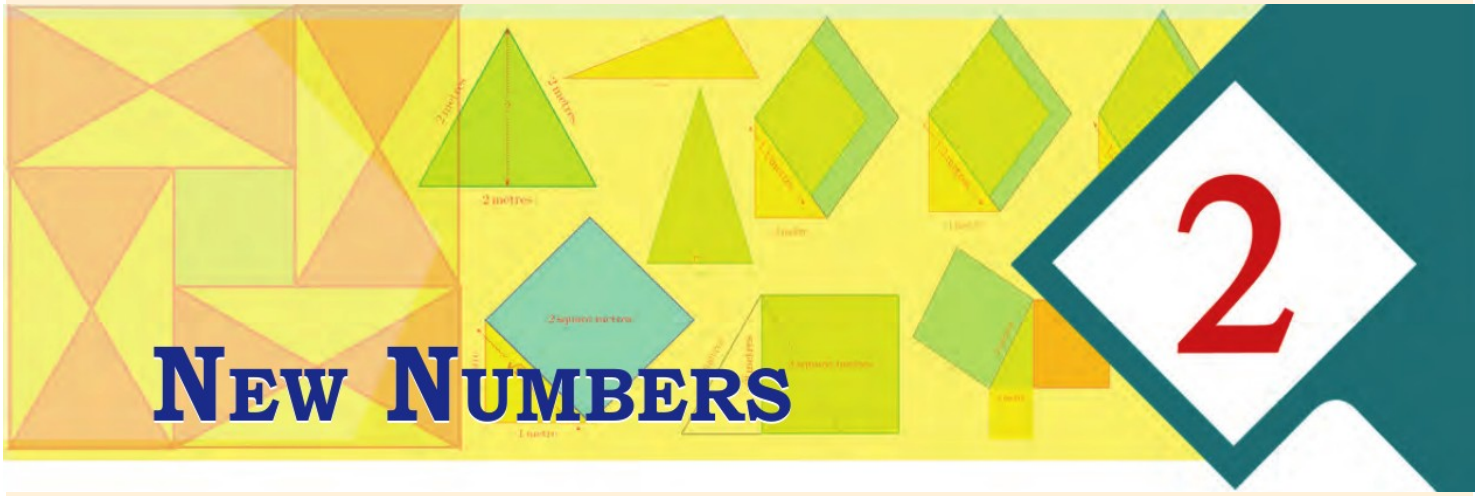

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(1) We have seen in class 8 that any odd number can be written as the difference of two perfect squares. Use this to draw squares of area 7 square centimetres and 11 square centimetres. What are the lengths of the sides of these squares?

ANSWER

$3^2 - 2^2 = 5$

$4^2 - 3^2 = 7$

$5^2 - 4^2 = 9$

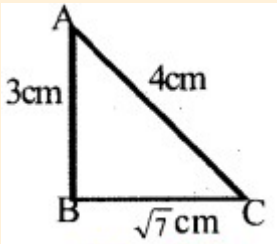
$n^2 - (n-1)^2 = 2n - 1$

Therefore, $4^2 - 3^2 = 7$

$6^2 - 5^2 = 11$

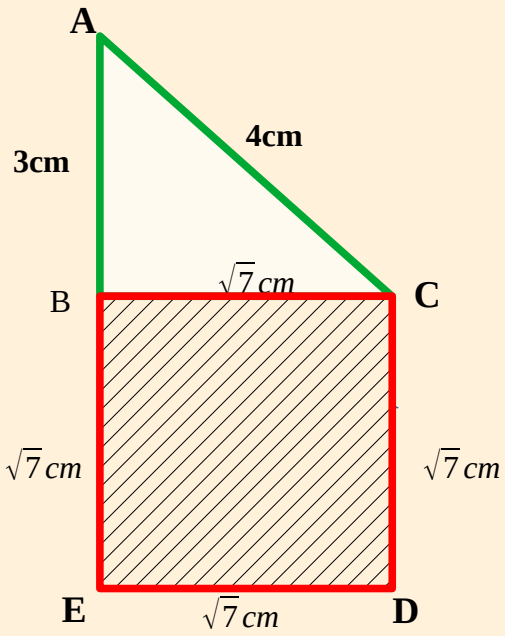
Draw a right angled triangle with hypotenuse 4cm and one side be 3cm.

It's third side be $\sqrt{7}$ **cm.**



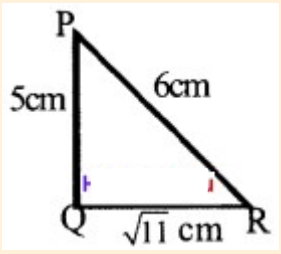
Draw square BCDE as side BC.

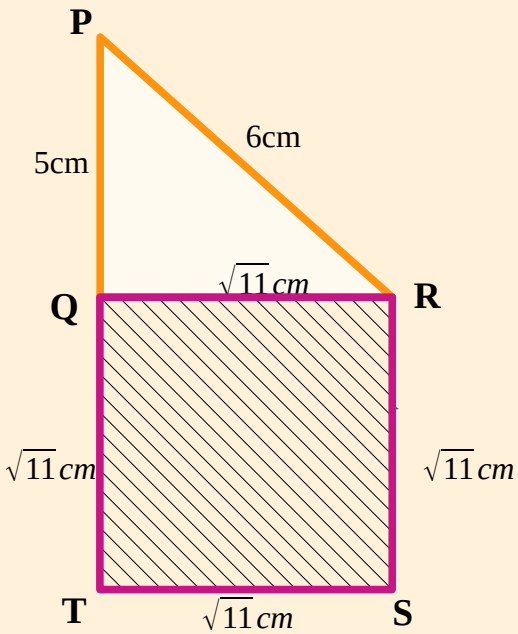
Area of square BCDE= $\sqrt{7} \times \sqrt{7} = 7\text{cm}^2$



Draw a right angled triangle with hypotenuse 6cm and one side be 5cm.

It's third side be $\sqrt{11}$ cm.

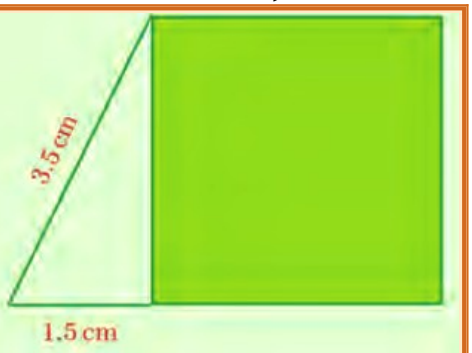




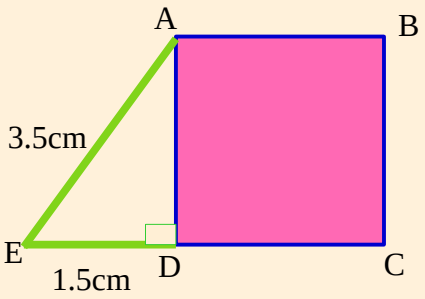
Draw square QRST as side QR.

Area of square QRST = $\sqrt{11}\,cm \times \sqrt{11}\,cm$ = 11cm^2

(2) What is the area of the square in the picture? What is the length of its sides?



ANSWER



Since ΔADE is a right triangle ,

AD= $\sqrt{3.5^2-1.5^2}$

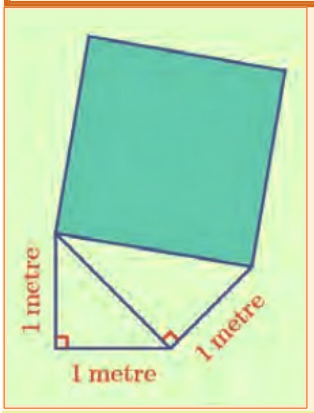
AD= $\sqrt{12.25-2.25}$

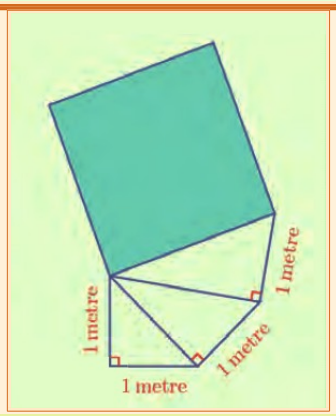
AD= $\sqrt{10}$ **cm**

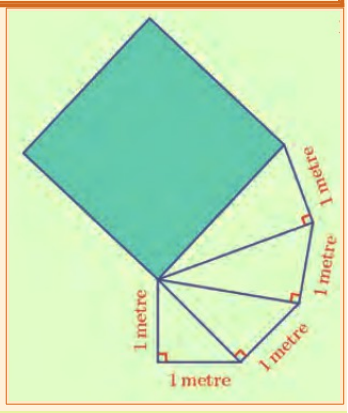
∴ Side of a square = $\sqrt{10}$ **cm**

∴ **Area of square =** $\sqrt{10} \times \sqrt{10}$ **= 10cm²**

(3) Calculate the area of the square and the length of its sides in each of the pictures below:

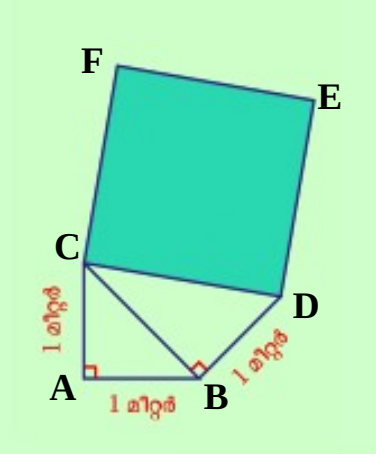






ANSWER

a)



Since Δ ABC and ΔBDC are right triangles

From Δ ABC, BC= $\sqrt{AB^2+AC^2}$

BC= $\sqrt{1^2+1^2}$

BC= $\sqrt{2}$ m

From Δ BDC, CD= $\sqrt{BC^2+BD^2}$

CD= $\sqrt{(\sqrt{2})^2+1^2}$

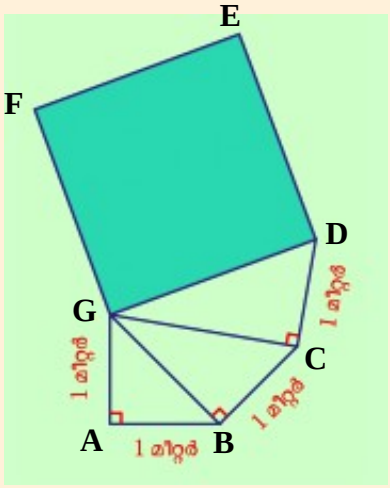
CD= $\sqrt{2+1}$

CD= $\sqrt{3}$ m

∴ Side of a square = $\sqrt{3}$ m

∴ Area of square CDEF = $\sqrt{3} \times \sqrt{3} = 3m^2$

b)



Since Δ ABG , ΔBCG and Δ CDG are right triangles

From Δ ABG , BG= $\sqrt{1^2+1^2}$ = $\sqrt{2}$ m

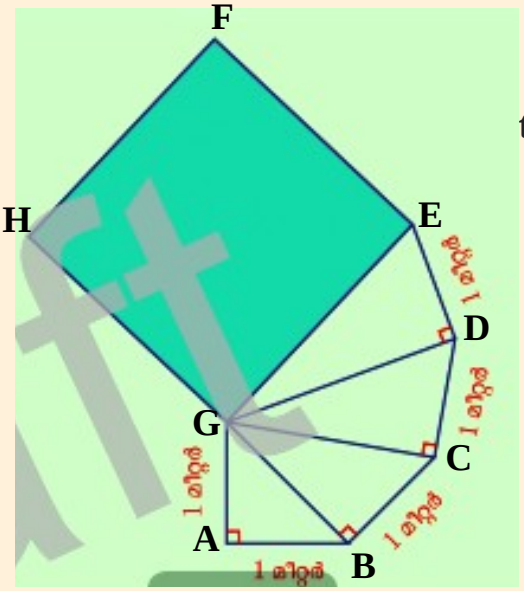
From Δ BCG , CG= $\sqrt{(\sqrt{2})^2+1^2}$ = $\sqrt{3}$ m

From Δ CDG , GD= $\sqrt{(\sqrt{3})^2+1^2}$ = $\sqrt{4}$ = 2m

∴ Side of a square = 2m

Area of square GDEF = 2 x 2= $4m^2$

c)



Since Δ ABG , ΔBCG, ΔCDG, ΔDEG are right triangles

From Δ ABG , BG= $\sqrt{1^2+1^2}$ = $\sqrt{2}$ m

From Δ BCG , CG= $\sqrt{(\sqrt{2})^2+1^2}$ = $\sqrt{3}$ m

From Δ CDG , GD= $\sqrt{(\sqrt{3})^2+1^2}$ = $\sqrt{4}$ = 2m

From Δ DEG , GD= $\sqrt{2^2+1^2}$ = $\sqrt{5}$ m

∴ Side of a square = $\sqrt{5}$ m

Area of square GEFH = $\sqrt{5}$ x $\sqrt{5}$ = $5m^2$

(4) Find three fractions greater than $\sqrt{2}$ and less than $\sqrt{3}$

ANSWER

Approximate value of $\sqrt{2}$ = 1.414

Approximate value of $\sqrt{3}$ = 1.732

The three fractions between $\sqrt{2}$ and $\sqrt{3}$ are 1.5, 1.6, and 1.65

$1.5 = \frac{15}{10} = \frac{3}{2}$

$1.6 = \frac{16}{10} = \frac{8}{5}$

$1.65 = \frac{165}{100} = \frac{33}{20}$

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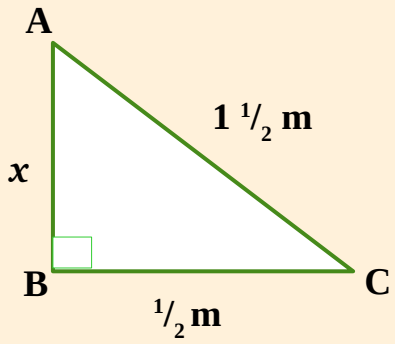
(1) The hypotenuse of a right triangle is $1\frac{1}{2}$ metres and one of the other sides is $\frac{1}{2}$ metre. Calculate its perimeter, up to a centimetre.

ANSWER



In Δ ABC , AC = $1\ \frac{1}{2}\ =\ \frac{3}{2}$ m

BC= $\frac{1}{2}$ m

Since Δ ABC is a right triangle , $AC^2 = BC^2 + AB^2$

$(1\frac{1}{2})^2 = (\frac{1}{2})^2 + x^2$

$(\frac{3}{2})^2 = (\frac{1}{2})^2 + x^2$

$\frac{9}{4} = \frac{1}{4} + x^2$

$x^2 = \frac{9}{4} - \frac{1}{4}$

$x^2 = \frac{9-1}{4}$

$x^2 = \frac{8}{4} = 2$

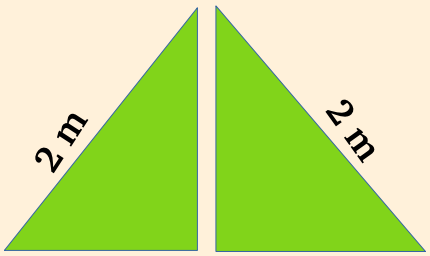
$\therefore\ x = \sqrt{2}$

$\therefore$ Perimeter = $1\ \frac{1}{2}$ m + $\frac{1}{2}$ m + $\sqrt{2}$ m

Perimeter = 2 + 1 . 414 = 3.414 m

Perimeter= 341.4 cm

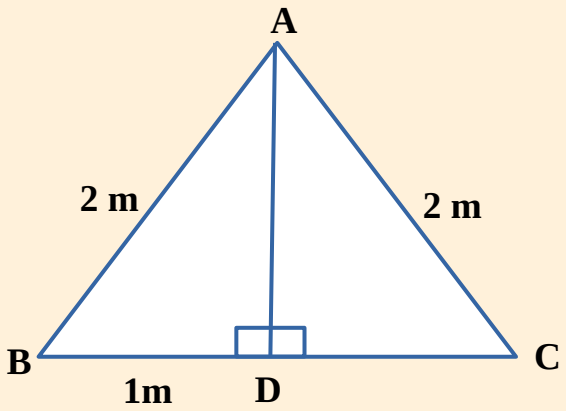
(2) The picture below shows an equilateral triangle cut into two triangles along a line through the middle:



(i) What is the perimeter of one of these ?

(ii) How much is it less than the perimeter of the whole triangle ?

ANSWER



(i) In Δ ADB , AB= 2 m, BD= 1 m

$AB^2 = BD^2 + AD^2$

$2^2 = 1^2 + AD^2$

$4 = 1 + AD^2$

$AD^2 = 4 - 1 = 3$

AD = $\sqrt{3}$

Perimeter of Δ ADB = 1+2+ $\sqrt{3}$

= 3+ $\sqrt{3}$

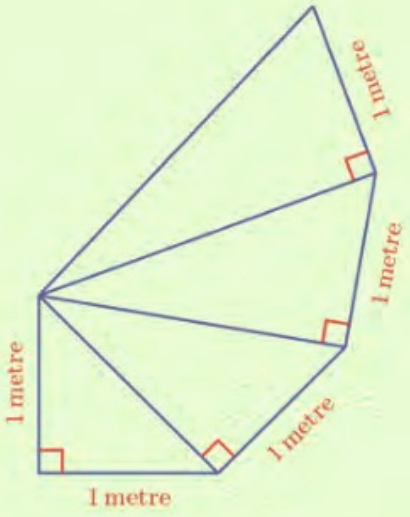
= 3+ 1.73

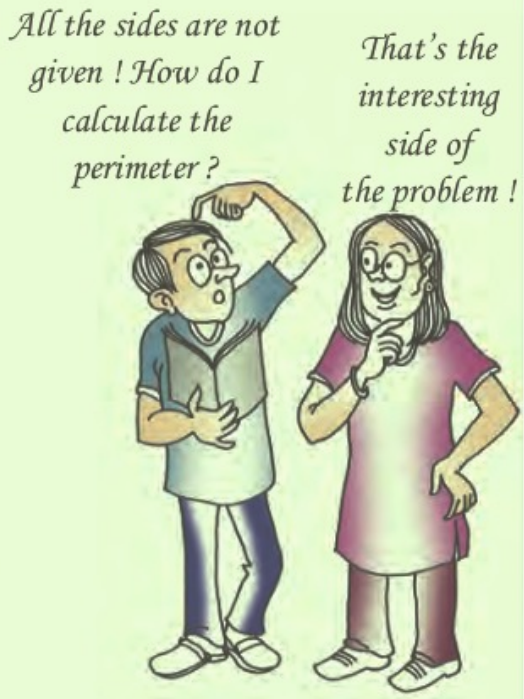
= 4.73m.

(ii) **∴ Perimeter of Δ ABC = 2+2+2= 6m**

∴ Decrease in perimeter = 6−4.73= 1.27m

(3) We've seen how we can go on drawing right triangles like this:



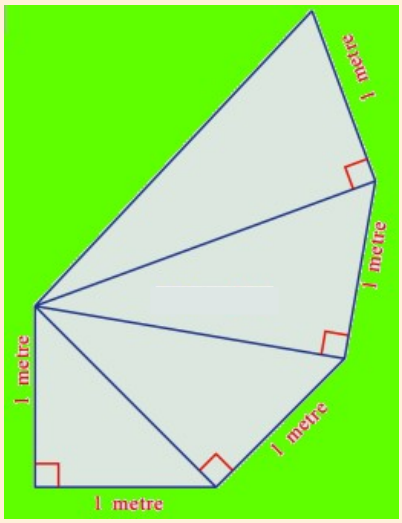


(i) What are the lengths of the sides of the tenth triangle in this pattern?

(ii) How much more is the perimeter of the tenth triangle than that of the ninth?

ANSWER

(i).



Sides of a first right triangle = 1m, 1m , $\sqrt{2}$ m

Sides of a second right triangle = 1m, $\sqrt{2}$ m , $\sqrt{3}$ m

Sides of a third right triangle = 1m, $\sqrt{3}$ m, $\sqrt{4}$ m

Sides of a fourth right triangle = 1m, $\sqrt{4}$ m , $\sqrt{5}$ m

---

∴ **Sides of a tenth right triangle** = 1m, $\sqrt{10}$ m , $\sqrt{11}$ m

(ii). **Perimeter of tenth right triangle** = 1 m+ $\sqrt{10}$ m + $\sqrt{11}$ m

Perimeter of ninth right triangle = 1 m+ $\sqrt{9}$ m + $\sqrt{10}$ m

∴ **Difference of perimeters of 10th and 9th right triangles**

$= (1\text{m} + \sqrt{10}\ \text{m} + \sqrt{11}\ \text{m}) - (1\text{m} + \sqrt{9}\ \text{m} + \sqrt{10}\ \text{m})$

$= \sqrt{11}\ \text{m} - \sqrt{9}\ \text{m}$

$= \sqrt{11}\ \text{m} - 3\text{m}$

(4) What is the hypotenuse of a right triangle with perpendicular sides $\sqrt{2}$ centimetres and $\sqrt{3}$ centimetres ? How much more is the sum of the perpendicular sides than the hypotenuse ?

Hypotenuse $= \sqrt{(\sqrt{3})^2+(\sqrt{2})^2}$

$= \sqrt{3+2}$

$= \sqrt{5}$ **cm = 2.24 cm**

sum of perpendicular sides $= \sqrt{2} + \sqrt{3}$

= 1.41 + 1.73 = 3.14

∴ **Difference between hypotenuse and perpendicular sides**

= 3.14 cm - 2.24 cm

= 0.9cm