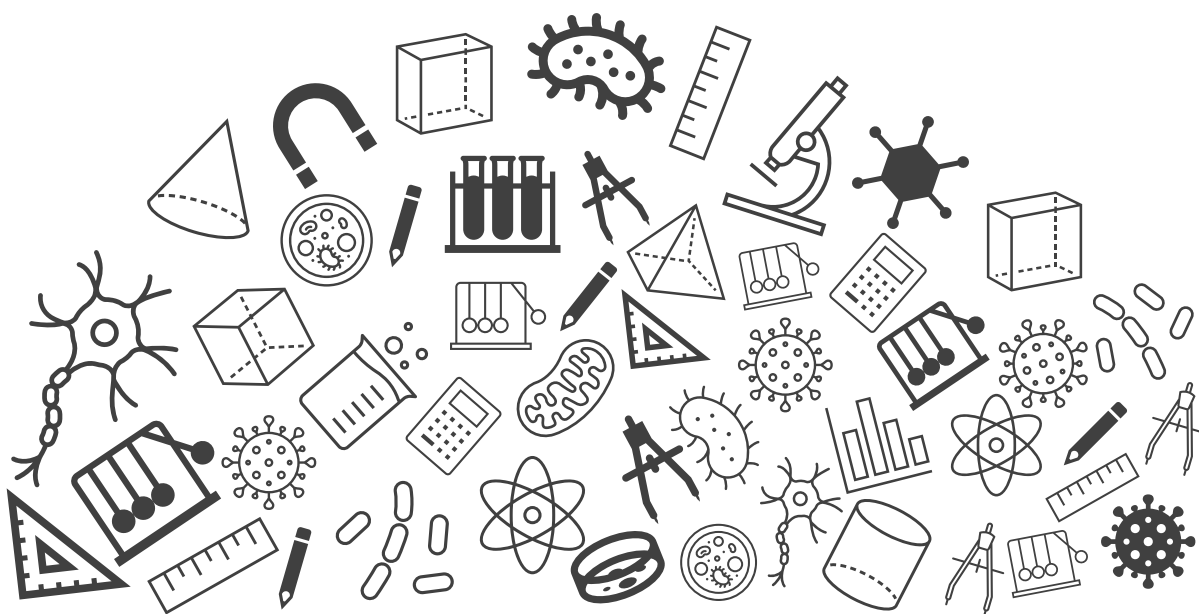# Grade 09: Maths
Exam Important Questions

Topic : Exam Important Questions

1. If the area of an equilateral triangle is $16\sqrt{3}cm^2$, then the perimeter of the triangle is

   [3 Marks]
   [Area of an Equilateral Triangle]

   Solution:

   Given, area of an equilateral triangle $= 16\sqrt{3}cm^2$

   $\because$ Area of an equilateral triangle $= \frac{\sqrt{3}}{4}(Side)^2$

   $\Rightarrow \quad \frac{\sqrt{3}}{4}(Side)^2 = 16\sqrt{3} \Rightarrow (Side)^2 = 64$

   $\therefore \qquad$ Side = 8cm
   .....(2 Mark)

   [taking positive square root because side is always positive]
   $\therefore$ Perimeter of an equilateral triangle = 3 $\times$ side = 3 $\times$ 8 = 24cm
   ....(1 Mark)

   Hence, the perimeter of an equilateral triangle is 24 cm.

2. The edges of a triangular board are 6cm, 8cm and 10cm. The cost of painting it at the rate of 9 paise per cm^2 is _____.

(3 Marks)

[Heron's Formula]

Solution:

Since, the edges of a triangular board are a = 6cm, b = 8cm and c=10cm.
Now, semi – perimeter of a triangular board,
$s = \frac{a+b+c}{2}$
$= \frac{6+8+10}{2} = \frac{24}{2} = 12cm$
....(0.5 Marks)

Now, area of a triangular board $= \sqrt{s(s-a)(a-b)(s-c)}$ [by Heron's formula]
$= \sqrt{12(12-6)(12-8)(12-10)}$
$= \sqrt{12 \times 6 \times 4 \times 2}$
$= \sqrt{(12)^2 \times (2)^2}$
$= 12 \times 2 = 24cm^2$
....(2 Mark)

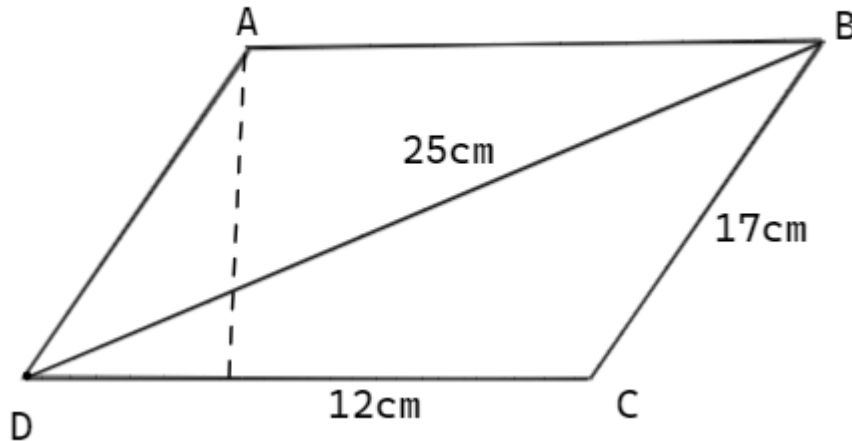Given that, the cost of painting an area of 1 cm^2 = Rs.0.09
∴ The cost of painting an area of 24 cm^2 = 0.09 × 24 = Rs 2.16
...(0.5 Marks)

Hence, the cost of painting the triangular board at the rate of 9 paise per cm^2 is Rs 2.16.

3. Find the area of a parallelogram given in the figure. Also, find the length of the altitude from vertex A on the side DC.

(4 marks)

Area of parallelogram ABCD = 2(Area of $\triangle BCD$)

Now, the sides of a $\triangle BCD$ are a = 12 cm, b = 17 cm and c = 25 cm.

Semi-perimeter , $s = \frac{12+17+25}{2} = \frac{54}{2} = 27$

(0.5 marks)

$\therefore$ Area of $\triangle BCD = \sqrt{s(s-a)(s-b)(s-c)}$ [by Heron's formula]

$= \sqrt{27(27-12)(27-17)(27-25)}$

$= \sqrt{27 \times 15 \times 10 \times 2}$

$= \sqrt{9 \times 3 \times 3 \times 5 \times 5 \times 2 \times 2}$

$= 3 \times 3 \times 5 \times 2 = 90 cm^2$

(2 marks)

Area of parallelogram ABCD = 2 $\times$ 90

= 180 cm^2

Let 'h' be the altitude of the parallelogram.

Area of parallelogram ABCD = Base $\times$ Altitude

$\Rightarrow$ $180 = DC \times h$
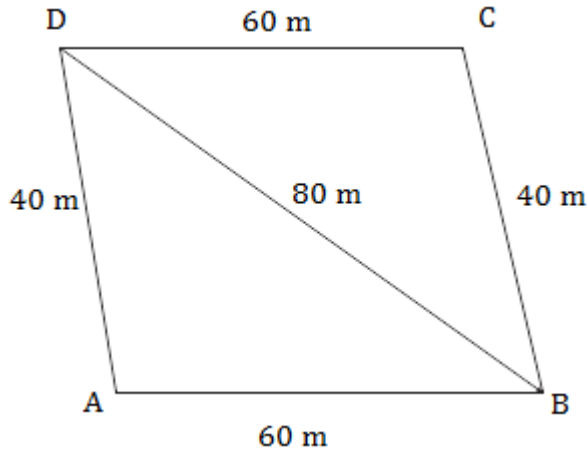
$\Rightarrow$ $180 = 12 \times h$

$\therefore$ $h = \frac{180}{12} = 15\ cm$

(1 marks)

Hence, the area of parallelogram is 180 cm^2 and the length of altitude is 15 cm.

(0.5 marks)

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4. A field in the form of a parallelogram has sides 60m and 40m and one of its diagonals is 80m long. Find the area of the parallelogram.

[5 marks]

[Heron's Formula]

Solution:

Let ABCD be a parallelogram field with sides AB = CD = 60m, BC = DA = 40m and diagonal BD = 80m.
Area of parallelogram ABCD = 2 (Area of ΔABD)
….(i)
Consider ΔABD,
Semi – perimeter of a triangle ΔABD,
$s = \frac{a+b+c}{2}$
$= \frac{AB+BD+DA}{2}$
$= \frac{60+80+40}{2} = \frac{180}{2}$
$= 90m$
......(1 Mark)

$\therefore$ Area of $\Delta ABD = \sqrt{s(s-a)(s-b)(s-c)}$ [by Heron's formula].
$= \sqrt{90(90-60)(90-80)(90-40)}$
$= \sqrt{90 \times 30 \times 10 \times 50}$
$= 100 \times 3\sqrt{15} = 300\sqrt{15}m^2$
....(2 Marks)

From Eq.(i),
Area of parallelogram $ABCD = 2 \times 300\sqrt{15} = 600\sqrt{15}m^2$
...(2 Mark)

Hence, the area of the parallelogram is $600\sqrt{15}m^2$

Exam Important Questions

5. A rhombus shaped sheet with perimeter 40 cm and one diagonal 12 cm, is painted on both sides at the rate of ₹ 5 per cm^2. Find the cost of painting.

(3 Marks)

[Heron's Formula]

Solution:
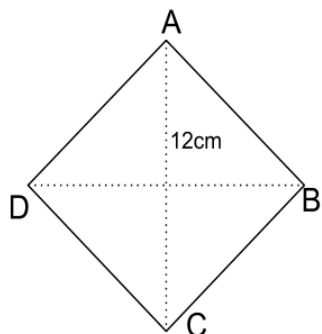
Let ABCD be a rhombus having each side equal

to x cm.

i.e, AB = BC = CD = DA = x cm

Given, perimeter of a rhombus = 40

∴ AB + BC + CD + DA = 40

⇒ x + x + x + x = 40

⇒ 4x = 40

⇒ $x = \frac{40}{4}$

∴ $x = 10\ cm$ (1 mark)

In ΔABC,

let a = AB = 10 cm, b = BC = 10 cm and c = AC = 12 cm

Now, semi-perimeter of

$\Delta ABC,\ \ s = \frac{a+b+c}{2}$

$= \frac{10+10+12}{2} = \frac{32}{2} = 16 cm$

∴ $Area\ of\ \Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$ $by\ Heron's\ formula$

$= \sqrt{16(16-10)(16-10)(16-12)}$

$= \sqrt{16 \times 6 \times 6 \times 4} = 4 \times 6 \times 2 = 48\ cm^2$

∴ Area of the rhombus = $2(Area\ of\ \Delta ABC) = 2 \times 48$

$= 96\ cm^2$ (1 mark)

The cost of painting a sheet of $1\ cm^2$ = ₹ 5

∴ The cost of painting a sheet of $96\ cm^2 = 96 \times 5$ = ₹ 480

Hence, the cost of painting the sheet on both sides = 2 × 480 = ₹ 960

(1 mark)

6. The triangular side walls of a flyover have been used for advertisement. The sides of the walls are 122 m, 22 m, and 120 m (see the given figure). The advertisements yield an earning of Rs 5000 per m^2 per year. A company hired one of its walls for 3 months. How much rent did it pay?
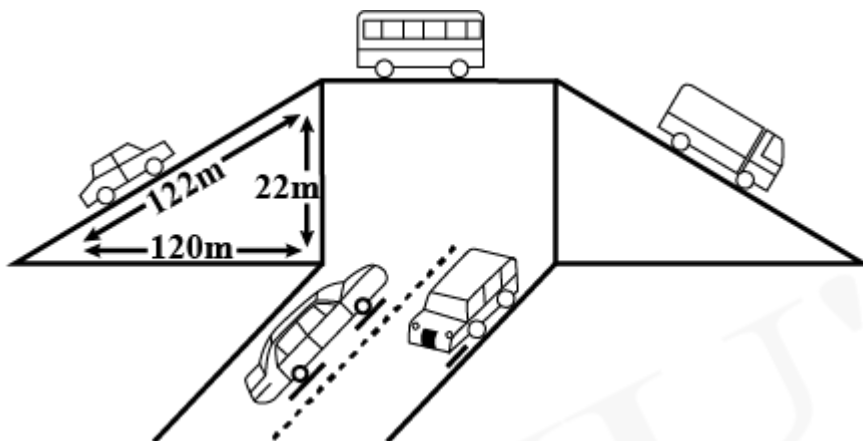
(3 Marks)

Let the sides of the triangle (i.e., a, b, c) be 122 m, 22 m, and 120 m respectively.
Perimeter of triangle = (122 + 22 + 120) m
2s = 264 m
∴ s = 132 m   (0.5 marks)

By Heron's formula,
Area of triangle = $\sqrt{s(s-a)(s-b)(s-c)}$
                    (0.5 marks)

Area of the given triangle $= \sqrt{132(132-122)(132-22)(132-120)}\ m^2$

$= \sqrt{132(10)(110)(12)}\ m^2$
$= 1320\ m^2$ (1 Mark)

Rent of 1 m^2 area per year = Rs 5000
Rent of 1 m^2 area per month = $Rs\,\dfrac{5000}{12}$
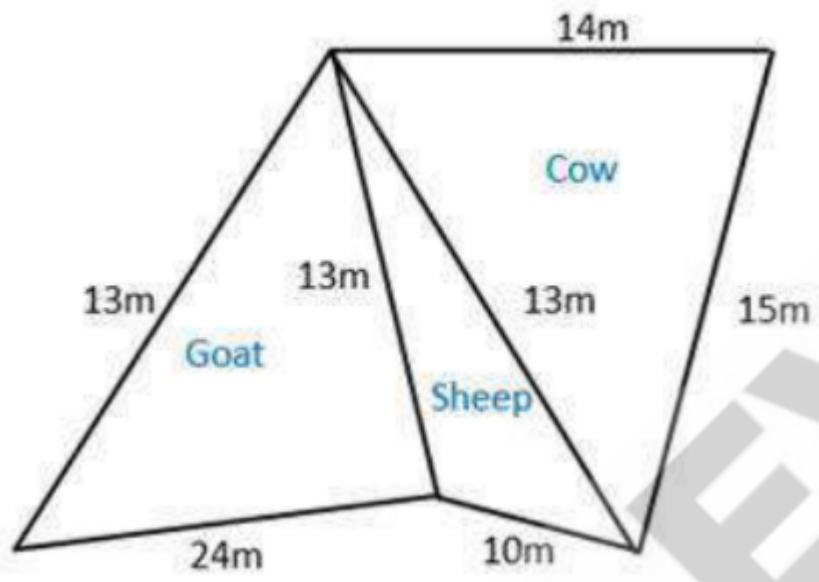Rent of 1320 m^2 area for 3 months = $Rs\left(\dfrac{5000}{12}\times 3 \times 1320\right)$

$= Rs\,(5000 \times 330)$
$= Rs\,16,50,000$ (1 Mark)

Therefore, the company paid Rs 16,50,000.

7. Raju has a rearing farm which he has divided into 3 parts for rearing cows, sheeps and goats. Now using the given information, find the area alloted for cows.

[2 marks]

We can see from the figure that, the area alloted for cows is a triangular region.

hence we can use Heron's formula to find the area alloted for rearing.

Area of a triangle $= \sqrt{s(s-a)(s-b)(s-c)}$ [0.5 marks]
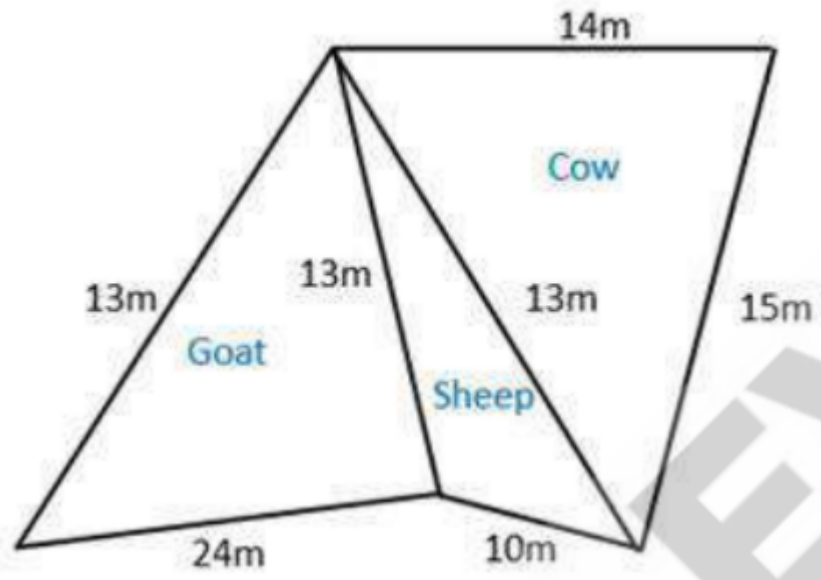
The length of the sides are 13 m, 14 m and 15 m.

Semiperimeter $= \frac{13+14+15}{2} = \frac{42}{2} = 21 \ m$ [0.5 marks]

Area $= \sqrt{21(21-13)(21-14)(21-15)}$

$= \sqrt{21(8)(7)(6)}$

$= 84 \ m^2$

[1 mark]

8. Raju has a rearing farm which he has divided into 3 parts for rearing cows, sheeps and goats. Now using the given information, find the area alloted for sheeps.

(3 Marks)

[Heron's Formula]

Solution:

We can see from the figure that, the area alloted for sheeps is a triangular region.
hence we can use Heron's formula to find the area alloted for rearing.

Area of a triangle $= \sqrt{s(s-a)(s-b)(s-c)}$
The length of the sides are 13 m, 13 m and 10 m.
Semiperimeter $= \frac{13+13+10}{2} = \frac{36}{2} = 18\ m$ $\hspace{2cm} (1 Mark)$

$$Area = \sqrt{18(18-13)(18-13)(18-10)}$$
$$= \sqrt{18(5)(5)(8)}$$
$$= 60\ m^2 \hspace{2cm} (2 Marks)$$