Higher Order Thinking Skills

Primary 5

Lesson 4:
Area & Perimeter (I)

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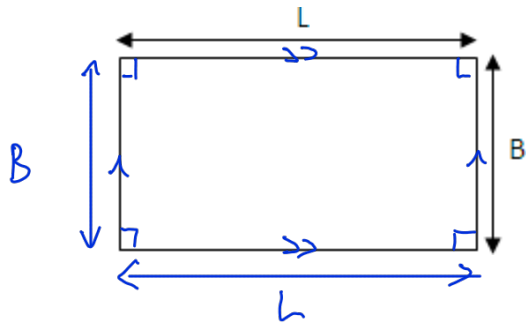
LESSON 4 Area & Perimeter (I)

Rectangle, Square and Triangle

Formula:

a) RECTANGLE:

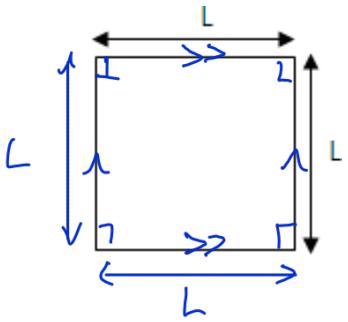


Area = L x B

Perimeter = 2L + 2B

= 2(L + B)

b) SQUARE:



Area = L x L

Perimeter = 4L

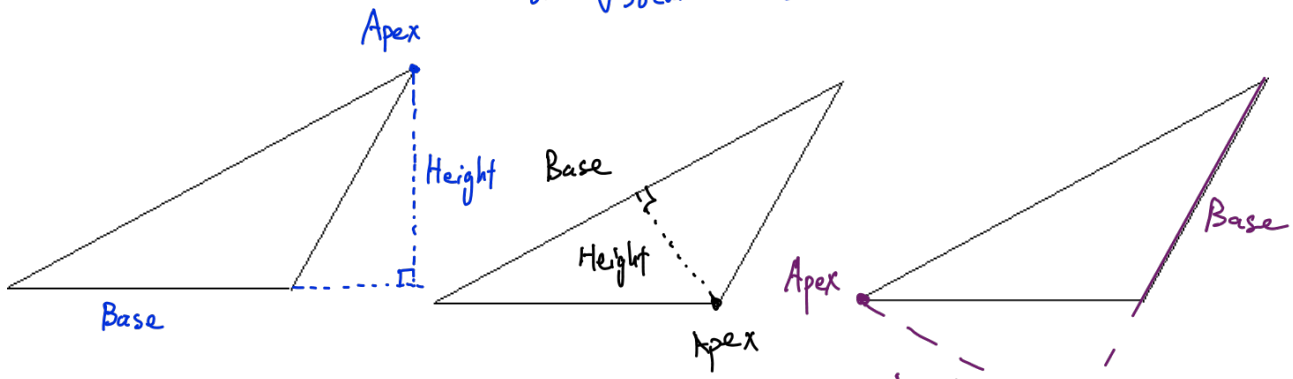
Confusion alert !

$36\ cm^2 \div 4 = 9\ cm$ ✗

$36\ cm^2 = 6cm \times 6cm$ ✓

or $\sqrt{36\ cm^2} = 6cm$ ✓

c) TRIANGLE



Area = $\frac{1}{2}$ x Base x Height

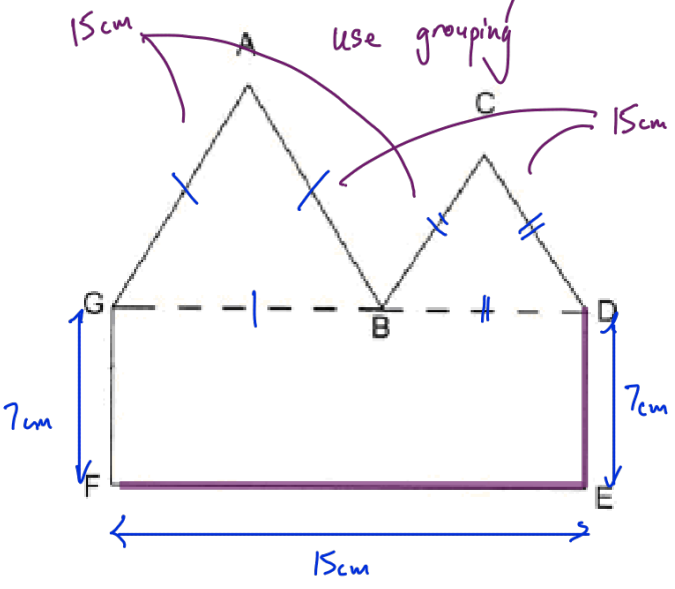
Perimeter = sum of 3 sides

GUIDED EXAMPLE 1

Visualisation

The figure is made up of a rectangle and two equilateral triangles.
The area of the rectangle DEFG is105 cm² and its perimeter is 44cm.
What is the perimeter of the figure?

(Pei Tong Pri/ SA1/Q42)



* Mark out equal lengths

** not necessary to obtain individual values
use grouping

Sum of length & breadth
44 ÷ 2 = 22

Use listing to determine length & breadth

L	x	B	=	Area	
21	x	1	=	21	X
20	x	2	=	40	x
⋮					
15	x	7	=	105	✓

perimeter = 3 x 15 + 2 x 7
= 59

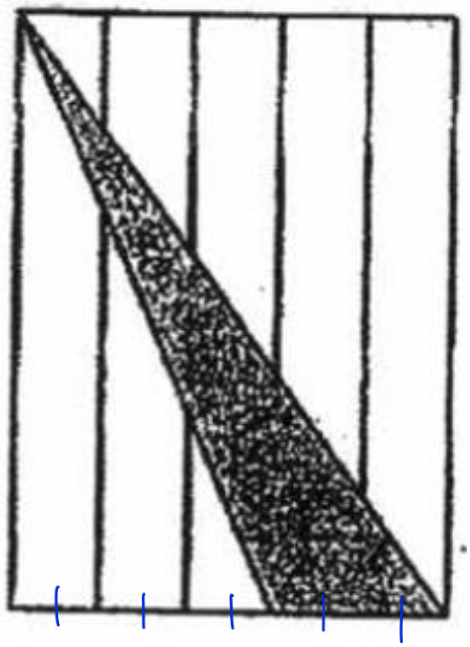
Ans : 59 cm

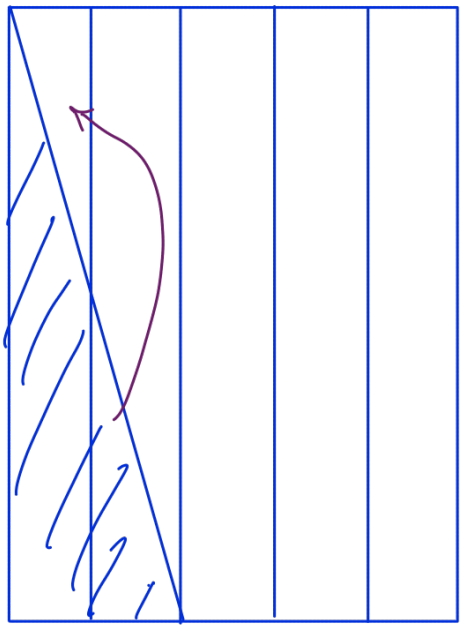
GUIDED EXAMPLE 2

Rearrangement of Parts

The figure below is made up of 5 identical rectangles.
What fraction of the figure is shaded?

Method 1 : Rearranging





Method 2: $\frac{2}{5} \times \frac{1}{2} = \frac{1}{5}$

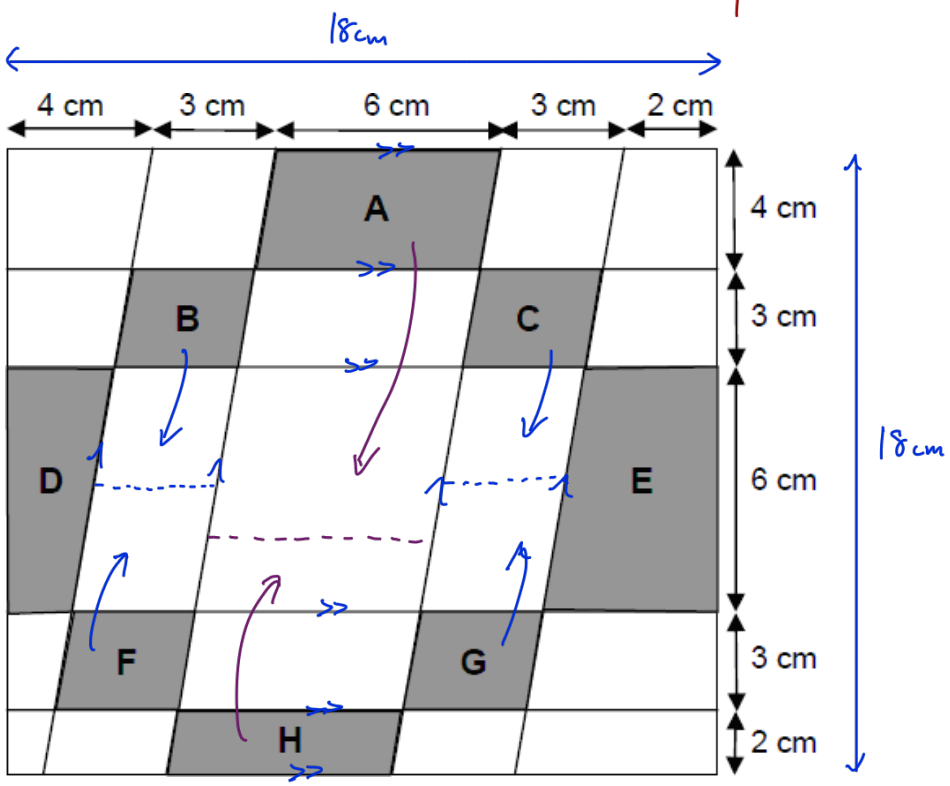
Ans : $\frac{1}{5}$

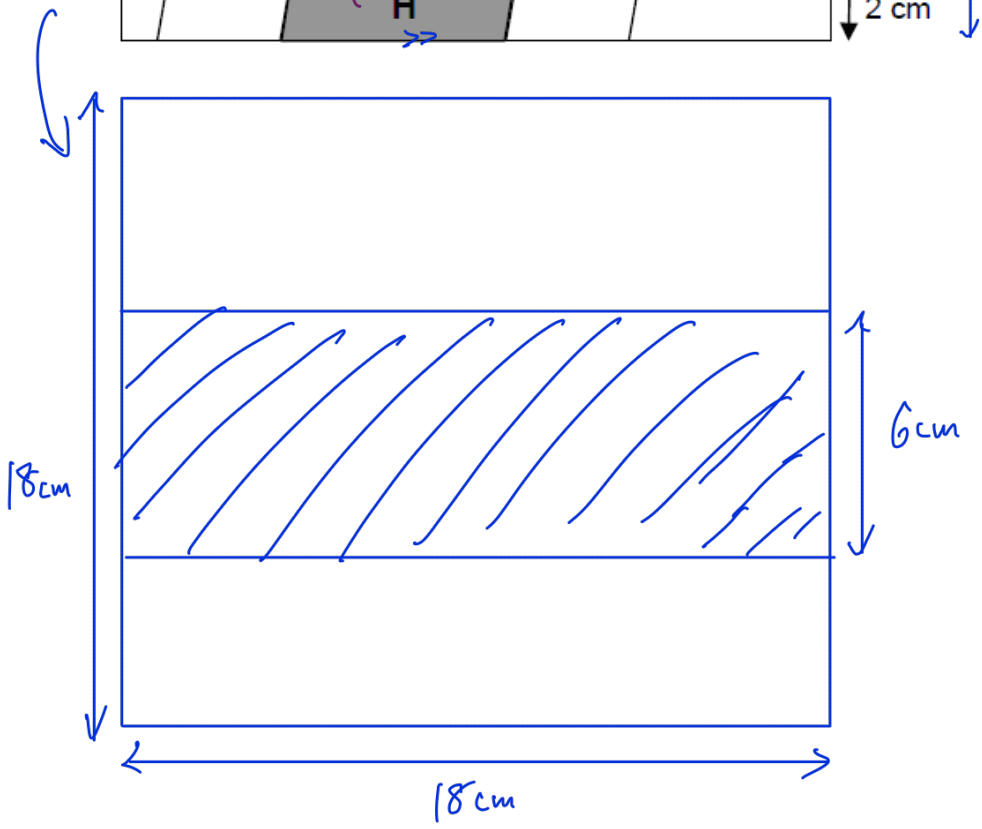
GUIDED EXAMPLE 3

Rearrangement of Parts

The figure below is not drawn to scale.
What fraction of the figure is the total area of the shadedregions A, B, C, D, E, F, G and H?

(Rosyth Pri/Prelim/Q44)





Required fraction $= \frac{6 \times 18}{18 \times 18}$

$= \frac{1}{3}$

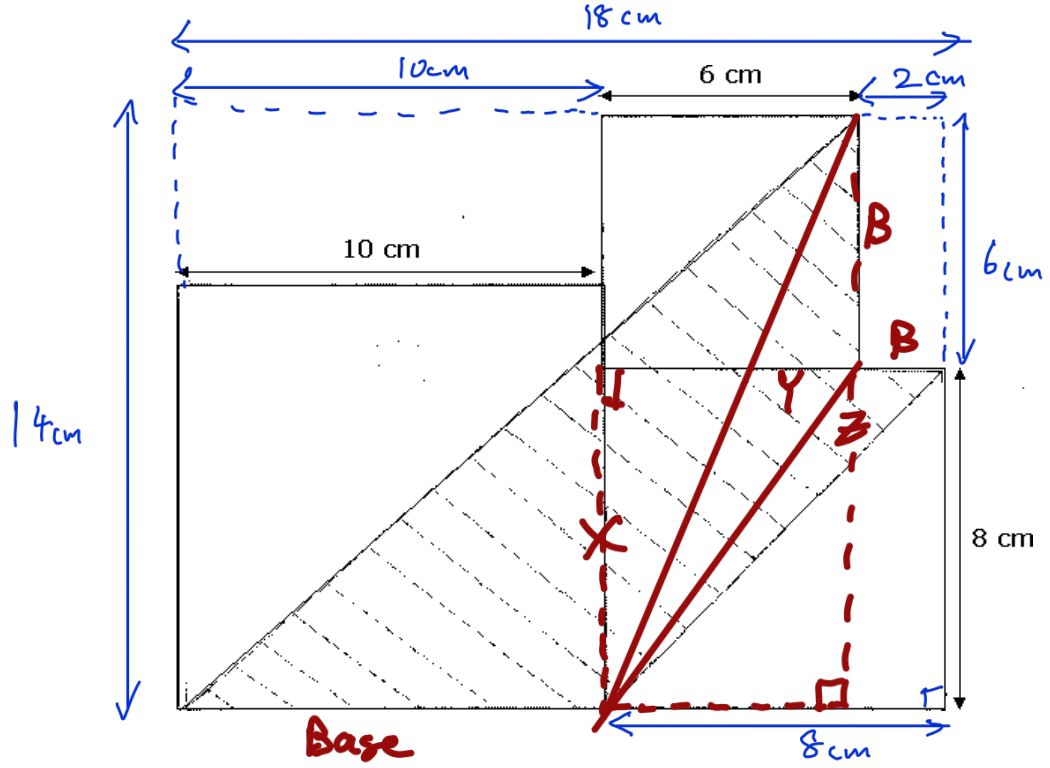
Ans : $\frac{1}{3}$

GUIDED EXAMPLE 4 — Drawing Lines

The figure below, not drawn to scale, is made up of 3 squares.

(a) Find the area of the shaded part.

(b) What fraction of the figure is shaded?



* Total area − Unwanted areas

a) Shaded area = Area of big rectangle − Area of big ◸ − Area of small ◿ − Area of small □

$= 18 \times 14 - \frac{1}{2} \times 16 \times 14 - \frac{1}{2} \times 8 \times 8 - 2 \times 6$

$= 96$

b) $\frac{96}{10 \times 10 + 6 \times 6 + 8 \times 8} = \frac{12}{25}$

Method 2 for (a):

$\frac{1}{2} \times 10 \times 14 + \frac{1}{2} \times 6 \times 6 + \frac{1}{2} \times 2 \times 8 = 96$ (X + Y + Z)

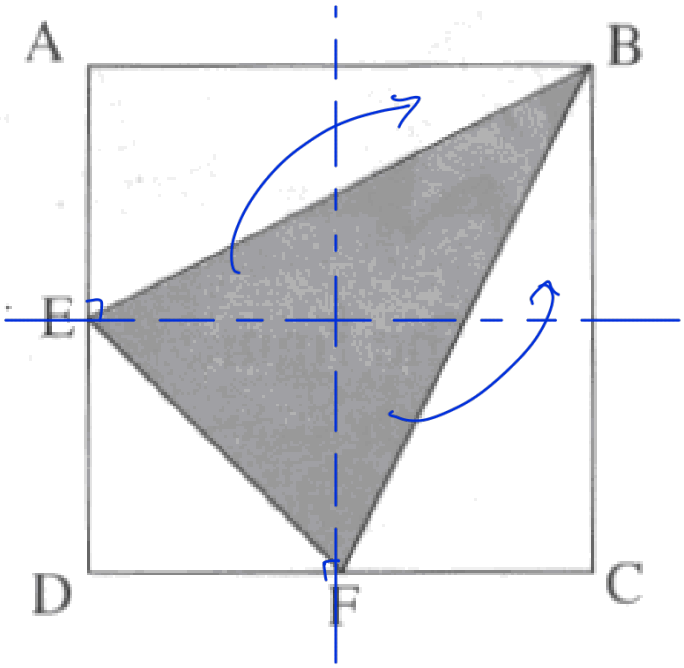
Ans: a) $96\ cm^2$

b) $\frac{12}{25}$

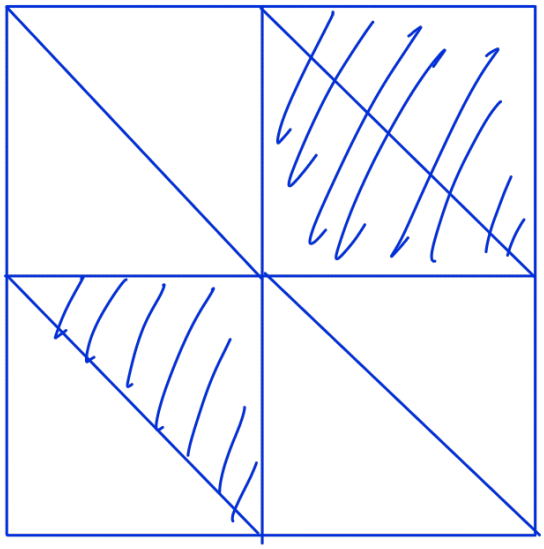
GUIDED EXAMPLE 5

Rearrange of Parts + Drawing of line

ABCD is a square of area 104 cm^2.
E and F are the midpoints of AD and DC.
Find the area of the shaded triangle.



rearrange



$\frac{3}{8}$ of the figure is shaded.

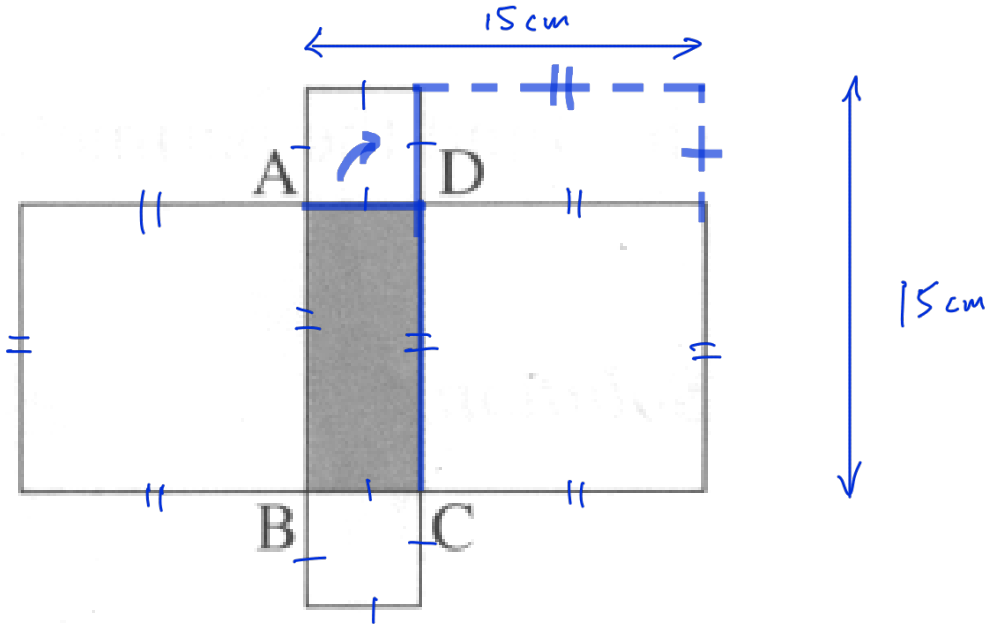
$\frac{3}{8} \times 104 = 39$

Ans : 39 cm^2

GUIDED EXAMPLE 6

Rearrange of Parts + Drawing of line

The figure below shows a shaded rectangle ABCD with squares constructed on each of its side. The perimeter of the shaded rectangle is 30 cm. The total area of the four squares is 160 cm^2, find the area of the shaded rectangle ABCD.



Sum of 1 Length and 1 breadth = 30 ÷ 2

= 15

Area of 1 small and 1 large square = 160 ÷ 2

= 80

Area of 2 rectangles = 15 × 15 − 80

= 145

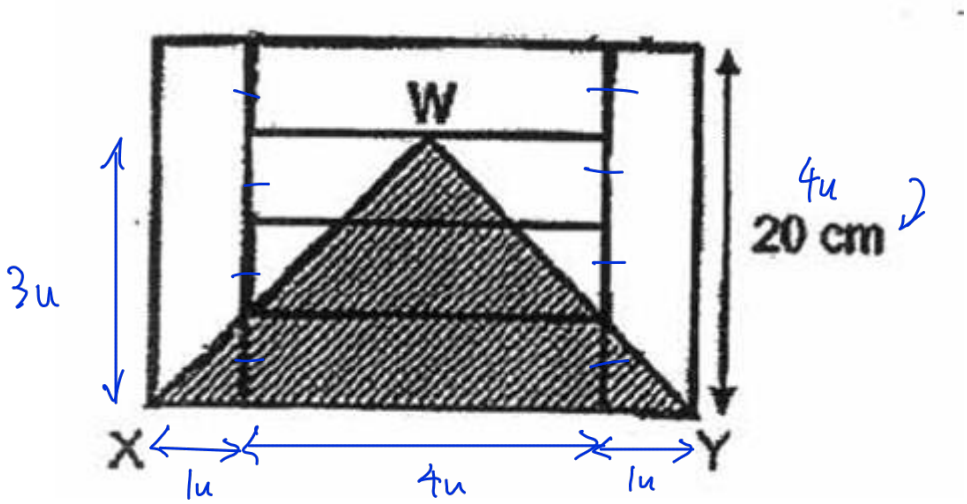
Required area = 145 ÷ 2

= 72.5

Ans : 72.5 cm^2

BUILD YOUR UNDERSTANDING

1a) The figure below is made up of 6 identical rectangles of length 20 cm.
Find the area of the shaded triangle WXY.



$4u = 20$

$1u = 20 \div 4$

$= 5$

$3u = 3 \times 5$

$= 15$

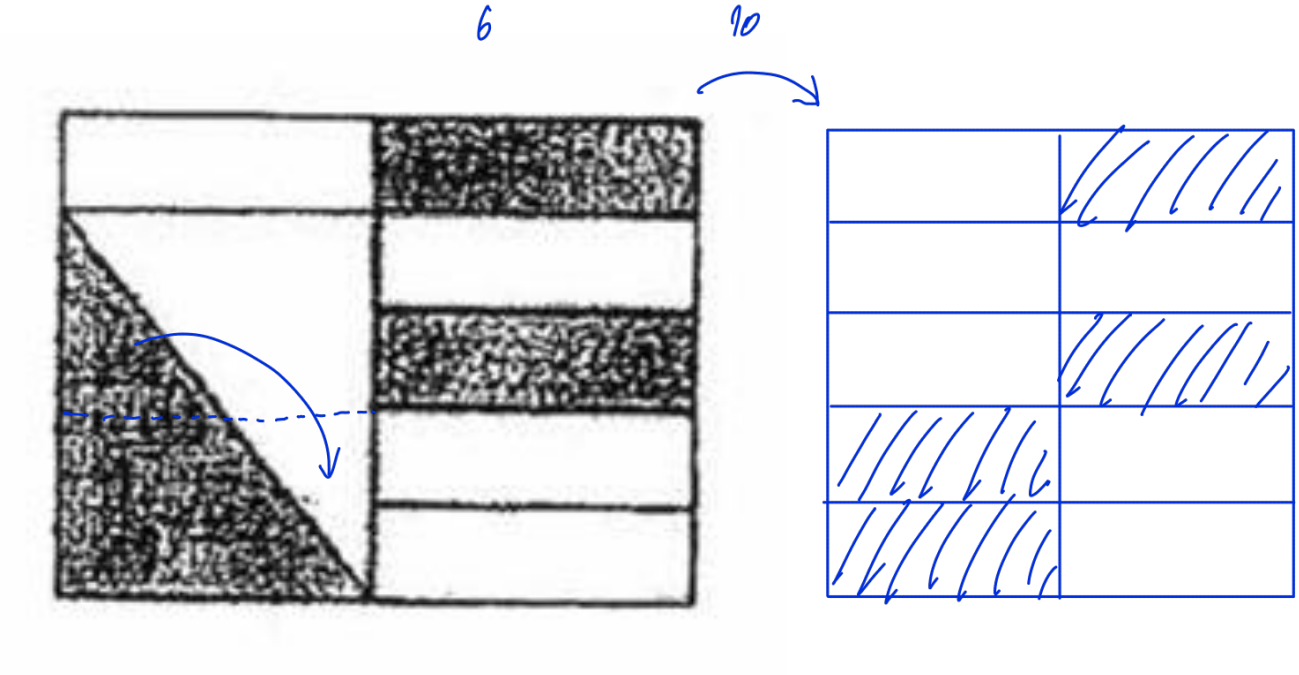
$6u = 6 \times 5$

$= 30$

$\frac{1}{2} \times 30 \times 15 = 225$

Ans : 225 cm^2

b) The figure below is made up of 2 similar triangles and 6 similar rectangles.
What is the ratio of the unshaded part to the whole figure?



$6 : 10 = 3 : 5$

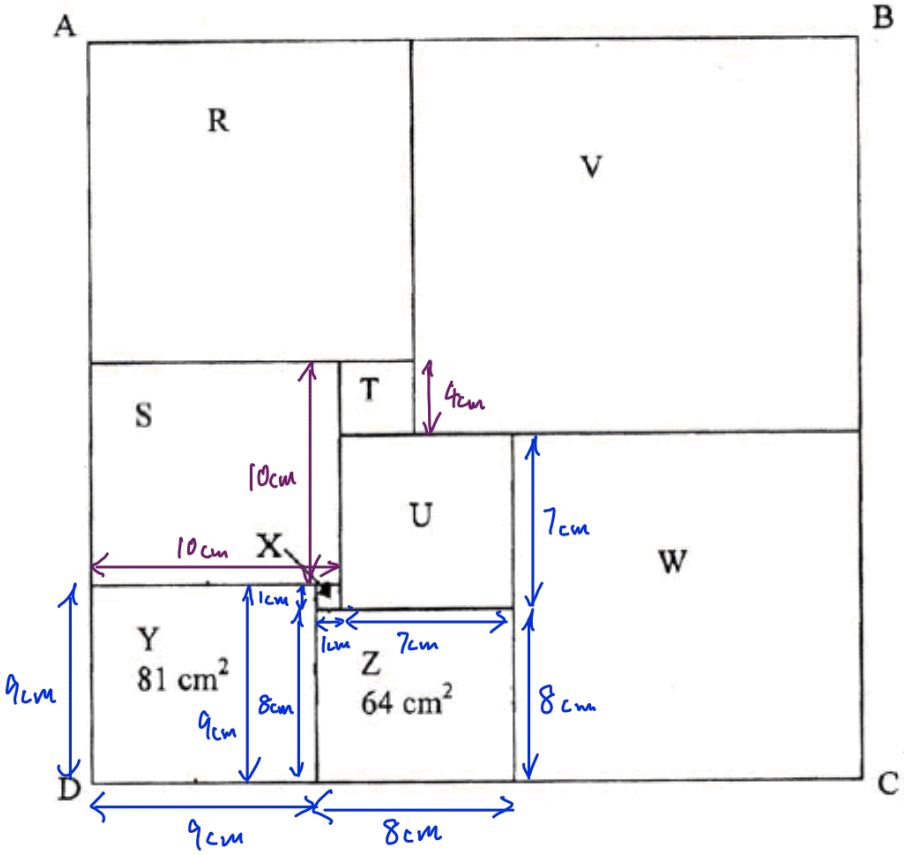
Ans : 3 : 5

2. The figure shows a rectangle, ABCD.
It is made up of 9 squares of different sizes.
The area ofsquare Y is 81 cm²
and the area of the square Z is 64 cm².

a) What is the length of each side of square W?

b) What is the area of square T?

(Poi Ching Pri/SA 1/Q42)



a) Length of Y = 9cm

Length of Z = 8cm

Length of X = 9cm − 8cm

= 1cm

Length of U = 8cm − 1cm

= 7cm

Length of W = 8cm + 7cm

= 15 cm

b) Length of S = 9cm + 1cm

= 10cm

Length of T = 10cm + 1cm − 7cm

= 4cm

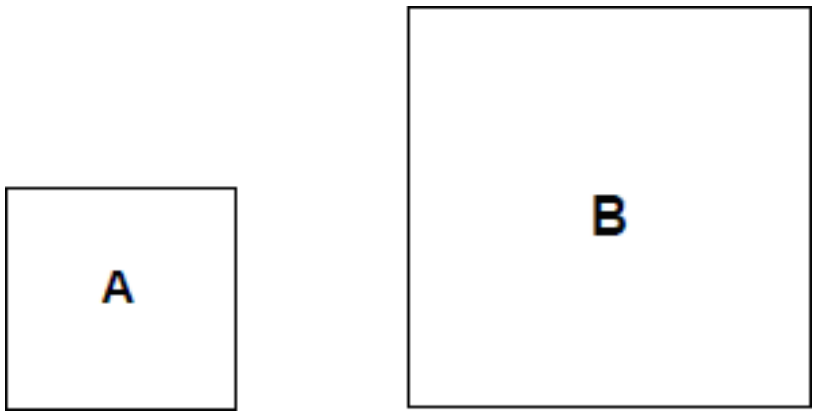
Area of T = 4 cm × 4cm

= 16 cm²

Ans : a) 15cm

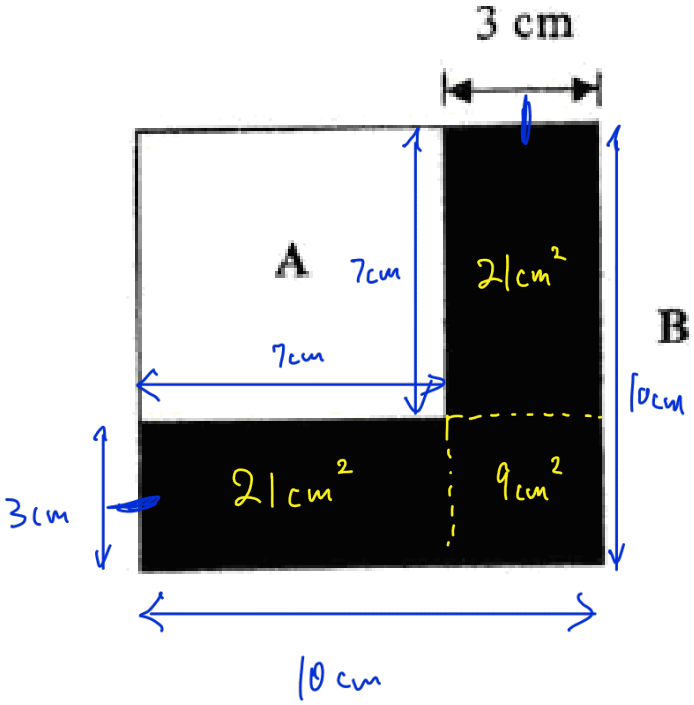
b) 16 cm²

3. Figures A and B are both squares.



When Square A is placed over Square B as shown below,
the shaded region has an areaof 51 cm².
What is the perimeter of the shaded region?

(Holy Innocents' Pri/Prelim/Q42)



$51 - 3 \times 3 = 42$

$42 \div 2 = 21$

$21 \div 3 = 7$

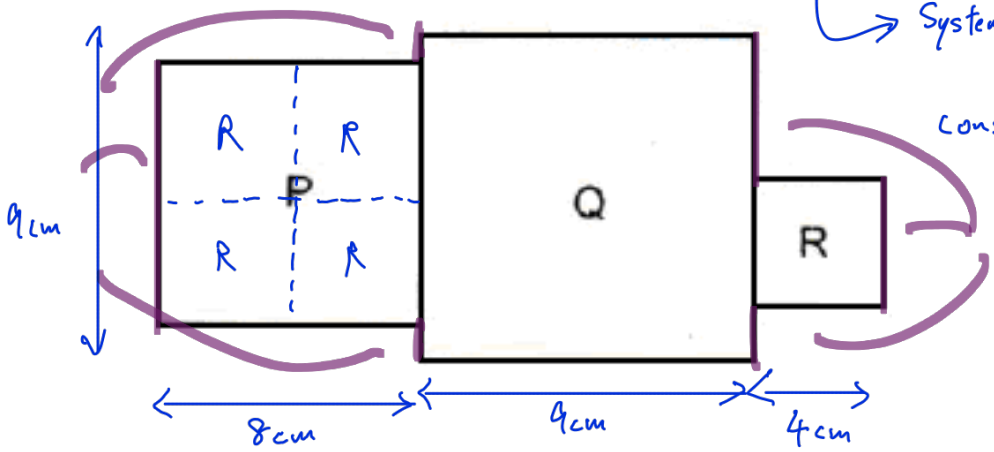
$10 + 10 + 7 + 3 + 7 + 3 = 40$

Ans : 40 cm

4. The figure is made up of 3 squares, P, Q and R, of different sizes.
The side of each square is a whole number.
The area of R is ¼ that of the area of P.
The total area of the figure is 161 cm².
Find the perimeter of the figure.

(Pei Chun Public Sch/ Prelim/Q42)

Systematic Listing + consider cases



9 cm

Length of R	1	2	3	4
Area of R	1	4	9	16
Length of P	2	4	6	8
Area of P	4	16	36	64
Total area	161	161	161	161
Area of Q	156	141	116	81
perfect square?	×	×	×	9

Length of Q

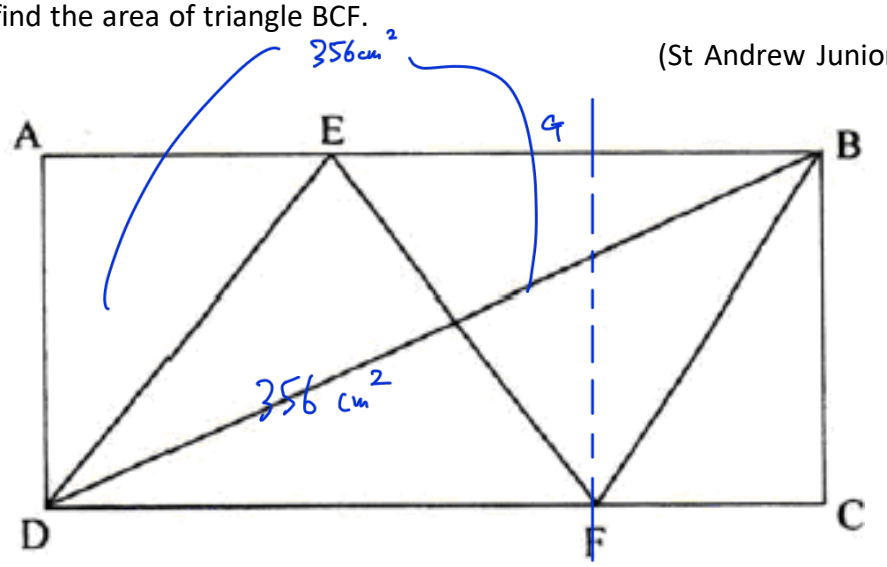
perimeter $= (8 + 9 + 4 + 9) \times 2$

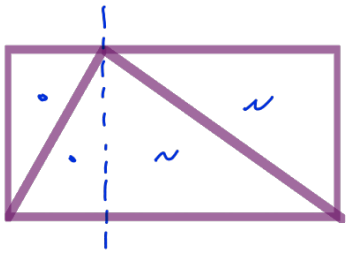
$= 60$

Ans : 60 cm

5. In the figure, ABCD is a rectangle with an area of 816 cm².
Given that the area of triangleDEF is 356 cm²,
find the area of triangle BCF.

(St Andrew Junior/Prelim/Q31)





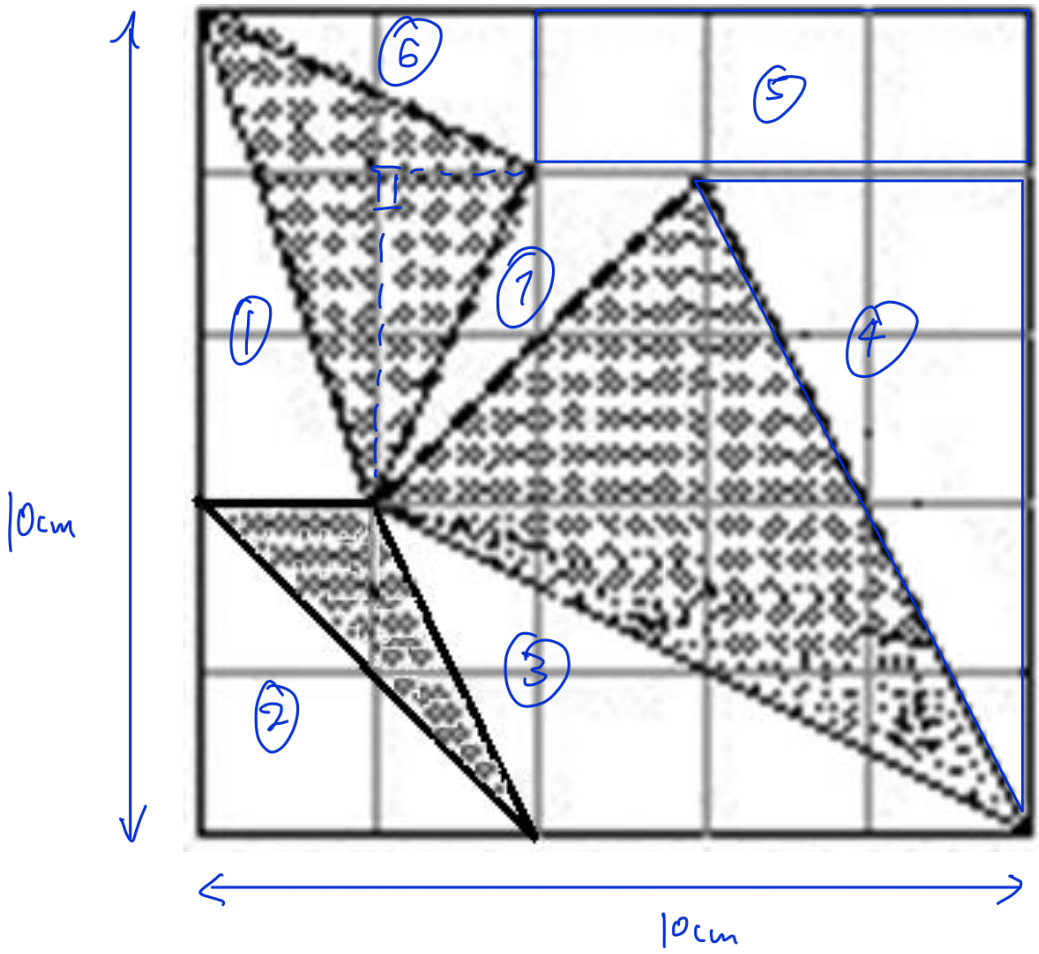
Area of GBCF = 816 − 2 × 356
= 104

Area of ΔBCF = 104 ÷ 2
= 52

Ans : 52 cm²

6. The side of each square grid is 2 cm.
Find the area of the shaded region.

* Total area - Unwanted



① ② ③ ④ ⑤

$10 \times 10 - \frac{1}{2} \times 2 \times 6 - \frac{1}{2} \times 4 \times 4 - \frac{1}{2} \times 6 \times 4 - \frac{1}{2} \times 4 \times 8 - 6 \times 2$

⑥ ⑦

$- \frac{1}{2} \times 4 \times 2 - \frac{1}{2} \times 2 \times 4$

$= 38$

Ans : $38\ cm^2$