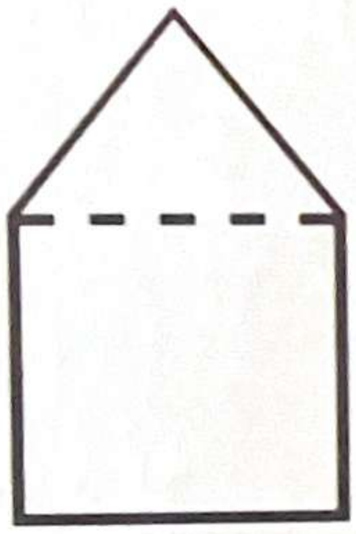
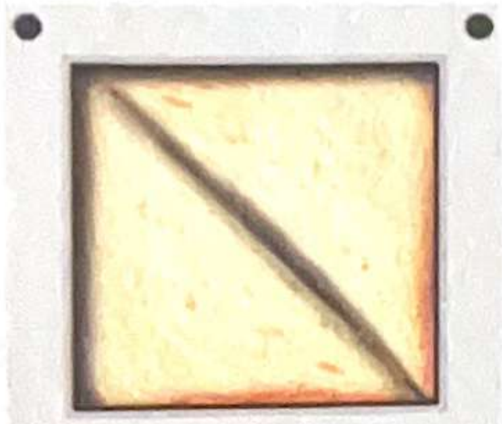
5 Area of Triangle

How do you identify the height and base of a triangle?

Bridge





Sandwiches

A composite figure is made up of two or more shapes.

We can find the area of this triangle using its related square.

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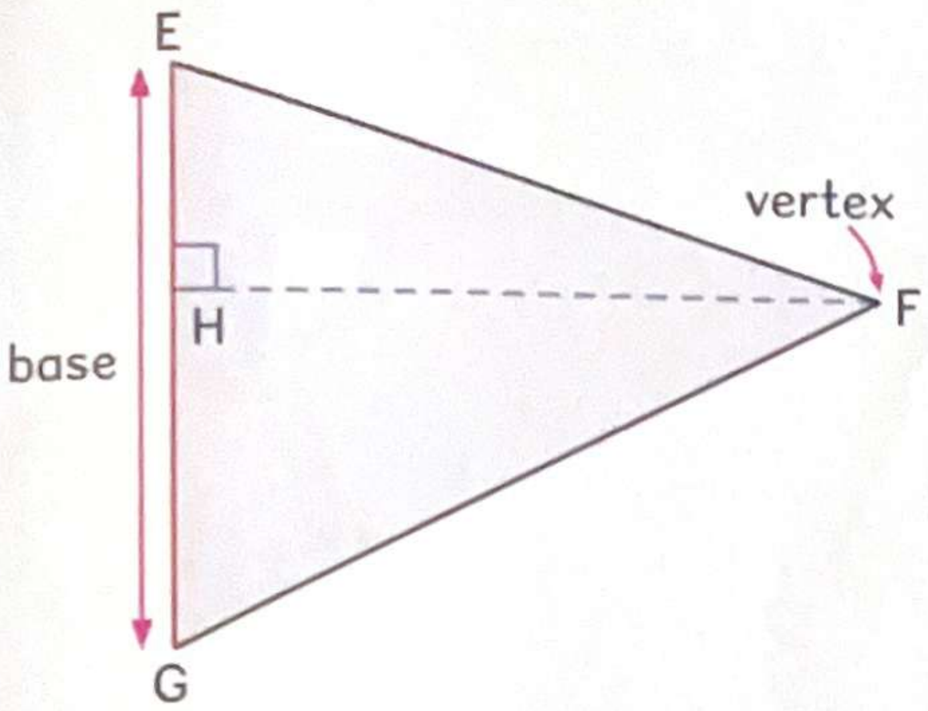
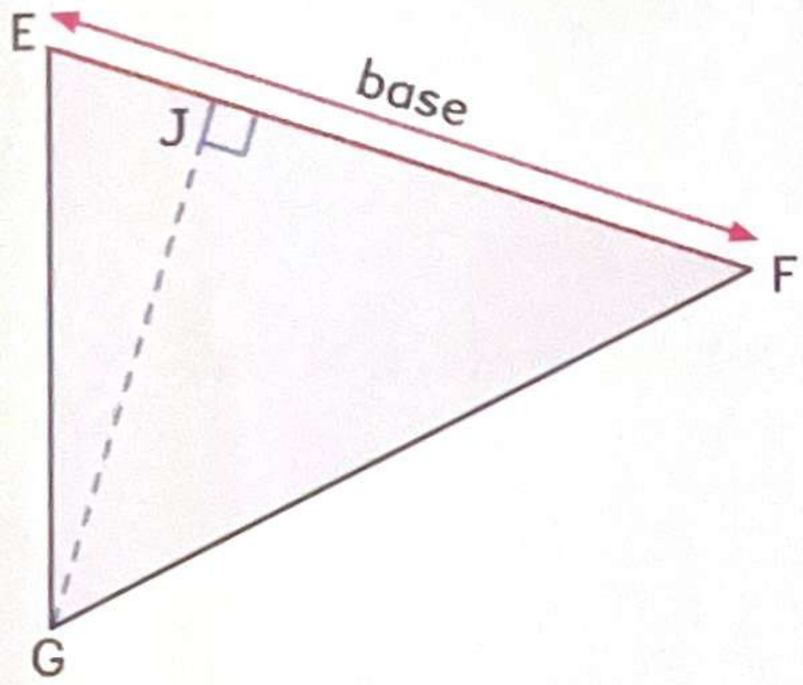
Do you know how to find the area of a triangle?

Learn more at *go.gov.sg/pm509*

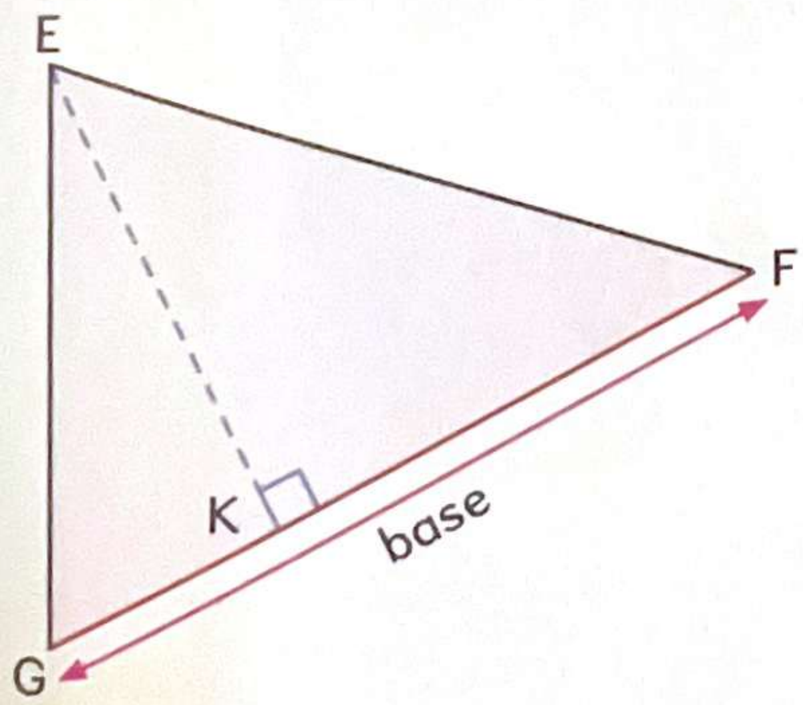
A **triangle** has **3 sides** and **3 angles**.
Let us identify the **height** of Triangle EFG for each given **base**.



EG is the base of the triangle.
FH ⊥ EG
Vertex F is opposite the base.
FH is the height.



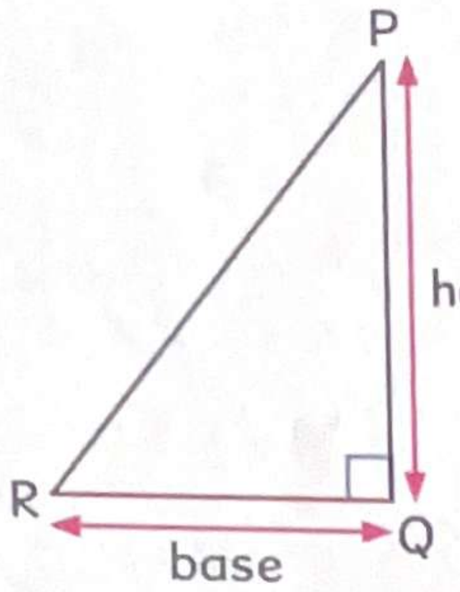
EF is the base of the triangle.
GJ ⊥ EF
Vertex G is opposite the base.
GJ is the height.



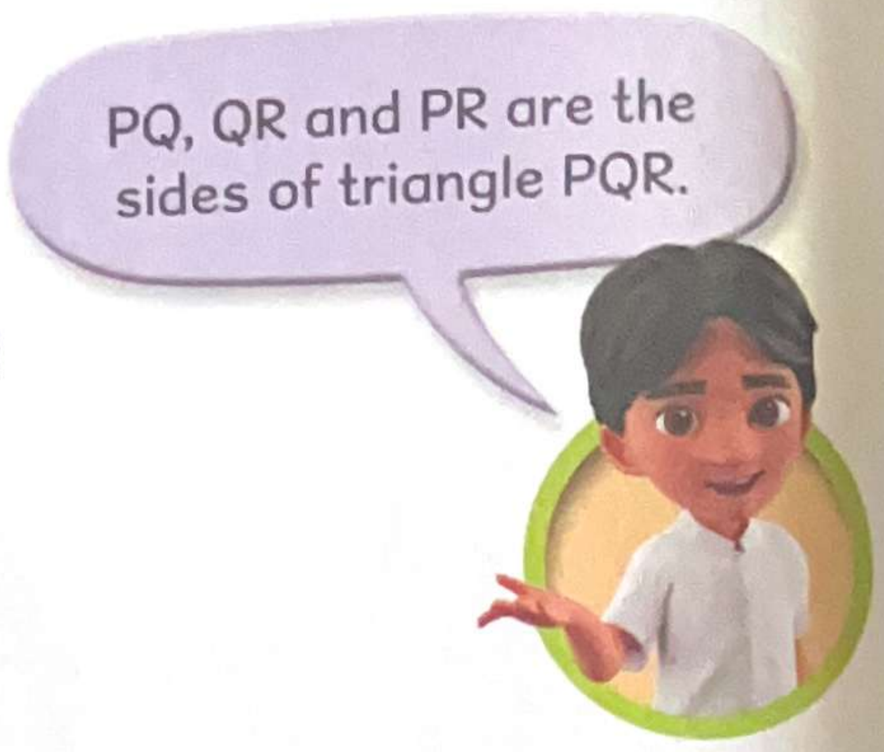
FG is the base of the triangle.
Can you identify the height of the triangle?

The base of a triangle can be any of its three sides.

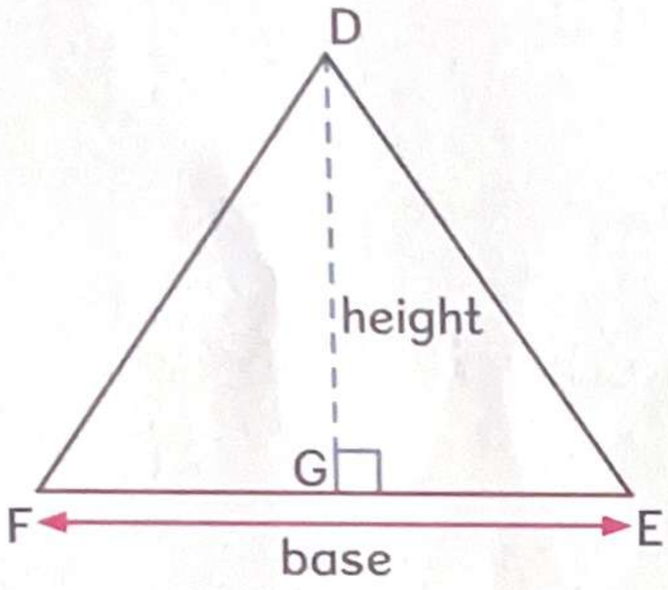
We can identify the base of a triangle given its height.
In Triangle PQR, PQ is the height and QR is the base.



$PQ \perp QR$

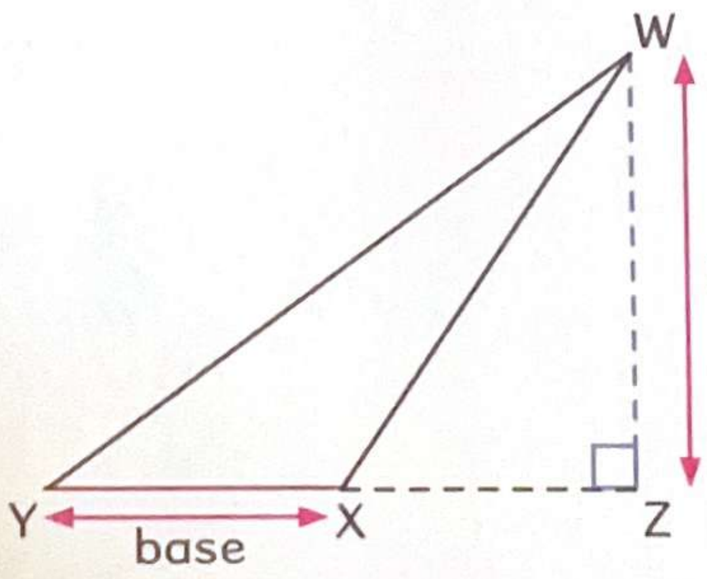


In Triangle DEF, DG is the height and EF is the base.



$DG \perp EF$

In Triangle WXY, WZ is the height and XY is the base.

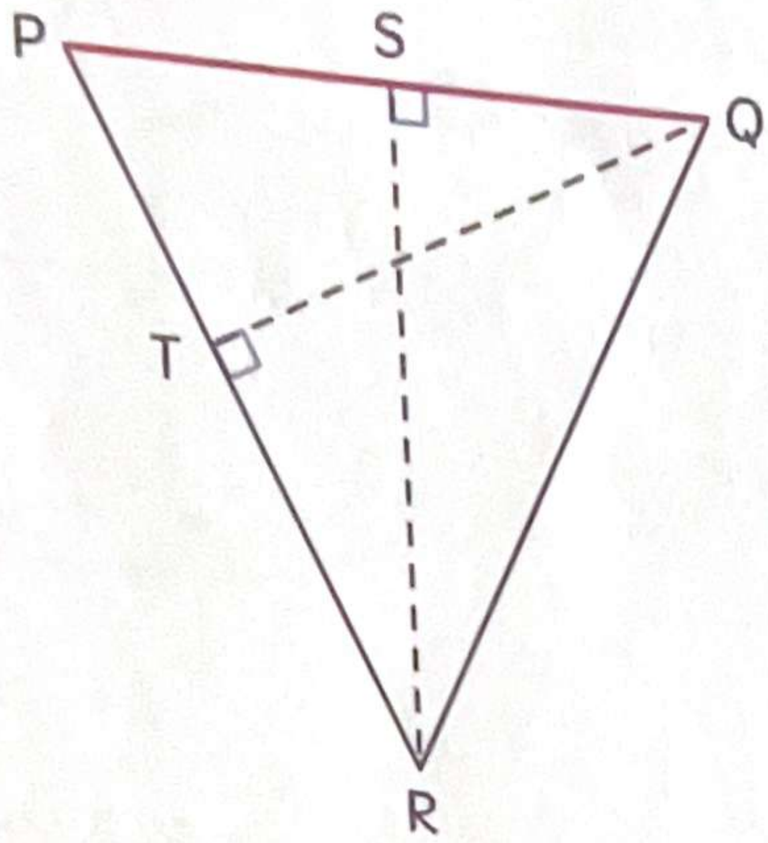


$WZ \perp XY$

The height of a triangle is always perpendicular to its base.

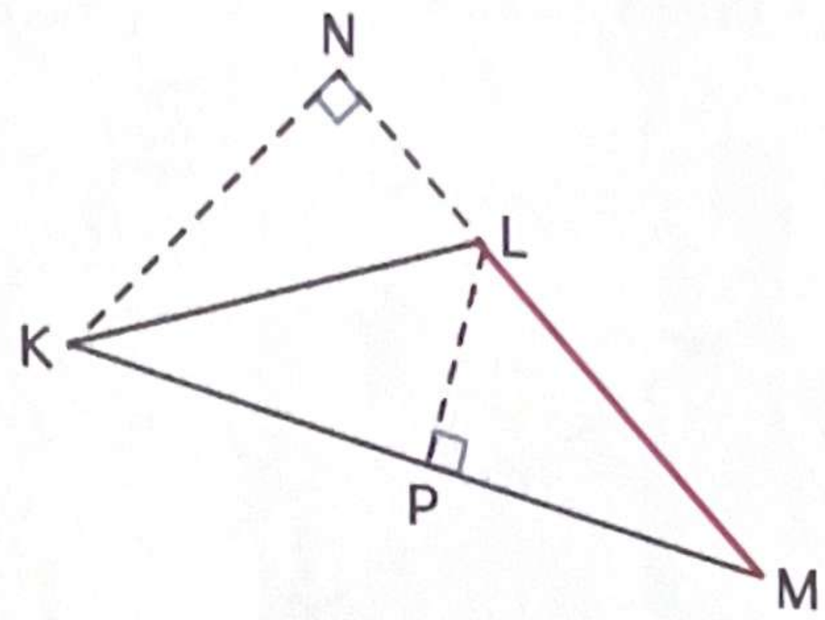
(a) Identify the height of each triangle given its base.

(i)



In Triangle PQR,
PQ is the base and
_____ is the height.

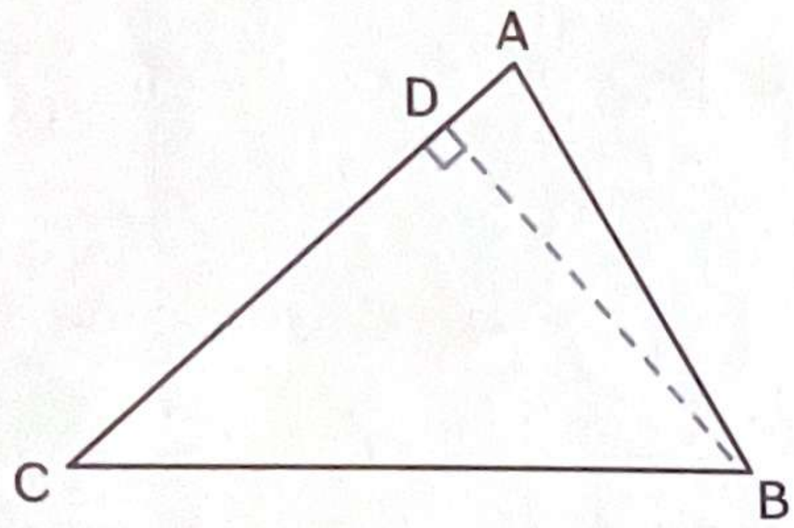
(ii)



In Triangle KLM,
LM is the base and
_____ is the height.

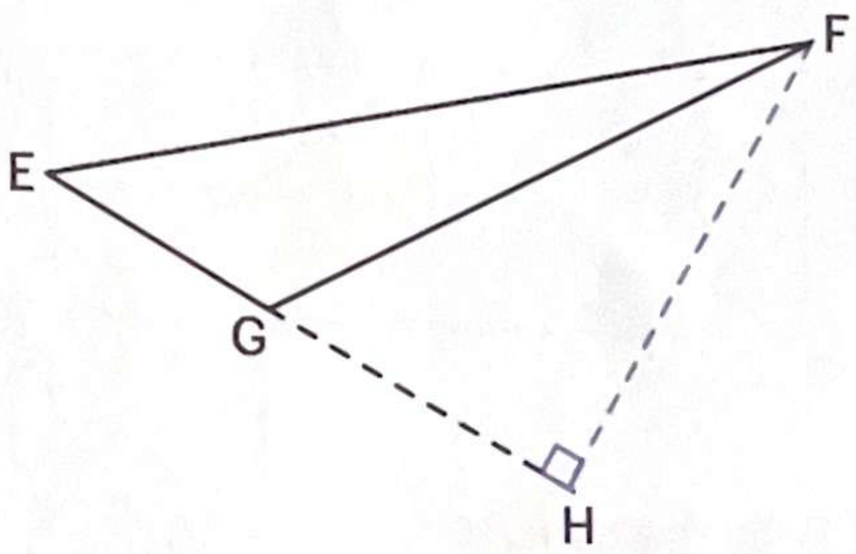
(b) Identify the base of each triangle given its height.

(i)



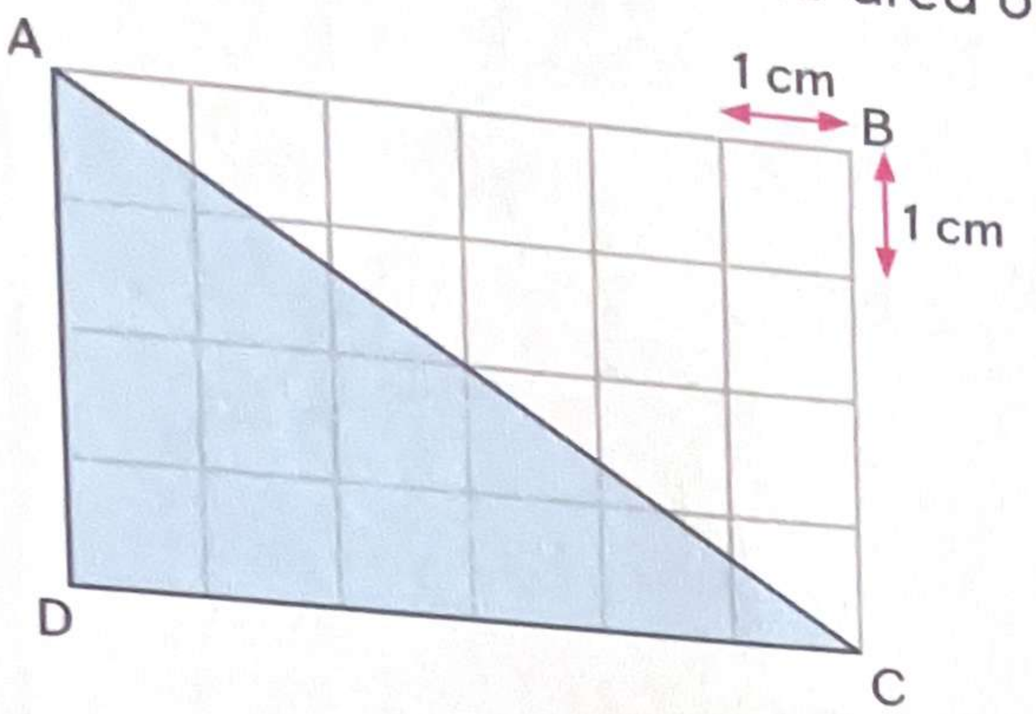
In Triangle ABC,
BD is the height and
_____ is the base.

(ii)

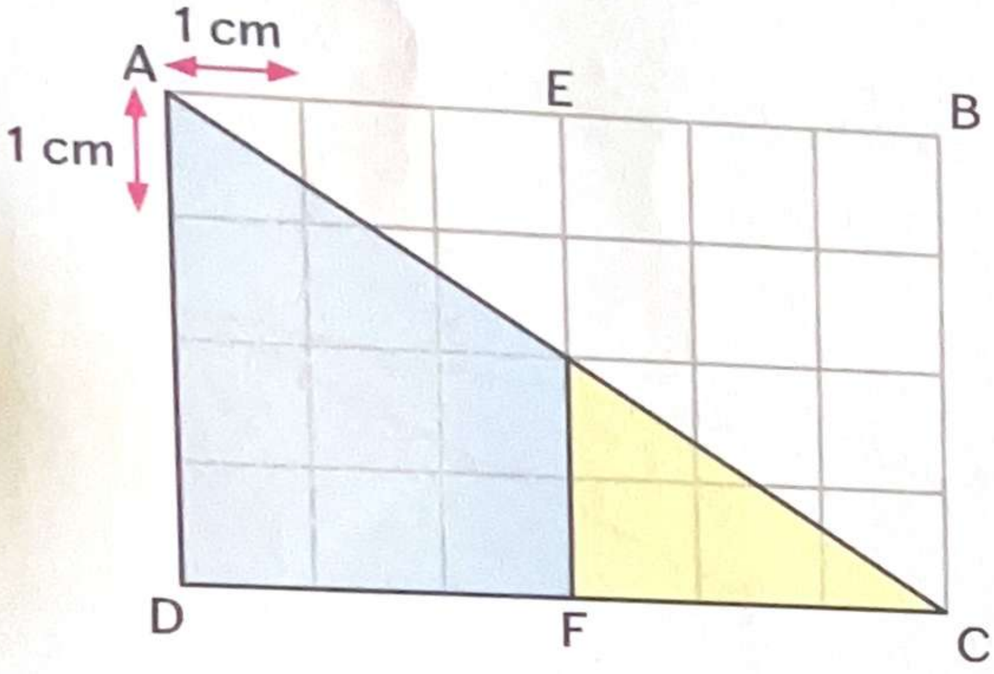


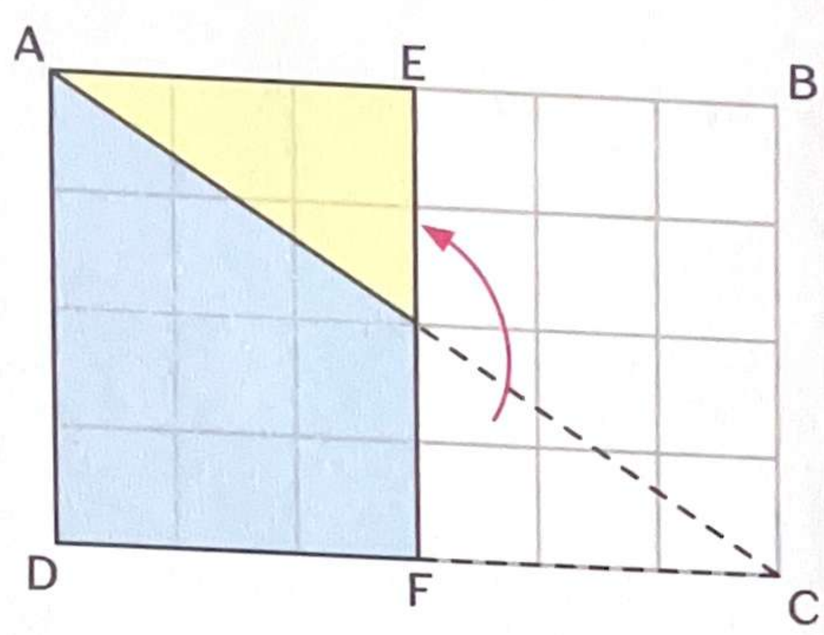
In Triangle EFG,
FH is the height and
_____ is the base.

Triangle ACD is shown on 1-cm square grids.
Let us learn how to find the area of Triangle ACD.



Area of rectangle ABCD = length × breadth
= 6 cm × 4 cm
= 24 cm²





ABCD is the **related rectangle** of Triangle ACD.

Area of Triangle ACD = Area of rectangle AEFD

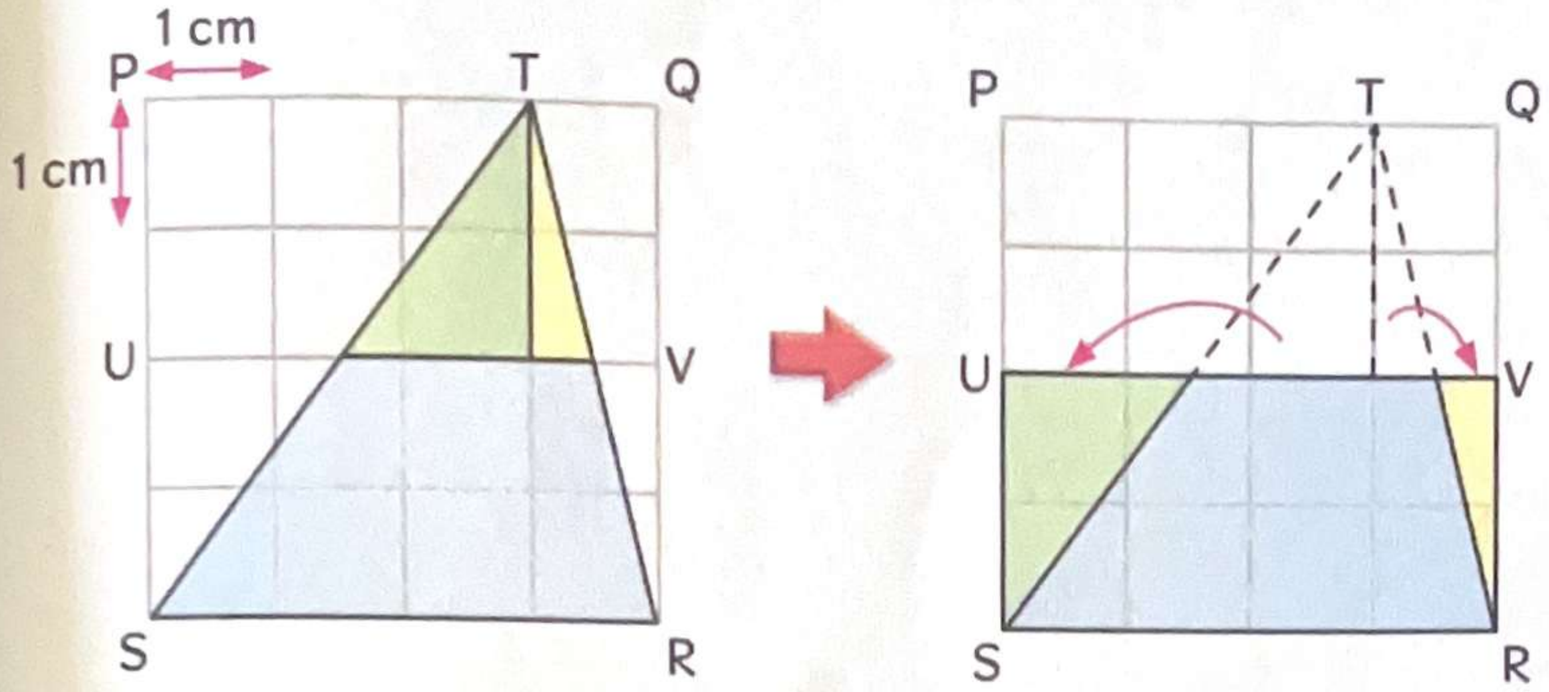
$= \frac{1}{2}$ of area of rectangle ABCD

$= \frac{1}{2} \times 24 \text{ cm}^2$

$= \mathbf{12 \text{ cm}^2}$

Area of Triangle ACD is $\frac{1}{2}$ the area of its related rectangle ABCD.

Triangle STR is shown on 1-cm square grids.
Find the area of Triangle STR.



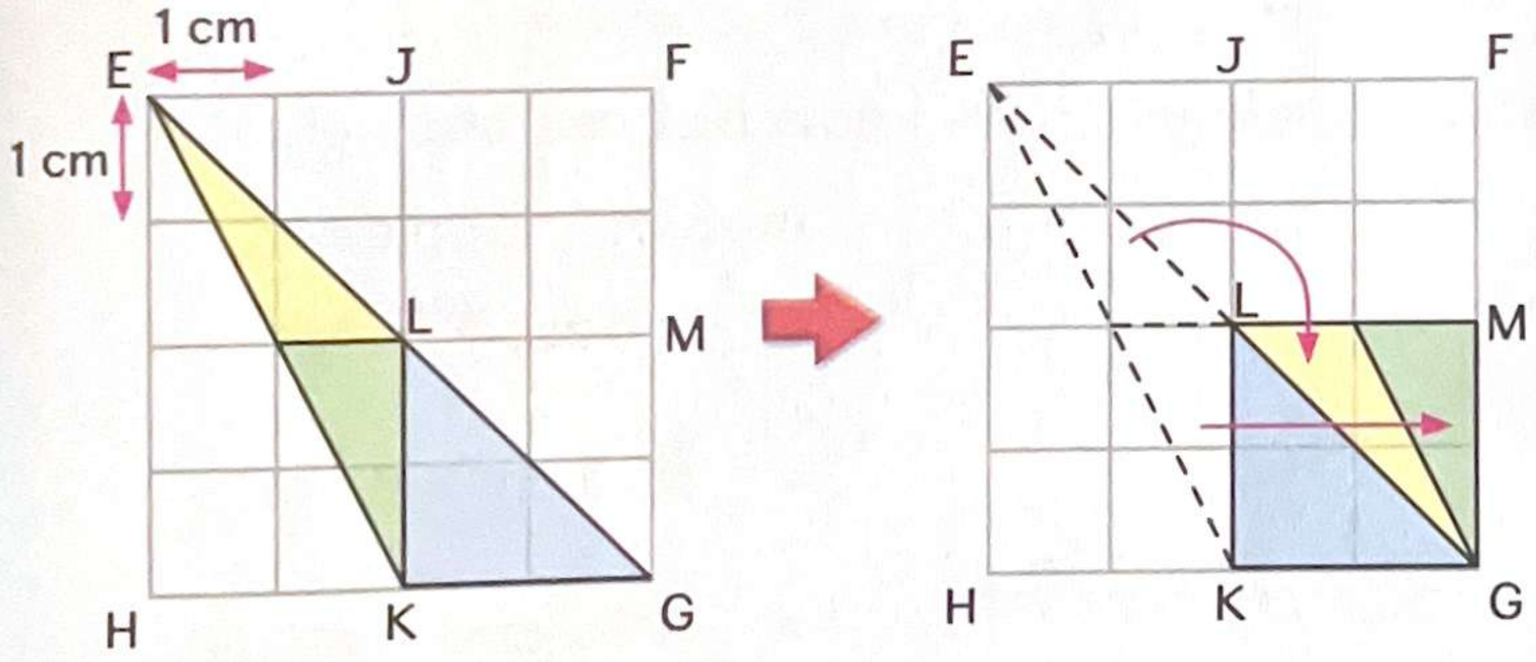
Area of Triangle STR is $\frac{1}{2}$ the area of its related square PQRS.

Area of Triangle STR $= \frac{1}{2} \times 4 \text{ cm} \times 4 \text{ cm}$

$= \frac{1}{2} \times 16 \text{ cm}^2$

$= \mathbf{8 \text{ cm}^2}$

Triangle EGK is shown on 1-cm square grids.
Find the area of Triangle EGK.

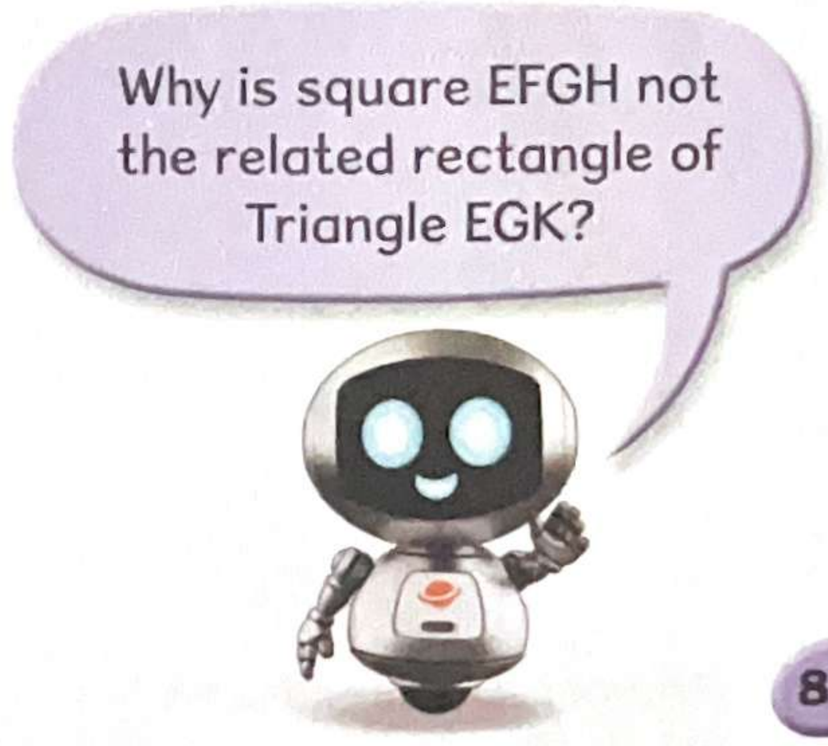


Area of Triangle EGK is $\frac{1}{2}$ the area of its related rectangle JFGK.

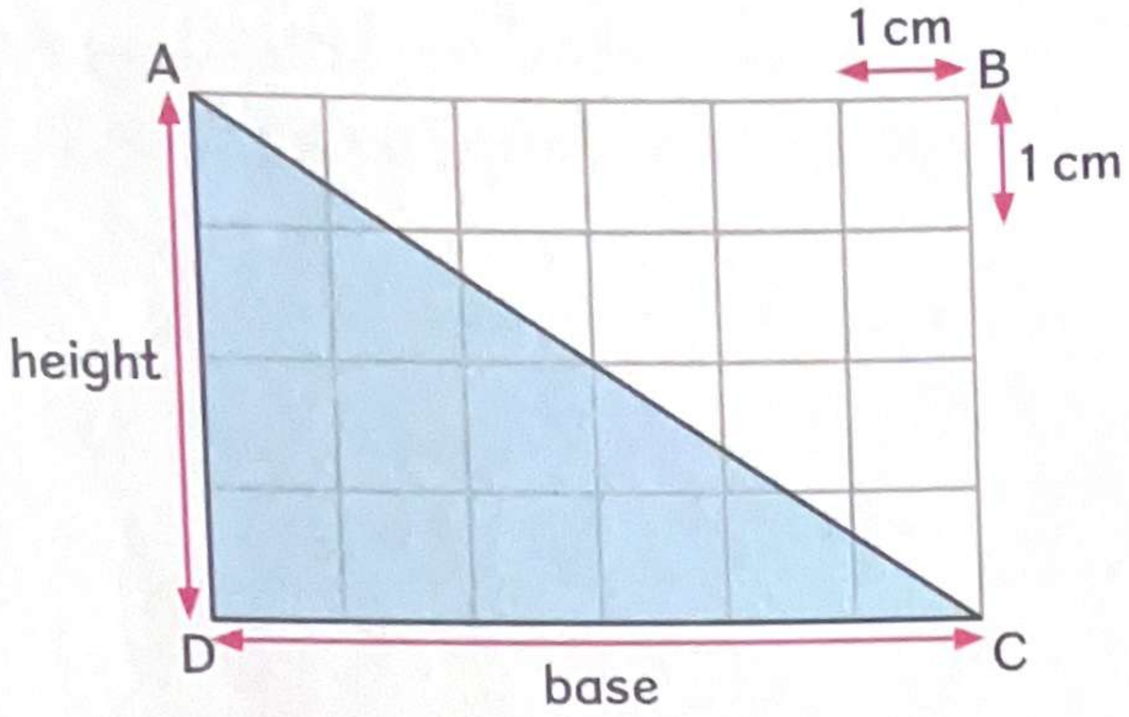
Area of Triangle EGK $= \frac{1}{2} \times 2 \text{ cm} \times 4 \text{ cm}$

$= \frac{1}{2} \times 8 \text{ cm}^2$

$= \mathbf{4 \text{ cm}^2}$



CD is the length of rectangle ABCD. CD is also the base of Triangle ACD.
AD is the breadth of the rectangle. AD is also the height of Triangle ACD.



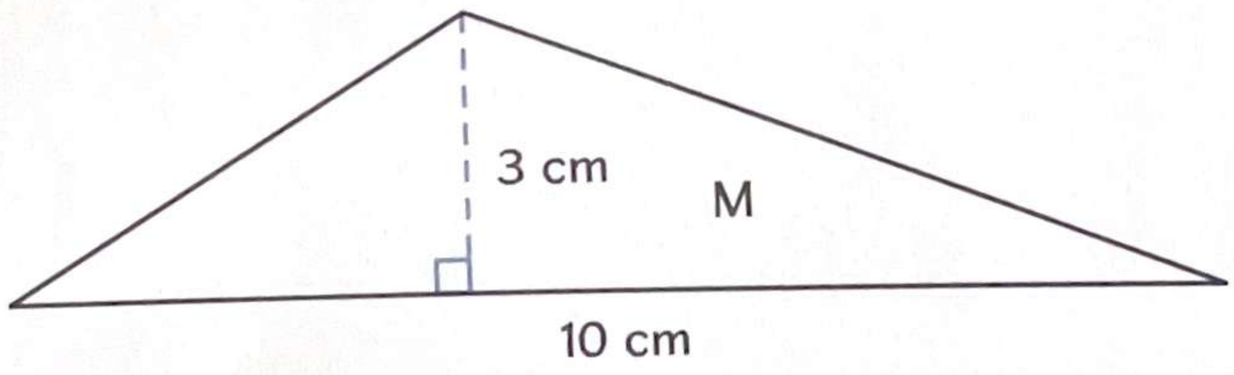
Area of Triangle ACD $= \frac{1}{2} \times$ area of rectangle ABCD

$= \frac{1}{2} \times$ length $\times$ breadth

$= \frac{1}{2} \times$ base $\times$ height

Area of triangle $= \frac{1}{2} \times$ base $\times$ height

We can find the area of a triangle when we know its base and height.



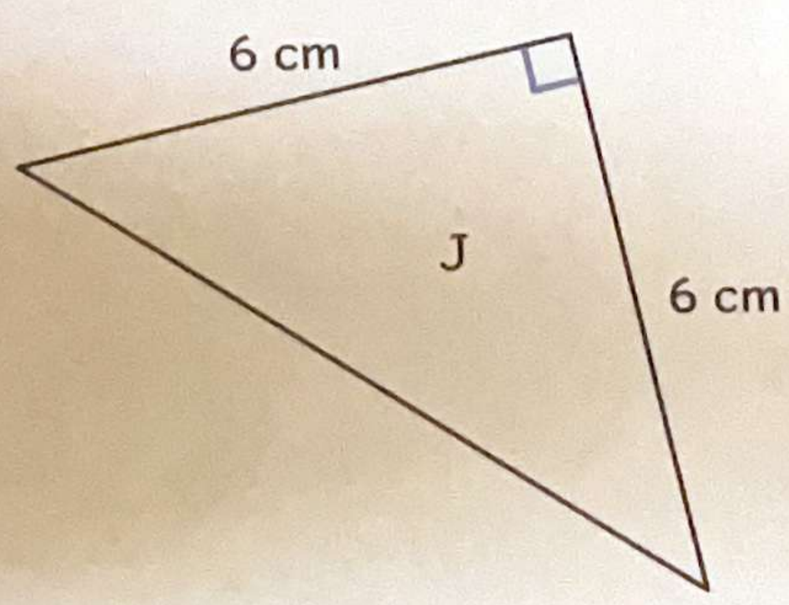
Area of Triangle M

$= \frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times 10 \text{ cm} \times 3 \text{ cm}$

$= \frac{1}{2} \times 30 \text{ cm}^2$

$= \mathbf{15 \text{ cm}^2}$



Area of Triangle J

$= \frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times 6 \text{ cm} \times 6 \text{ cm}$

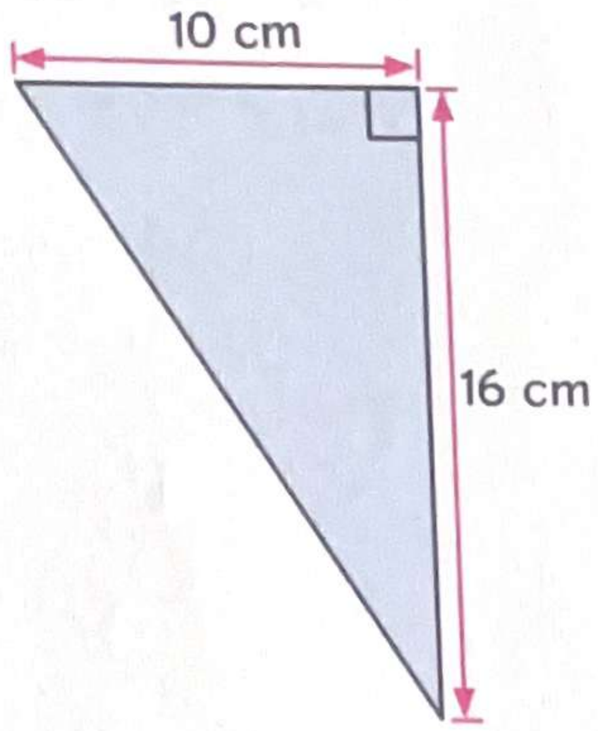
$= \frac{1}{2} \times 36 \text{ cm}^2$

$= \mathbf{18 \text{ cm}^2}$

Let's Try! 2

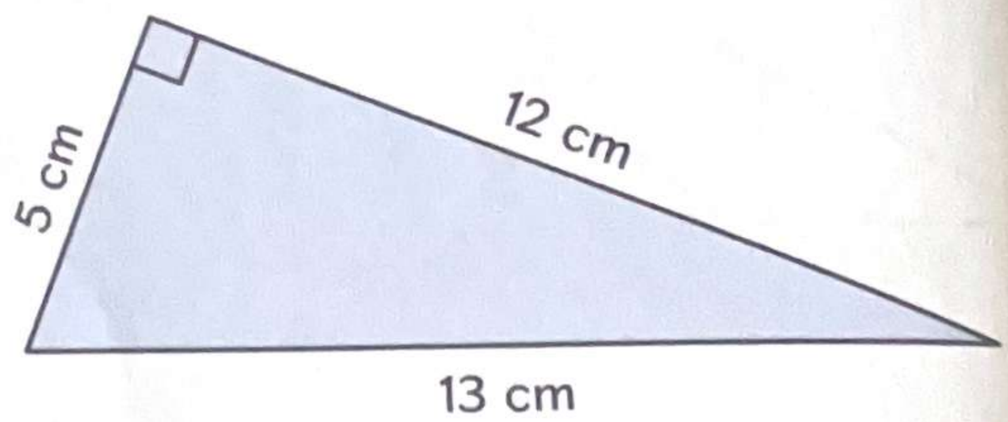
Find the area of each shaded triangle.

(a)



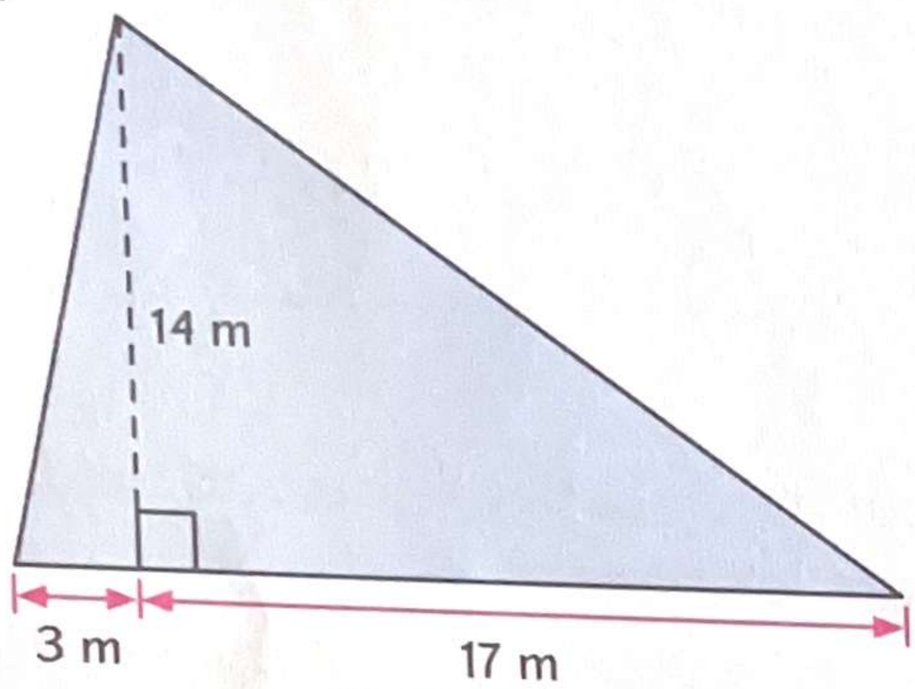
_____ cm^2

(b)



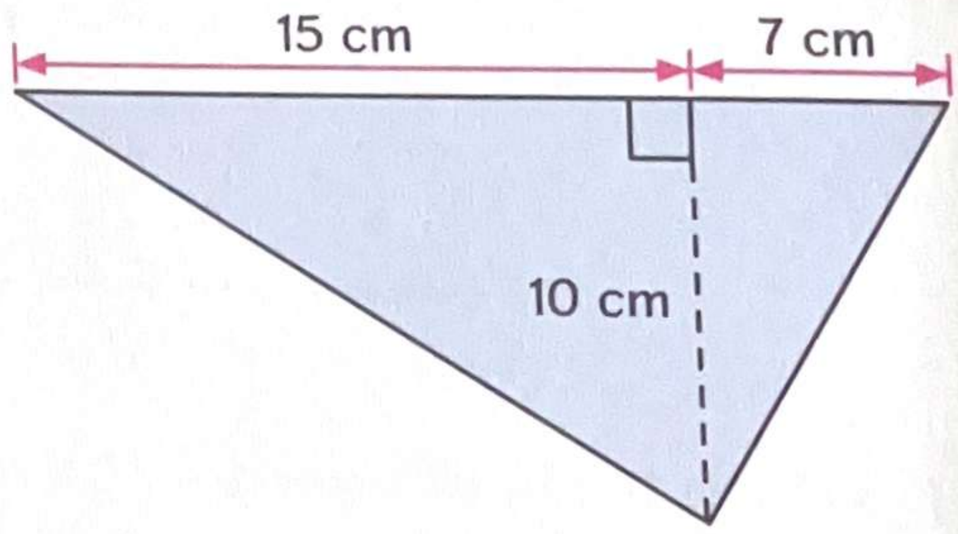
_____ cm^2

(c)



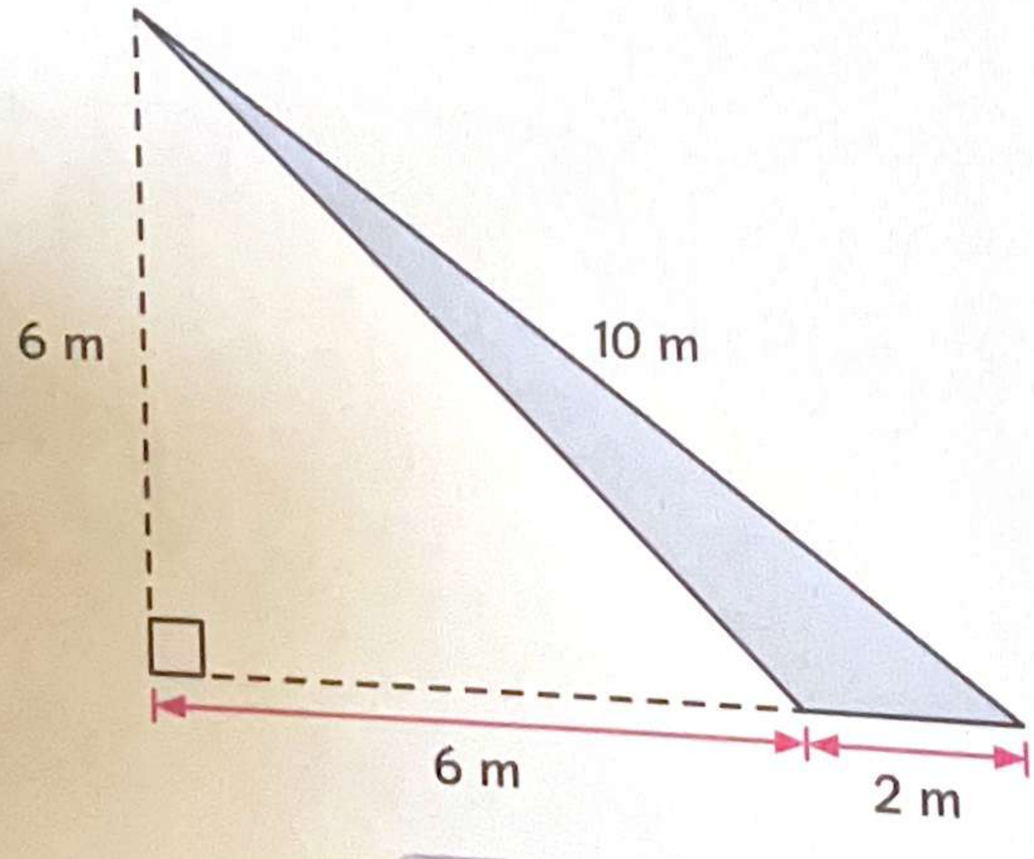
_____ m^2

(d)



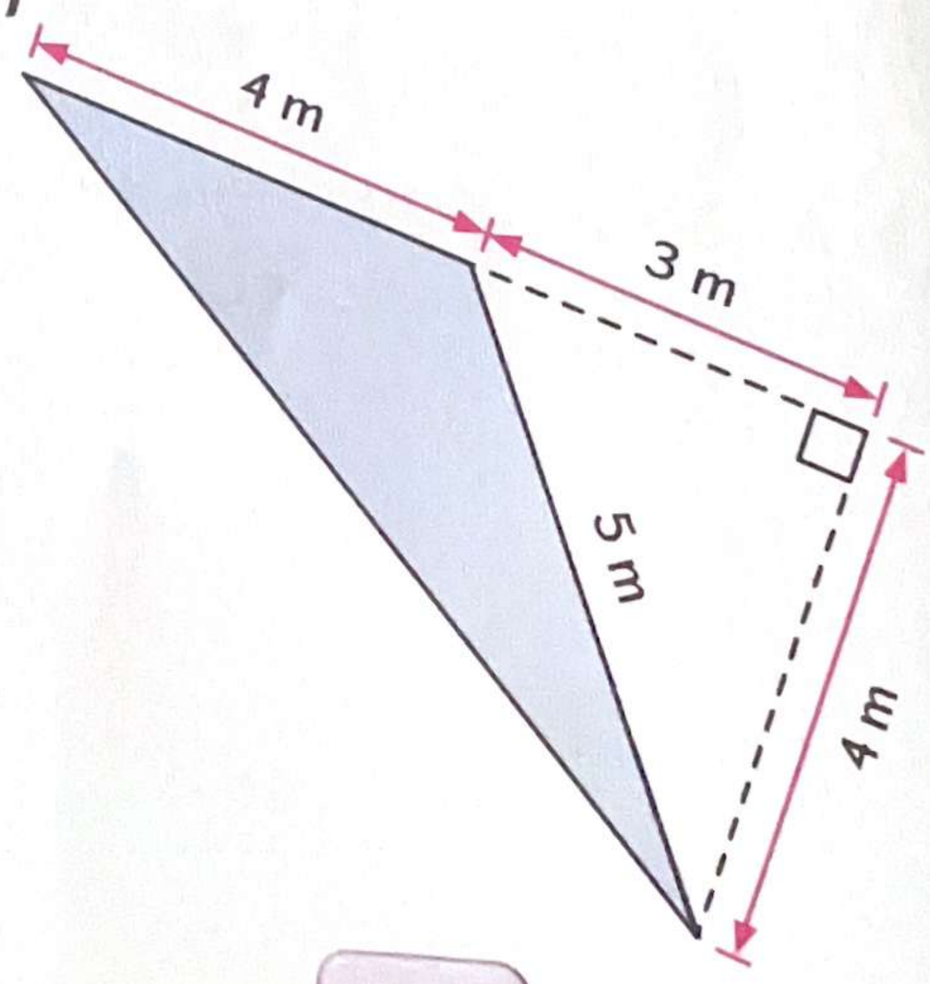
_____ cm^2

(e)



_____ m^2

(f)

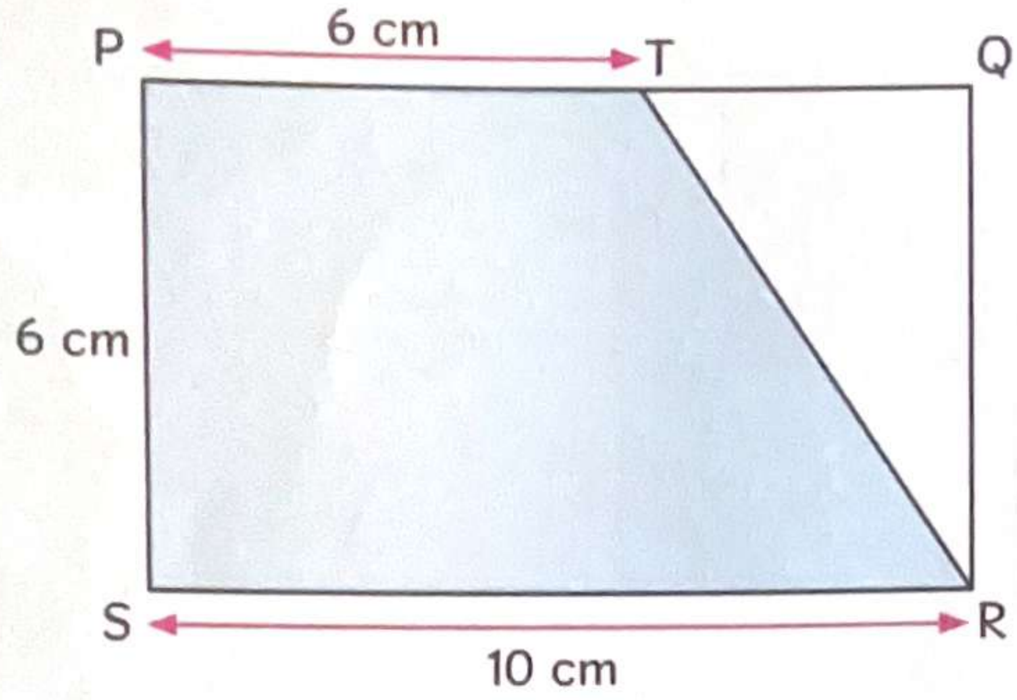


_____ m^2

Go to PB 5A

Area of Composite Figures

PQRS is a rectangle. Find the area of the shaded part, PTRS.



Split and Add Method

Area of square PTUS = 6 cm × 6 cm

= 36 cm^2

RU = 10 cm − 6 cm

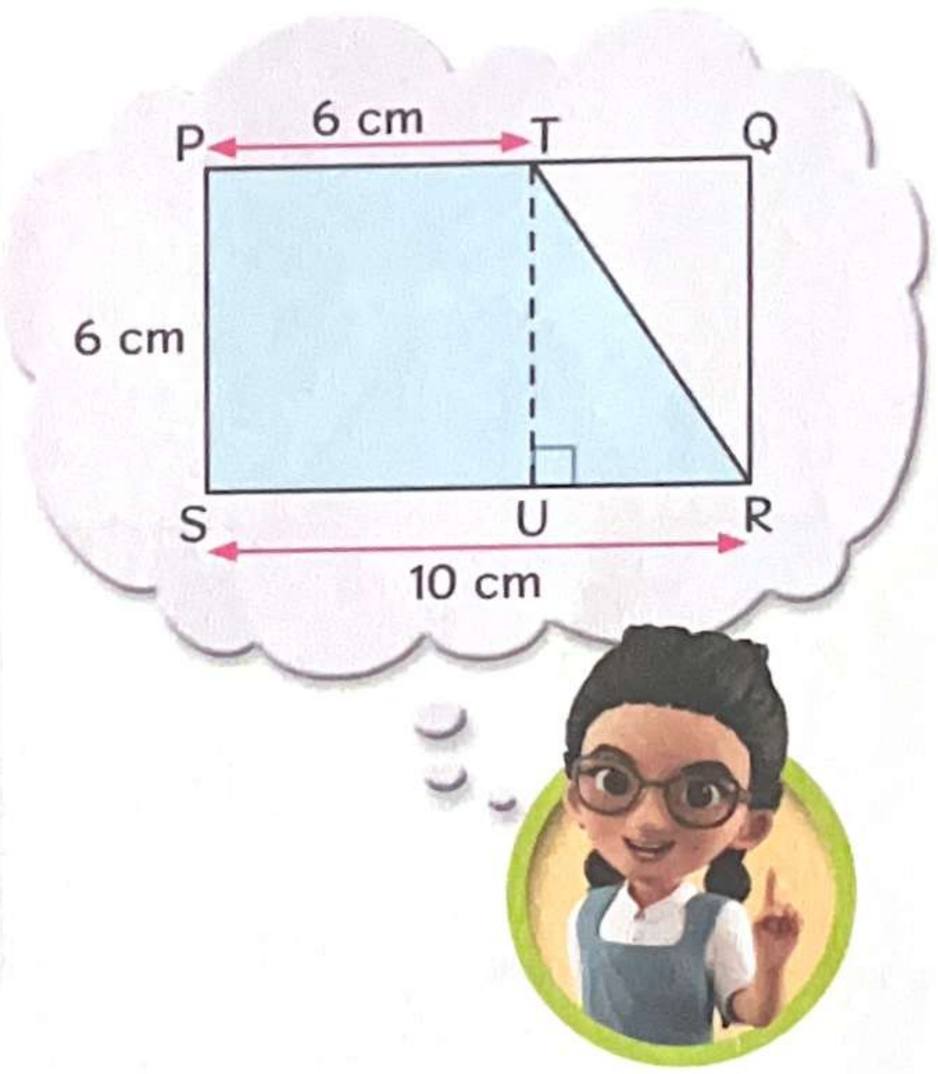
= 4 cm

Area of triangle TRU = $\frac{1}{2}$ × 4 cm × 6 cm

= 12 cm^2

Area of PTRS = 36 cm^2 + 12 cm^2

= **48 cm^2**



Take Away Method

Area of Rectangle PQRS = 10 cm × 6 cm

= 60 cm^2

TQ = 10 cm − 6 cm

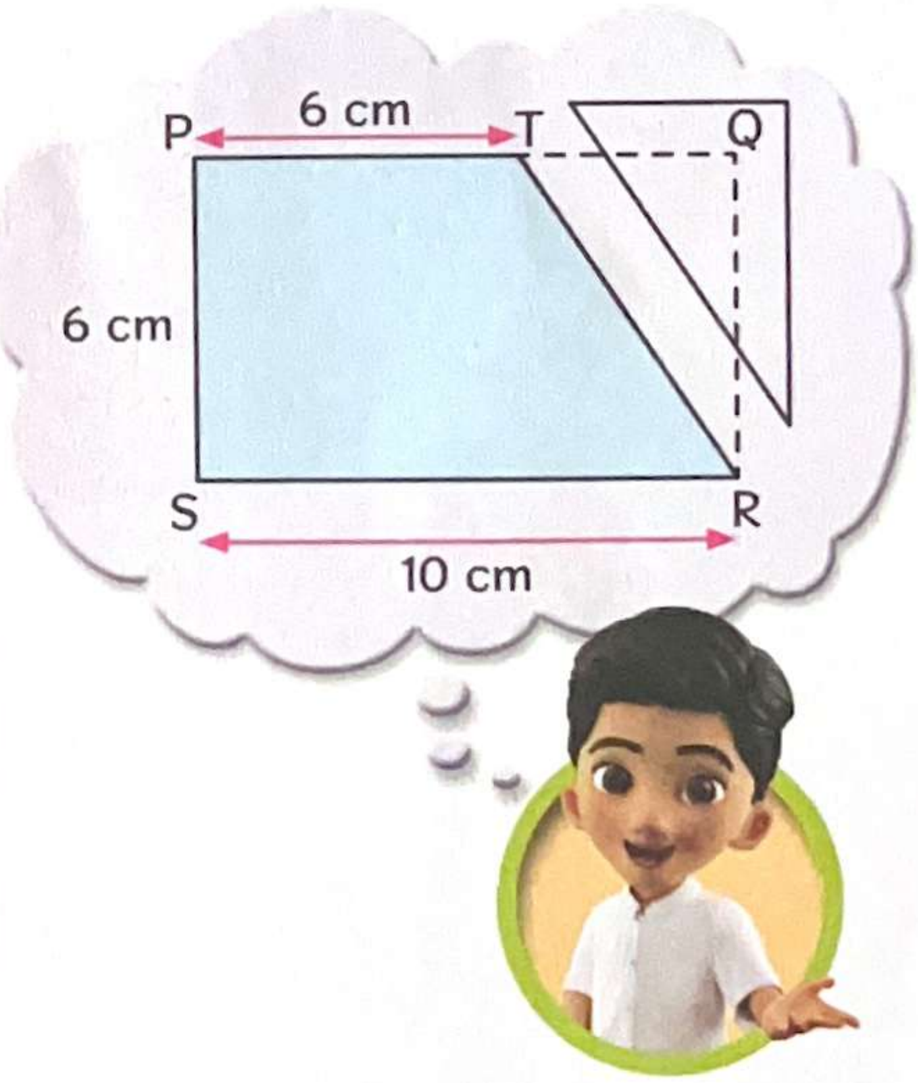
= 4 cm

Area of triangle TQR = $\frac{1}{2}$ × 4 cm × 6 cm

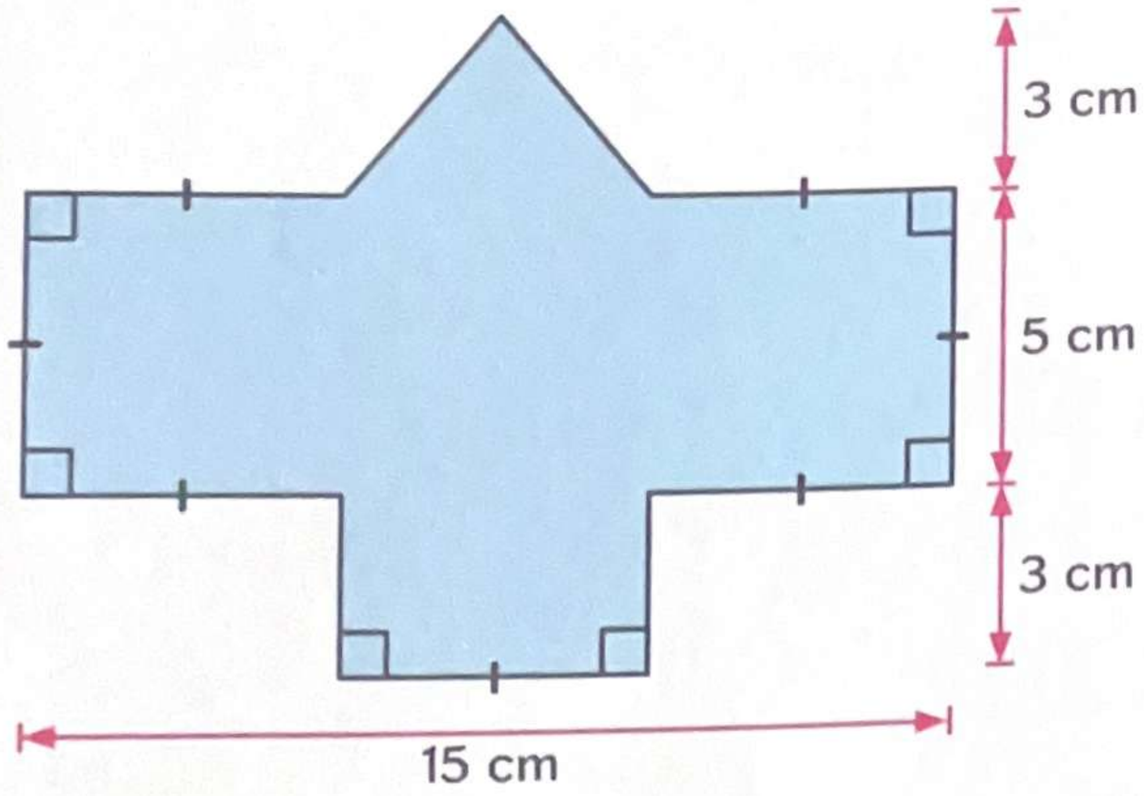
= 12 cm^2

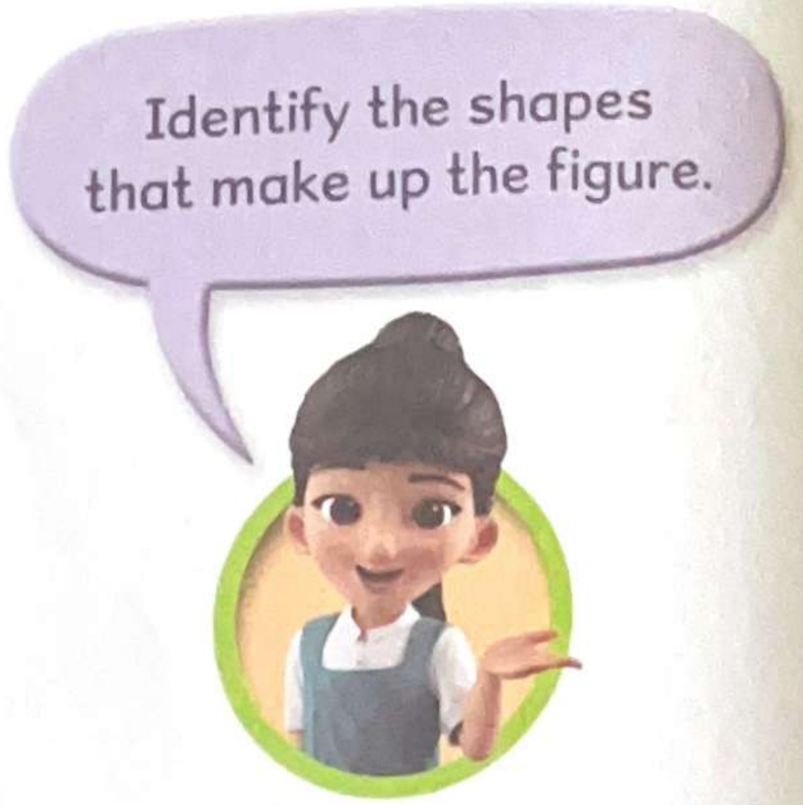
Area of PTRS = 60 cm^2 − 12 cm^2

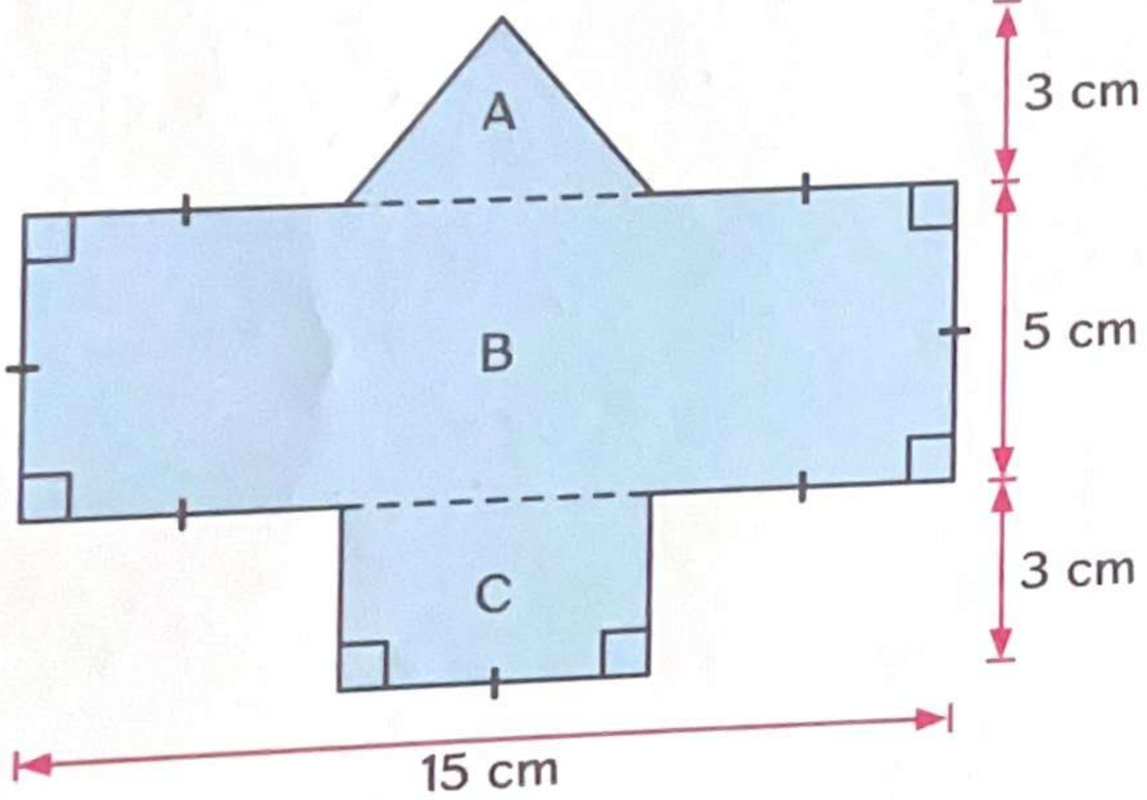
= **48 cm^2**



Find the area of the figure.





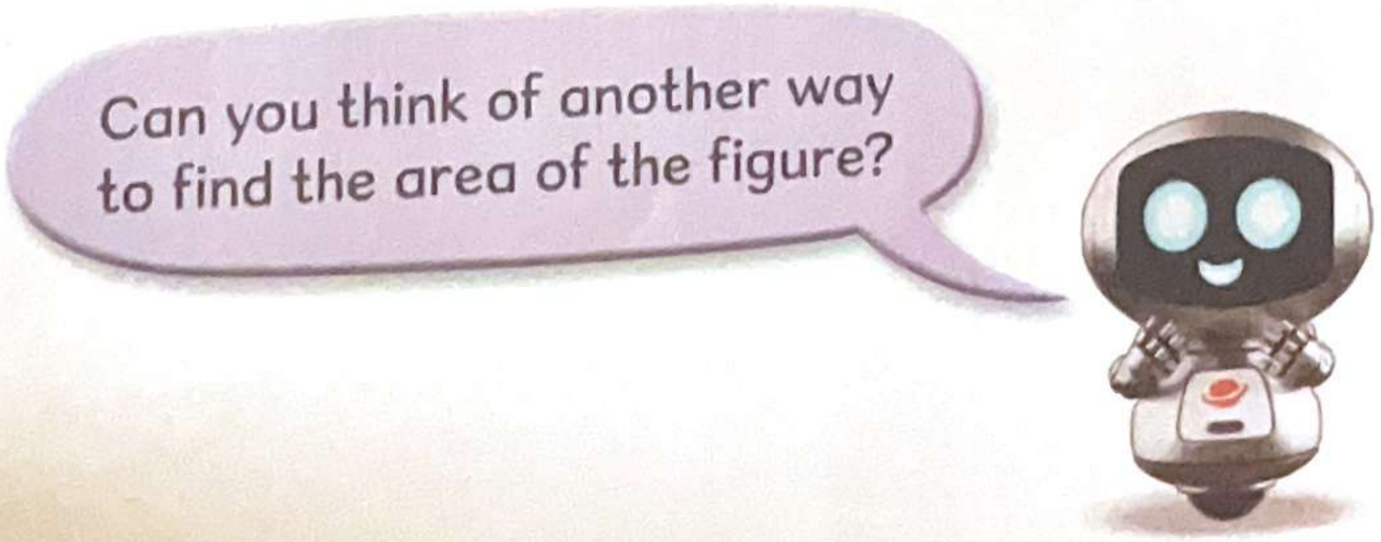


Area of triangle A $= \frac{1}{2} \times 5 \text{ cm} \times 3 \text{ cm}$
$= 7.5 \text{ cm}^2$

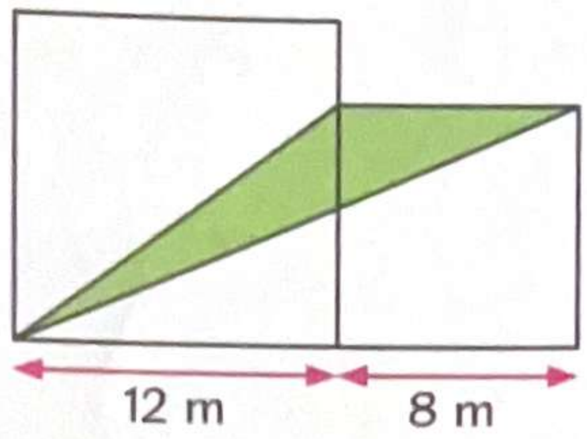
Area of rectangle B $= 15 \text{ cm} \times 5 \text{ cm}$
$= 75 \text{ cm}^2$

Area of rectangle C $= 5 \text{ cm} \times 3 \text{ cm}$
$= 15 \text{ cm}^2$

Area of figure $= 7.5 \text{ cm}^2 + 75 \text{ cm}^2 + 15 \text{ cm}^2$
$= \mathbf{97.5 \text{ cm}^2}$



The figure is made up of two squares. The side of the small square is 8 m. The side of the big square is 12 m. What is the area of the shaded part?

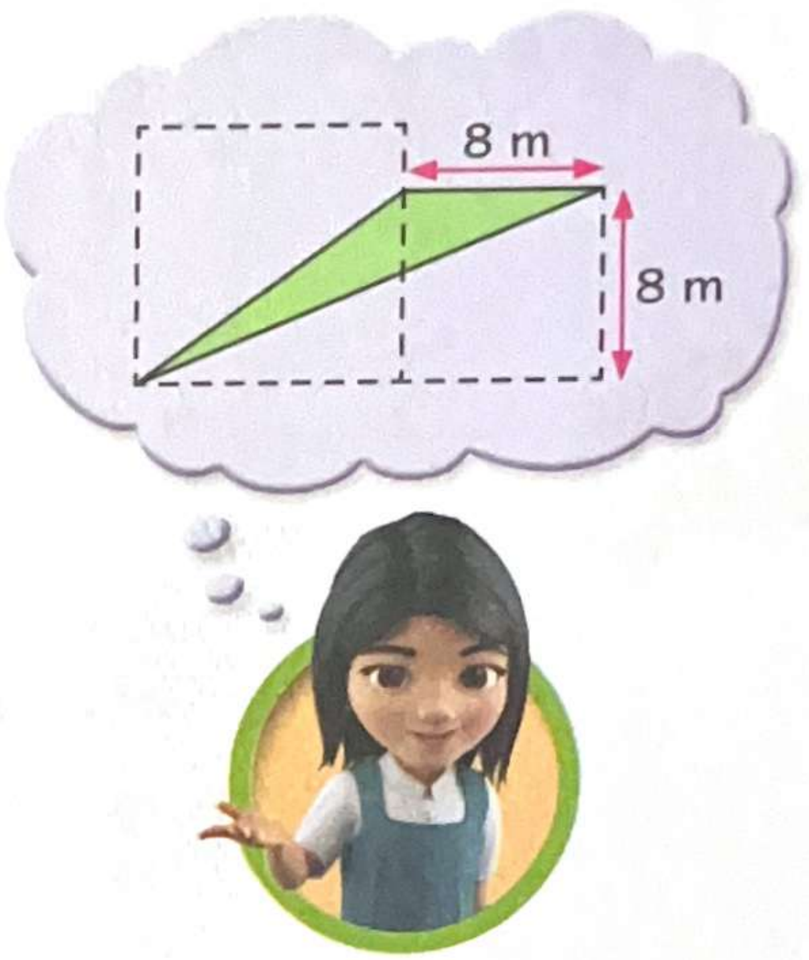


Base of triangle = 8 m

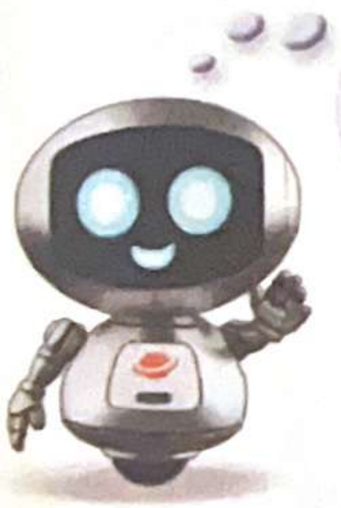
Height of triangle = 8 m

Area of triangle = $\frac{1}{2}$ × 8 m × 8 m

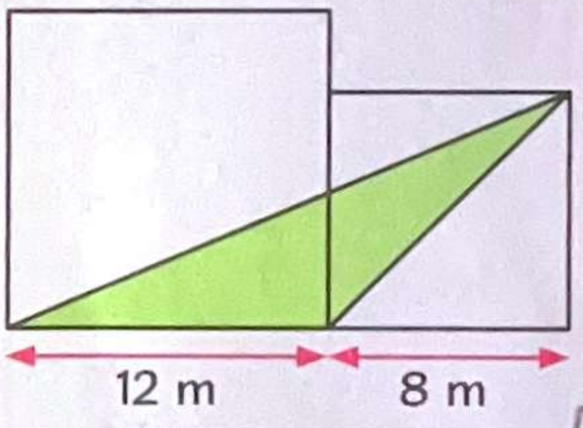
= 32 m²



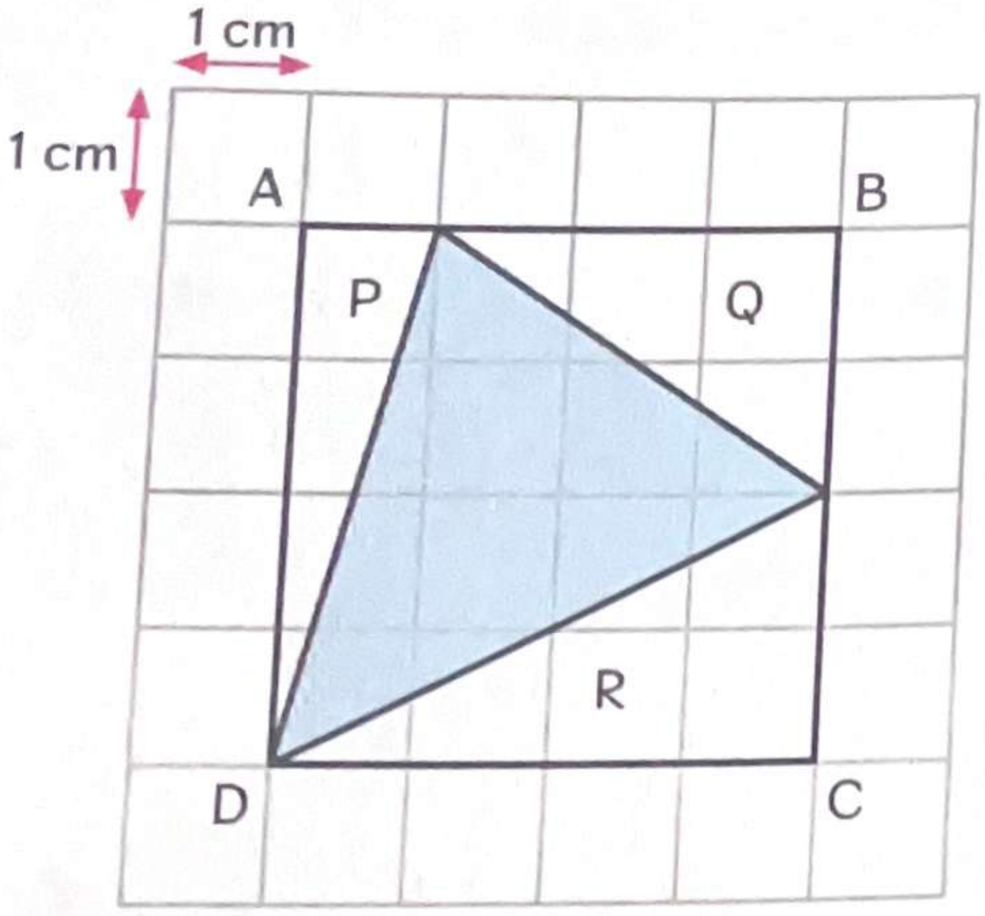
The area of the shaded part is **32 m²**.



Compare this figure with the one above. Will the area of the shaded part be different?



Find the area of the shaded triangle.



Area of Square ABCD = 4 cm × 4 cm
= 16 cm²

Area of Triangle P = $\frac{1}{2}$ × 1 cm × 4 cm
= 2 cm²

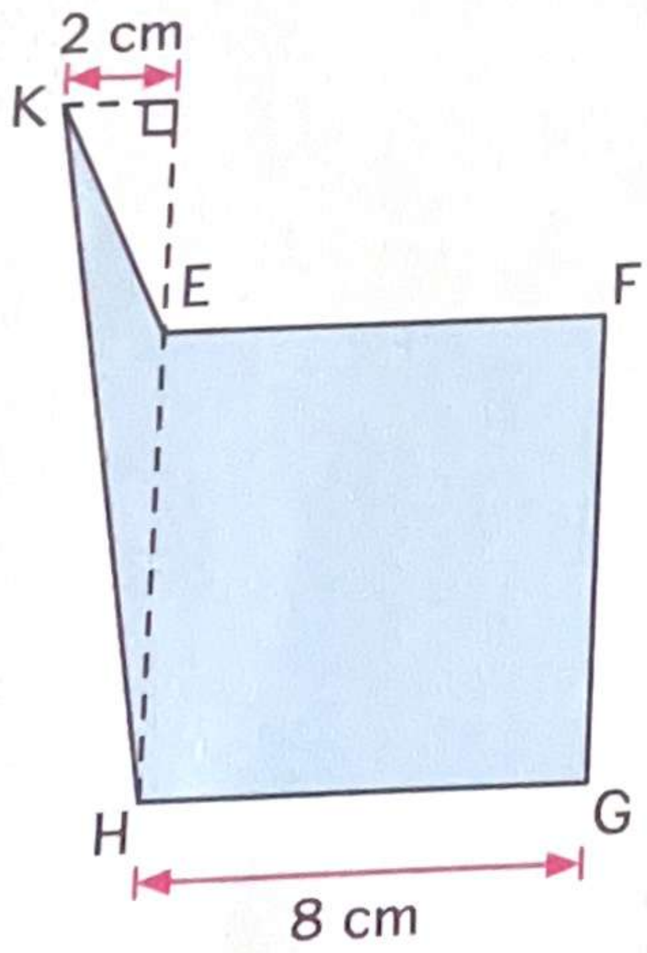
Area of Triangle Q = $\frac{1}{2}$ × 3 cm × 2 cm
= 3 cm²

Area of Triangle R = $\frac{1}{2}$ × 4 cm × 2 cm
= 4 cm²

Area of the shaded triangle = (16 − 2 − 3 − 4) cm²
= **7 cm²**

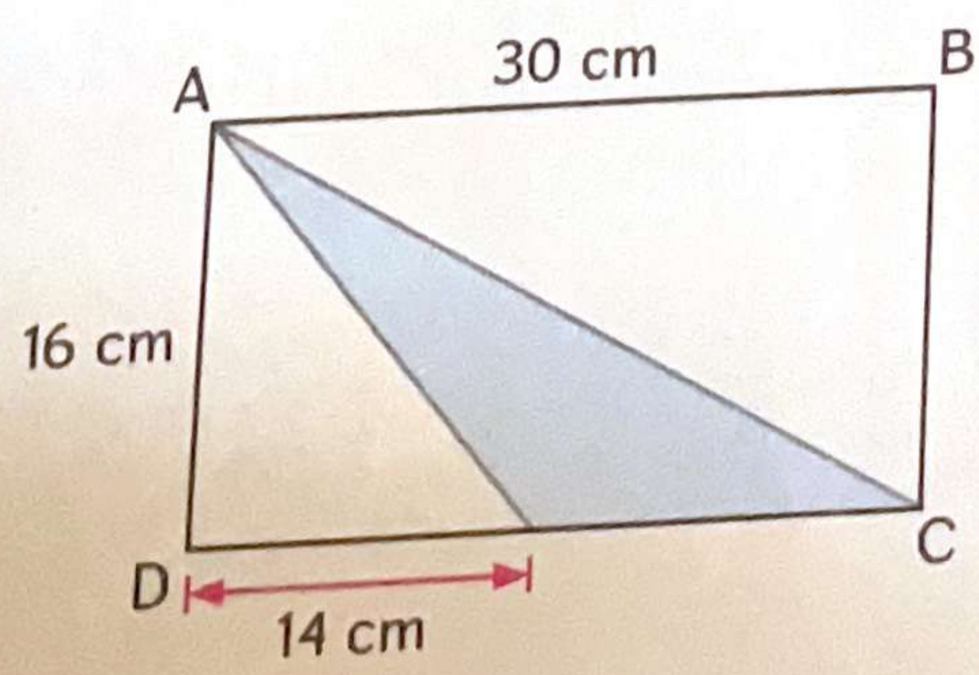
Let's Try! 3

(a) The figure is made up of a square and a triangle.
EFGH is a square and EHK is a triangle.
What is the area of the figure?



[ ] cm²

(b) ABCD is a rectangle. It is formed by three triangles.
What is the shaded part of the figure?



[ ] cm²

Go to PB 5A Practice 4