Date
Page 36

Herons's Formula

12.1

(1) Let each side of the equilateral triangle be a.

$s = \frac{a+a+a}{2} = \frac{3a}{2}$

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

$= \sqrt{s(s-a)(s-a)(s-a)} = \sqrt{s(s-a)^3}$

$= \sqrt{\frac{3a}{2}\left(\frac{3a}{2}-a\right)^3}$

$= \sqrt{\frac{3a}{2} \times \left(\frac{a}{2}\right)^3}$

$= \sqrt{\frac{3a^4}{2^4}} = \frac{\sqrt{3}}{4}a^2$

(2)

$P = 180^-$

$\Rightarrow a+a+a = 180cm$

$\Rightarrow 3a = 180cm$

$\Rightarrow a = \frac{180}{3}$ cm

$\Rightarrow a = 60cm$

$A = \frac{\sqrt{3}}{4}a^2$

$= \frac{\sqrt{3}}{4}(60)^2 cm^2$

$= 900\sqrt{3}\ cm^2$

(5) $P = 540cm$

$\Rightarrow 18c + 17c + 25c = 540$

$\Rightarrow 54c = 540$

$\Rightarrow c = 10$

$a = 180cm$

$b = 170cm$

$c = 250cm$

$s = 270cm$

$A = \sqrt{270(270-180)(270-170)(270-250)}\ cm^2$

$= 9,000cm^2$

(2)

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Heron's Formula

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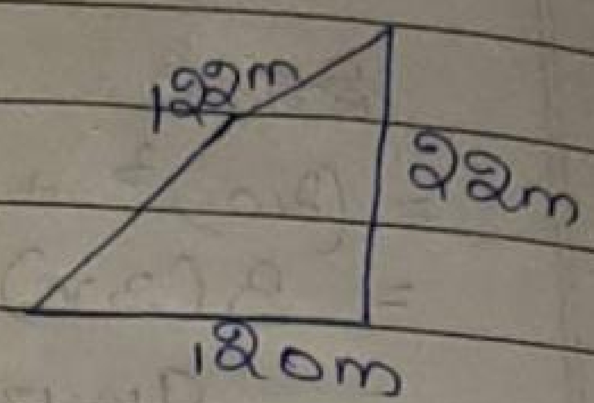
12.1

(2) $S = \frac{122+120+22}{2}$

$= \frac{264}{2} = 132$ m



Area $= \sqrt{S(S-a)(S-b)(S-c)}$

$= \sqrt{132(132-122)(132-120)(132-22)}$

$= \sqrt{132 \times 10 \times 12 \times 110}$

$= \sqrt{2\times2\times3\times11\times2\times5 \times 3\times2\times2\times 2\times5\times11}$

$= 2\times3\times11\times2\times5\times2$

$= 6\times10\times22$

$= 1320$

~~1 yr = ₹ 5000~~
~~12 months = 5000~~
~~3 months = $\frac{5000 \times 3}{12}$~~
~~of the walls = ₹ 12500~~
~~Cost for 3 months = ₹ 12500 × 1320~~
~~= ₹ 16,500,000~~

1 yr = 12 months = ₹ 5000

3 months $= \frac{5000 \times 3}{12}$

$= 1250$

Cost of the walls for 3 months

$= 1250 \times 1320$

$= 1650000$

(3) $S = \frac{a+b+c}{2} = \left(\frac{15+11+6}{2}\right) = 16$ m

$A = \sqrt{S(S-a)(S-b)(S-c)}$

$= \sqrt{16(16-15)(16-11)(16-6)}$

$= \sqrt{16 \times 1 \times 5 \times 10}$

$= \sqrt{2\times2\times2\times2\times1\times5\times2\times5}$

$= 2\times2\times5\sqrt{2}$

$= 20\sqrt{2}$ m²

(4) Let c be ...
P = 42
⇒ 18+10 ...
⇒ c = ...
$S = \frac{42}{2} = $ ...
A = $\sqrt{S(S-a)}$ ...
= $\sqrt{21(21-}$ ...
= 21 ...

(5) a+b+c = ...
⇒ 12+12+ ...
⇒ 24 ...
⇒ c = ...
⇒ c = ...

A = ...

(4) Let c be 10 cm.

$P = 42$

$\Rightarrow 18 + 10 + a = 42$

$\Rightarrow a = 14$ cm

$s = \frac{42}{2} = 21$ cm

$A = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{21(21-8)(21-10)(21-14)}$

$= 21\sqrt{11}\ cm^2$

(6) $a + b + c =$ perimetre

$\Rightarrow 18 + 12 + c = 30$ cm

$\Rightarrow 24 + c = 30$

$\Rightarrow c = 30 - 24$

$\Rightarrow \underline{c = 6}$

$s = \frac{30}{2} = 15$

$A = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{15(15-18)(15-12)(15-6)}$

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

$= 3 \times 3\sqrt{3 \times 15}$

$= \underline{9\sqrt{15}\ cm^2}$