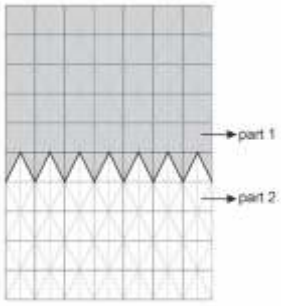
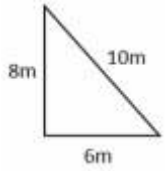
# Curriculum Aligned Competency Based Test Items
# Mathematics
# Class 9 – Chapter 12
# Heron's Formula

Glass buildings can be strengthened using iron frames. A glass structure and its iron frame are shown below.




The frame consists of equal triangles. The dimensions of a triangle are shown below.




SAS21M09S1201

**1** How much area is enclosed by one triangle?

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_____

SAS21M09S1202

**2** What is the area of part 1 of the frame?

A. $84\ m^2$
B. $1680\ m^2$
C. $3360\ m^2$
D. $3696\ m^2$

SAS21M09S1203

3 Is the area of part 1 equal to the area of part 2? Why?

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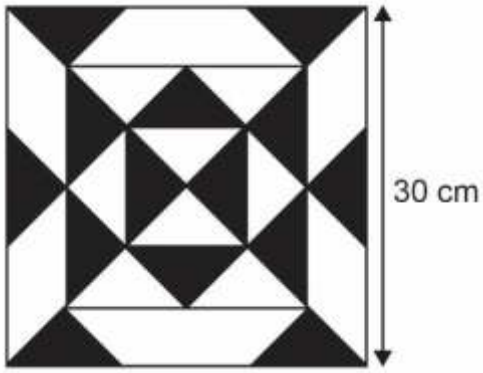
SAS21M09S1204

4 Maintenance of the building's exterior is done by a company. The company charges Rs 750 per square meter per month.
Which of the following calculations represents the monthly maintenance charges?

A. $24 \times 12$
B. $750 \times 24$
C. $3024 \times 750$
D. $6720 \times 750$

The design on a tile is made of isosceles triangles.
The side lengths of the triangles are 6 cm, 6 cm and 8 cm.




SAS21M09S1205

5 How much area of the tile is black?

A. $24\ cm^2$
B. $9\sqrt{7}\ cm^2$
C. $90\ cm^2$
D. $112\sqrt{5}\ cm^2$

SAS21M09S1206

6 A tile is made by joining the vertices of four equilateral triangles. The side length of the triangles is 15 cm. What is the area of the tile?

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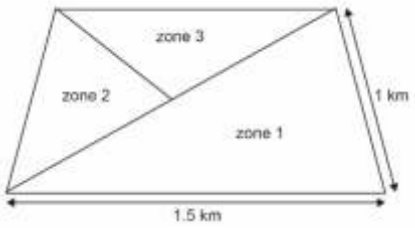
A zoo is in the shape of an isosceles trapezium.
It is divided into three zones – Zone 1, Zone 2 and Zone 3.
Animals are kept without cages in Zone 1. Zone 2 is for visitors and Zone 3 is reserved for park authorities.




To avoid the entry of animals in zones 2 and 3, a 1.8 km long wired fencing is installed.

SAS21M09S1207

**7** Which of the following calculations shows the area for animals?

A. $\sqrt{1.35 \times 0.65 \times 1.15}$
B. $2.15 \times 0.35 \times 0.65 \times 1.15$
C. $\sqrt{3.15 \times 1.35 \times 1.65 \times 1.15}$
D. $\sqrt{4.30 \times 1.35 \times 0.65 \times 1.15}$

SAS21M09S1208

**8** "The area reserved for animals is twice the area reserved for the zoo authorities." Do you have enough information to support this statement? Explain your answer.

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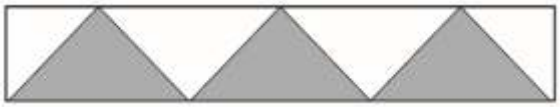
The outer boundary of Zone 1 is made of solid structures in the shape of isosceles triangles of the same size and barbed wires.



The wall consists of 15 such solid structures.

SAS21M09S1209

**9** Which of the following calculations shows the total area (in square meters) of the solid structures?

A. $\sqrt{50 \times 50 \times 30}$
B. $\sqrt{130 \times 50 \times 50 \times 30}$
C. $15\sqrt{130 \times 50 \times 50 \times 30}$
D. $15\sqrt{260 \times 180 \times 180 \times 16}$

SAS21M09S1210

**10** What is the area of a triangle with side lengths 20 cm, 20 cm and 8 cm?

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_____

# Answers



| | |
|---|---|
| **Item Number** | Question 1 |
| **Question Code** | SAS21M09S1201 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Employ |
| **Item Type** | Closed Constructed Response |
| **Full Credit (Full Score)** | 24 $m^2$ |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 2 |
| **Question Code** | SAS21M09S1202 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Employ |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | D. 3696 $m^2$ |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 3 |
| **Question Code** | SAS21M09S1203 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Interpret & Evaluate |
| **Item Type** | Closed Constructed Response |
| **Full Credit (Full Score)** | No, with valid reasoning<br>• No, the area reserved under part 1 is not equal to the area reserved under part 2. Area under part 1 is 3696 $m^2$ whereas the area under part 2 is 3024 $m^2$ |
| **No Credit (No Score)** | Any other response or missing response |

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|---|---|
| **Item Number** | Question 4 |
| **Question Code** | SAS21M09S1204 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Interpret & Evaluate |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | D. 6720×750 |
| **No Credit (No Score)** | Any other response or missing response |

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|---|---|
| **Item Number** | Question 5 |
| **Question Code** | SAS21M09S1205 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Employ |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | D. $112\sqrt{5}$ cm$^2$ |
| **No Credit (No Score)** | Any other response or missing response |

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|---|---|
| **Item Number** | Question 6 |
| **Question Code** | SAS21M09S1206 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Interpret & Evaluate |
| **Item Type** | Closed Constructed Response |
| **Full Credit (Full Score)** | $225\sqrt{3}$ square centimetres<br>$225\sqrt{3}$ sq cm |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 7 |
| **Question Code** | SAS21M09S1207 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Employ |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | B. 2.15×0.35×0.65×1.15 |
| **No Credit (No Score)** | Any other response or missing response |

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|---|---|
| **Item Number** | Question 8 |
| **Question Code** | SAS21M09S1208 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Interpret & Evaluate |
| **Item Type** | Closed Constructed Response |
| **Full Credit (Full Score)** | No, with a valid explanation<br>No, we don't have enough information to say that the area reserved for animals is double the area reserved for the zoo authorities. The area reserved under zone 1 = area reserved under zone 2 + 3, but we cannot say the area reserved under zone 2 and 3 are equal. |
| **No Credit (No Score)** | Any other response or missing response |

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|---|---|
| **Item Number** | Question 9 |
| **Question Code** | SAS21M09S1209 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Interpret & Evaluate |
| **Item Type** | Multiple Choice Question |
| **Full Credit (Full Score)** | C.$15\sqrt{130\times50\times50\times30}$ |
| **No Credit (No Score)** | Any other response or missing response |

| | |
|---|---|
| **Item Number** | Question 10 |
| **Question Code** | SAS21M09S1210 |
| **Grade & Chapter Name** | Grade 9 \| Heron's Formula |
| **Concept \| Sub-concept** | Mensuration \| Finding Area of a Triangle using Heron's Formula |
| **Competency** | Employ |
| **Item Type** | |
| **Full Credit (Full Score)** | $32\sqrt{6}cm^2$ |
| **No Credit (No Score)** | Any other response or missing response |