(s - a)(s - b)(s - c) = \underline{\hspace{4cm}}$$
$$\text{area} = \sqrt{s(s-a)(s-b)(s-c)}$$
$$= \underline{\hspace{4cm}} \text{ cm}^2$$

10. Find the area of a triangle length of whose two sides are 18 cm and 10 cm and the perimeter is 42 cm.

Sol. Hint : Length third side = Perimeter – (sum of lengths of two given sides)

Step. 1. Find the lengths of 3rd side

Step. 2. $s = \dfrac{a+b+c}{2}$

Step. 3.   area (triangle) = $\sqrt{s(s-a)(s-b)(s-c)}$ sq units.

_____

_____

_____

_____

_____

_____

11. The length of sides of a triangular plot are in the ratio of 12 : 17 : 25 and its perimeter is 540 cm. Find its area.

Sol. Hint :   Let dimensions be a = 12 x

b = 17 x

c = 25 x

Now find s = $\dfrac{a+b+c}{2}$

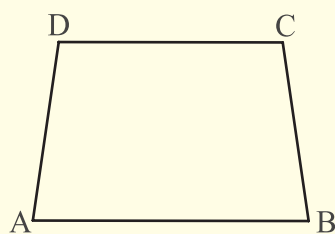then area using the Heron's formula

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Note : Area of a quadrilateral, lengths of whose sides and one diagonal are given, can be calculated by dividing the quadrilateral into two triangles and using the Heron's formula.

12. A field is in the shape of a trapezium whose parallel sides are 25 m and 10 m. The non-parallel sides are 14 m and 13 m. Find the area of the field.

D   C

A   B

Sol. _____

_____

_____

_____

_____

_____

_____