Let's Do MATHEMATICS

Worktext 6B

for learners ***11 - 12 years old***

Let's Do Mathematics

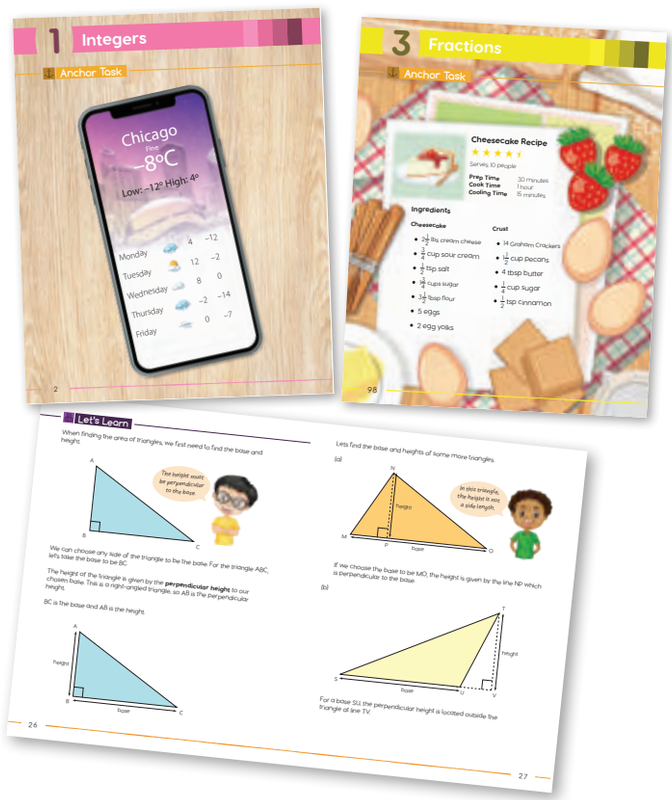
Let's Do Mathematics is a series covering levels K-6 and is fully aligned to the United States Common Core State Standards (USCCSS). Each level consists of two books (Book A and Book B) and combines textbook-style presentation of concepts as well as workbook practice.

Central to the USCCSS is the promotion of problem-solving skills and reasoning. Let's Do Mathematics achieves this by teaching and presenting concepts through a problem-solving based pedagogy and using the concrete-pictorial-abstract (CPA) approach. Learners acquire knowledge and understanding of concepts through a guided progression beginning with concrete examples and experiences which then flow into pictorial representations and finally mastery at the abstract and symbolic level. This approach ensures that learners develop a fundamental understanding of concepts rather than answering questions by learned procedures and algorithms.

Key features of the series include:

Anchor Task

Open-ended activities serve as the starting point for understanding new concepts. Learners engage in activities and discussions to form concrete experiences before the concept is formalized.

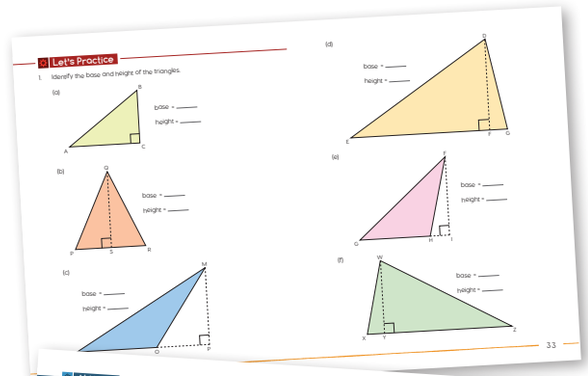


Let's Learn

Concepts are presented in a clear and colorful manner. Worked problems provide learners with guided step-by-step progression through examples. Series mascots provide guidance through helpful comments and observations when new concepts are introduced.

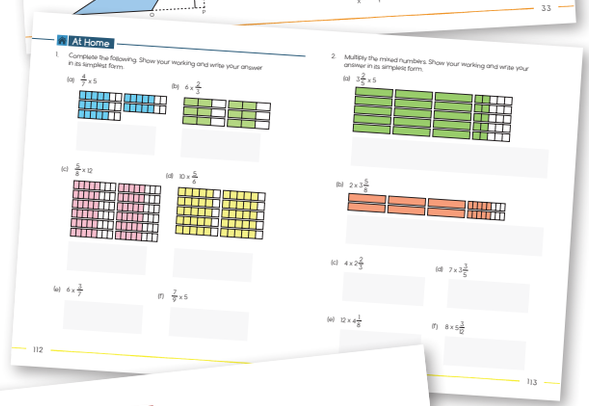
Let's Practice

Learners demonstrate their understanding of concepts through a range of exercises and problems to be completed in a classroom environment. Questions provide a varying degree of guidance and scaffolding as learners progress to mastery of the concepts.



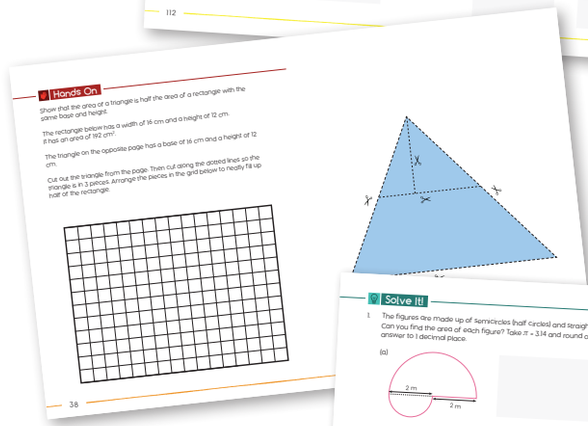
At Home

Further practice designed to be completed without the guidance of a teacher. Exercises and problems in this section follow on from those completed under Let's Practice.



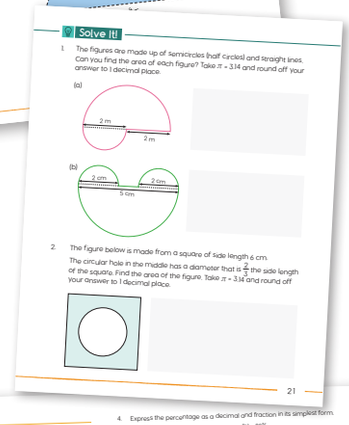
Hands On

Learners are encouraged to 'learn by doing' through the use of group activities and the use of mathematical manipulatives.



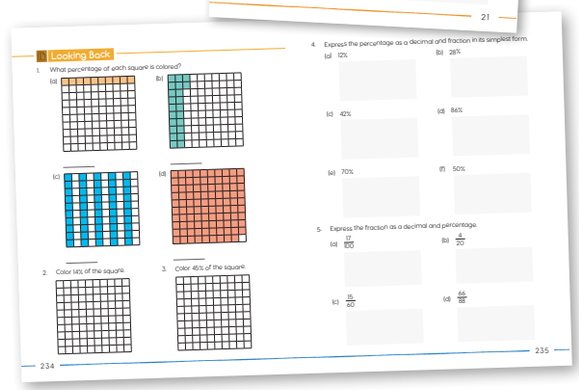
Solve It!

Activities that require learners to apply logical reasoning and problem-solving. Problems are often posed which do not have a routine strategy for solving them. Learners are encouraged to think creatively and apply a range of problem-solving heuristics.



Looking Back

Consolidated practice where learners demonstrate their understanding on a range of concepts taught within a unit.

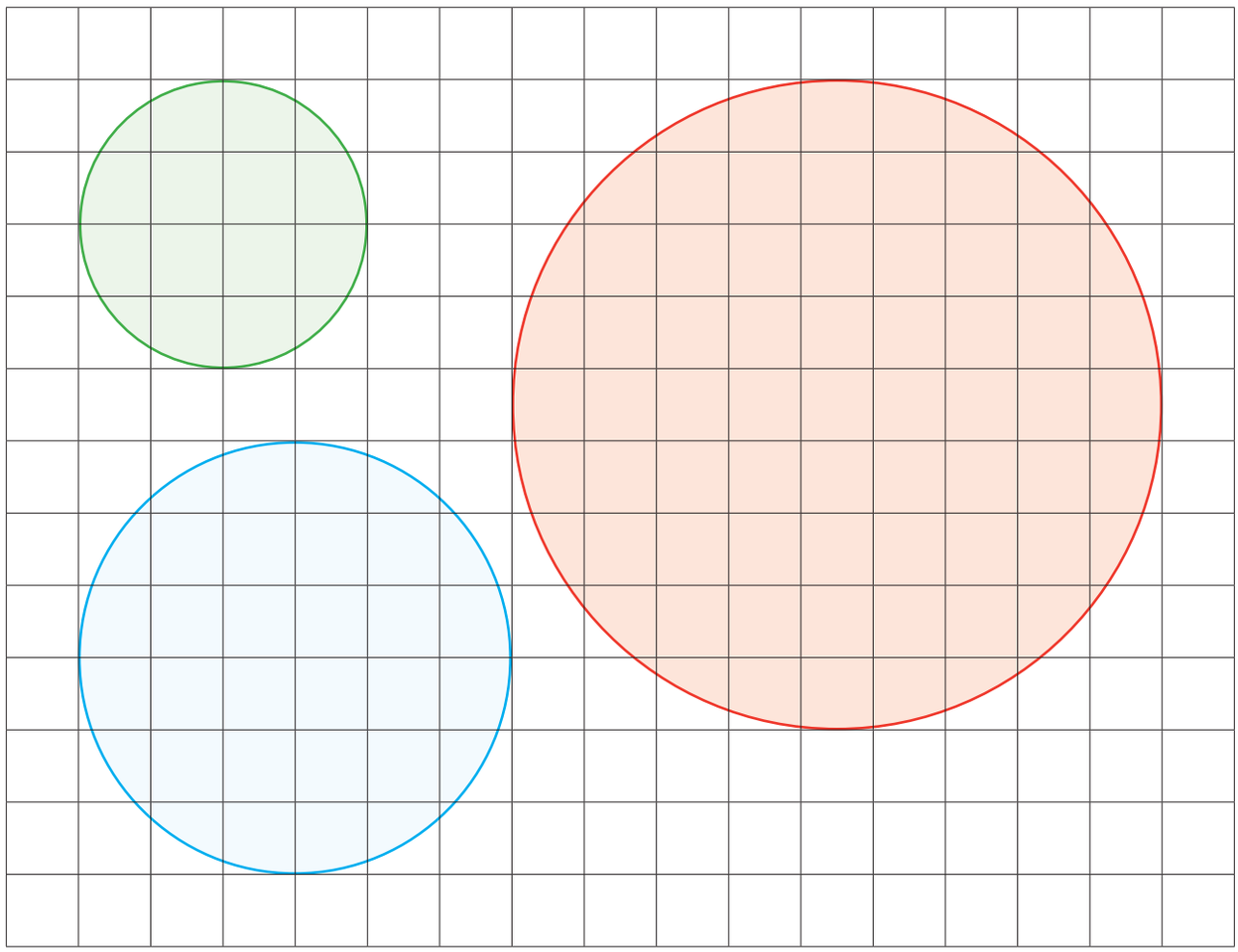


Contents

7 Geometry

Properties of Circles

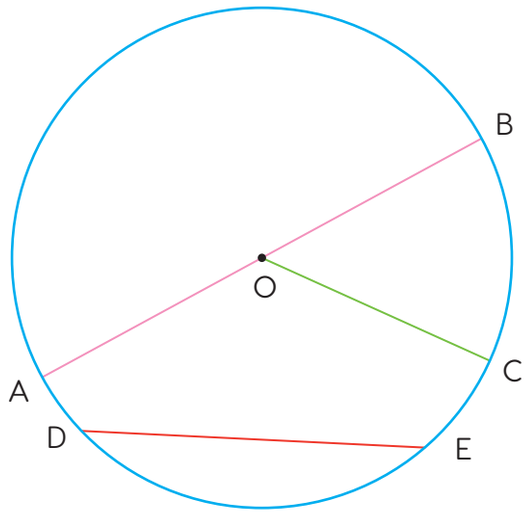
Anchor Task



	Diameter	Circumference	
Green circle			
Blue circle			
Red circle			

Let's Learn

Let's look at the different parts of a circle.



O is a point at the center of the circle.
AB is a straight line that passes through the center point O.

AB is a **diameter** of the circle.

OC is a straight line from the center of the circle to its perimeter.

OC is a **radius** of the circle.

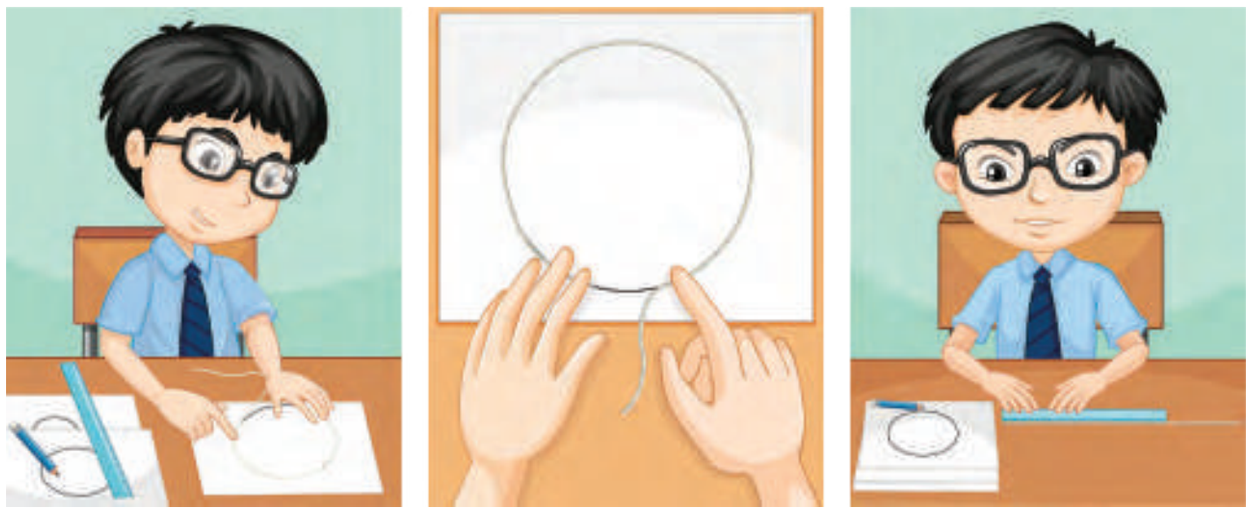
DE is a straight line that does not pass through the center of the circle.

DE is a **chord** of the circle.

Recall that the path around a shape such as a rectangle or triangle is called the perimeter. The perimeter of a circle has a special name – circumference.

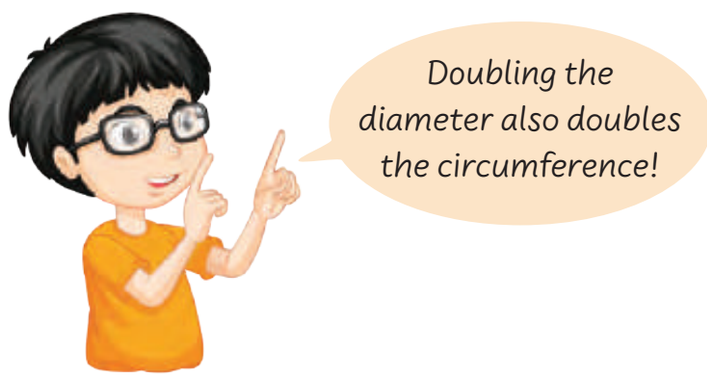
The **circumference** of a circle is its perimeter.

Dominic placed a piece of string so that it fits around a circle. He then measured the length of the string to find the circumference of the circle.



Dominic used string to find the circumference of different sized circles. He recorded his findings in a table.

	Diameter (cm)	Circumference (cm)
Circle 1	5	15.7
Circle 2	10	31.4
Circle 3	20	62.8

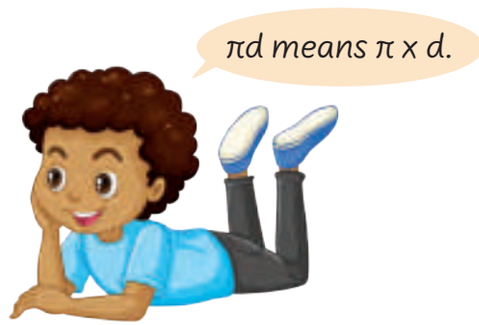


Dominic uses a calculator to divide the circumference by the diameter for each circle. He notices that the quotient is the same for every circle.

	Diameter (cm)	Circumference (cm)	Circumference ÷ Diameter
Circle 1	5	15.7	3.14
Circle 2	10	31.4	3.14
Circle 3	20	62.8	3.14

The circumference of any circle divided by its diameter is always the same value. This value is represented by the symbol π, which is a letter of the Greek alphabet. We say this symbol as 'pie'. We can approximate π as the decimal 3.14 or the fraction $\frac{22}{7}$.

Circumference = π x d
= πd

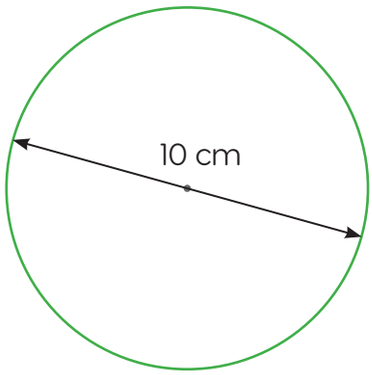


The diameter of a circle is 2 times its radius. So we can also write:

Circumference = 2 x π x r
= $2\pi r$

Find the circumference of each circle. Take π = 3.14 and round off your answer to 1 decimal place.

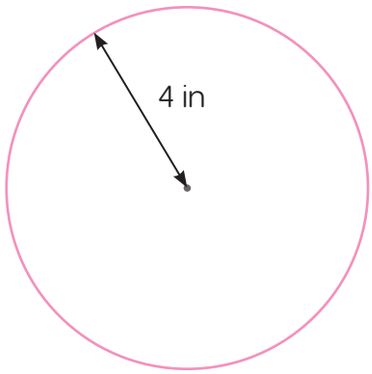
The diameter of the circle is 10 cm.



Circumference = πd
= 3.14 x 10 cm
= 31.4 cm

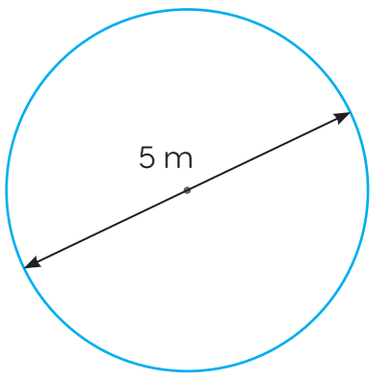
Make sure you write the correct unit of length.

The radius of the circle is 4 in.



Circumference = $2\pi r$
= 2 x 3.14 x 4 in
= 8 x 3.14 in
= 25.1 in

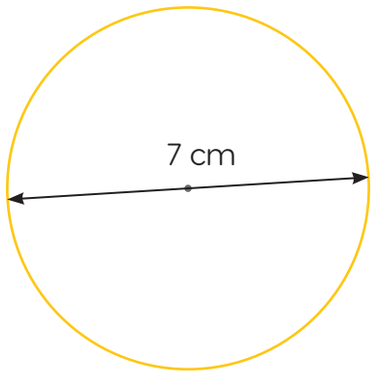
The diameter of the circle is 5 m.



Circumference = πd
= 3.14 x 5 m
= 15.7 m

Find the circumference of each circle. Take $\pi = \frac{22}{7}$.

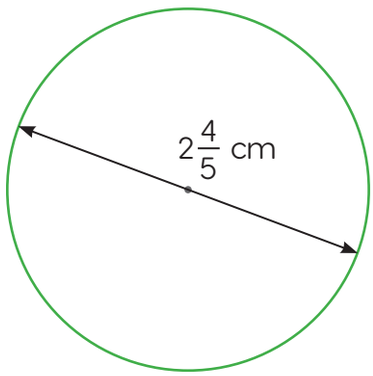
The diameter of the circle is 7 cm.



Circumference = πd

$= \frac{22}{7} \times 7$ cm

$= 22$ cm



Circumference = πd

$= \frac{22}{7} \times 2\frac{4}{5}$

$= \frac{22}{7} \times \frac{14}{5}$

$= \frac{22 \times 14}{7 \times 5}$

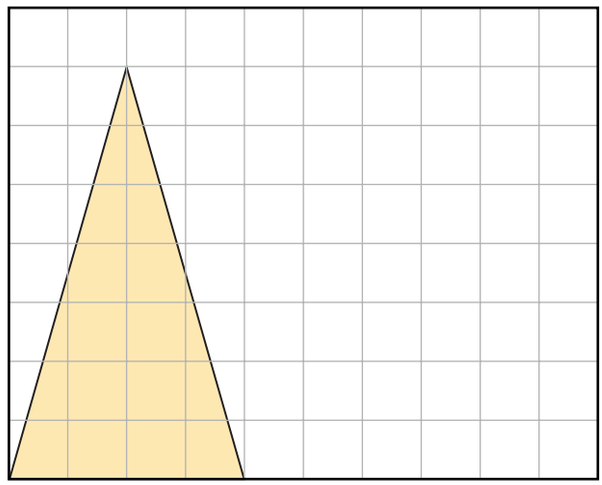
$= \frac{22 \times 2}{5}$

$= \frac{44}{5} = 8\frac{4}{5}$

The circumference is $8\frac{4}{5}$ cm.

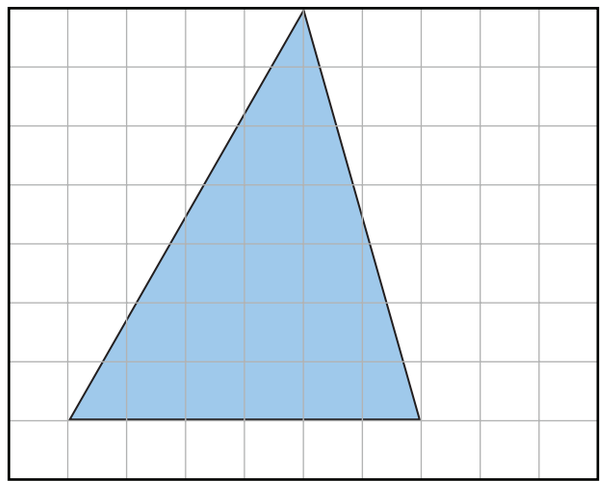
2. Each square in the grids is 1 cm by 1 cm.
Find the area of the triangles.
Show your working in the space provided.

(a)



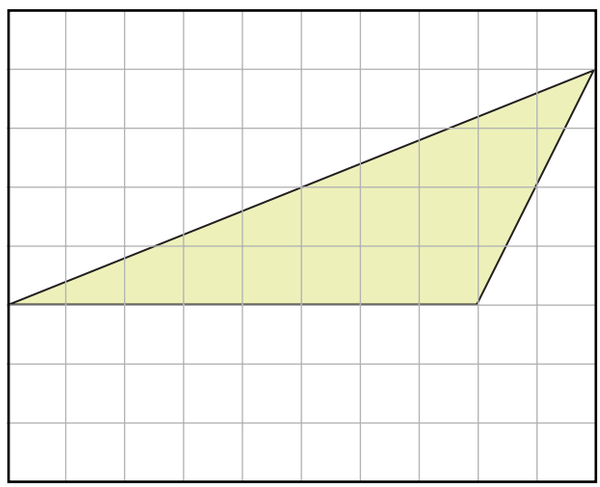
Area = _____

(b)



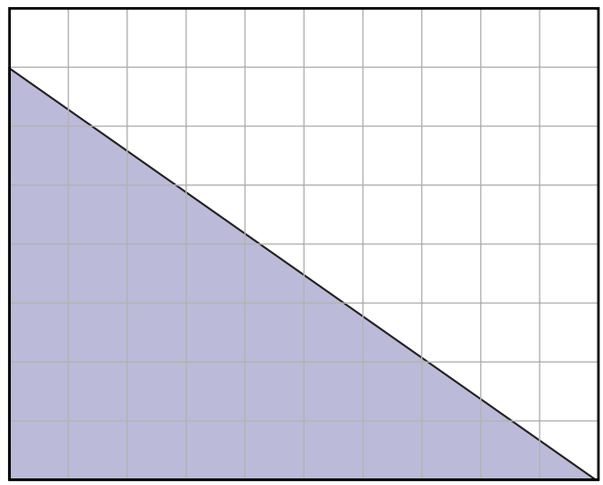
Area = _____

(c)



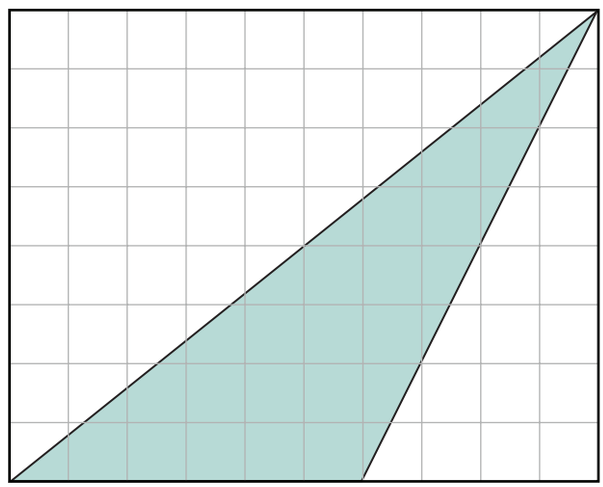
Area = _____

(d)



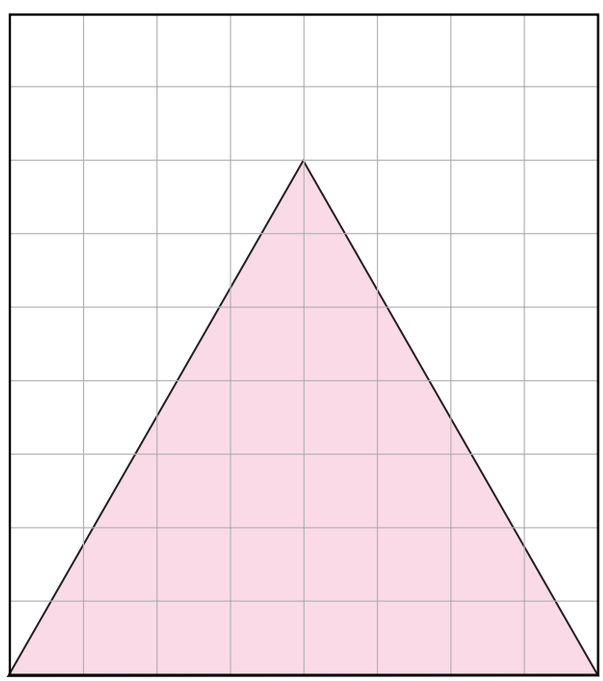
Area = _____

(e)



Area = _____

(f)



Area = _____

Solve It!

Ethan is designing a mask for a dress-up party.
The mask is made from a piece of square cardboard of side length 20 cm

He cut a 12 cm by 3 cm rectangular hole for the mouth.
For the eyes, he cut 2 right-angled triangles of the same size.
They each had a base and height of 8 cm.

Find the area of Ethan's mask.

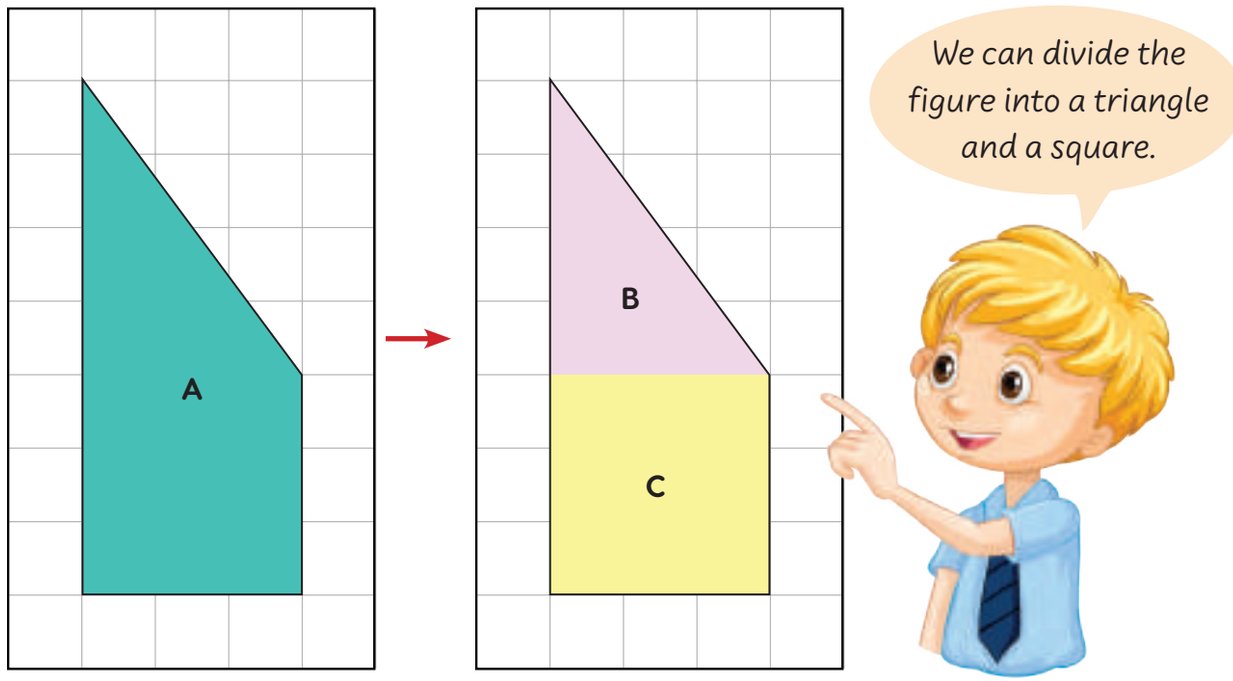
Ethan's mask has an area of _____ cm^2.

Area of Composite Figures

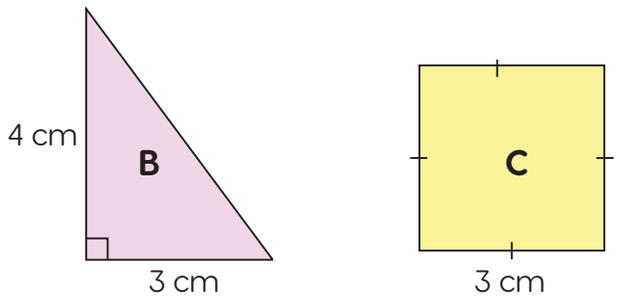
Anchor Task

Let's Learn

The figure below is inside a 1 cm by 1 cm grid.
Let's find its area.



Find the area of the composite shapes and add to find the total area of the figure.



Area B = $\frac{1}{2}$ x 3 cm x 4 cm

= $\frac{1}{2}$ x 12 cm^2

= 6 cm^2

Area C = 3 cm x 3 cm

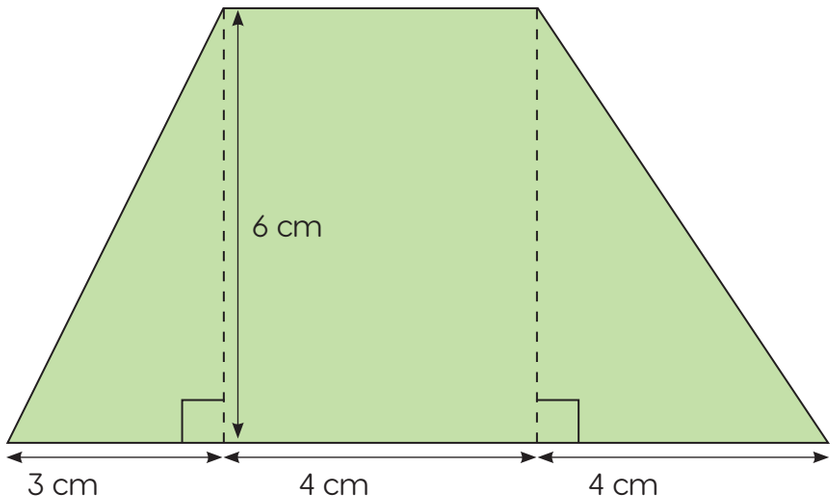
= 9 cm^2

Area A = Area B + Area C

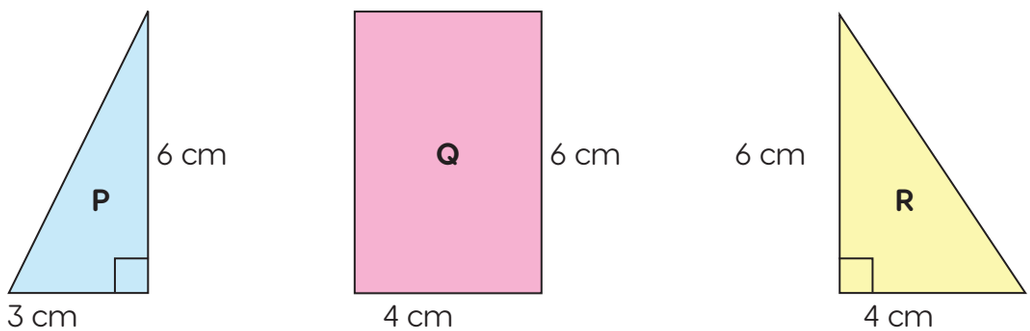
= 6 cm^2 + 9 cm^2

= 15 cm^2

Find the area of the figure.



We can break the figure into 2 triangles and a rectangle.



Area of figure = Area P + Area Q + Area R

Area P = $\frac{1}{2}$ x 3 cm x 6 cm

= 9 cm^2

Area Q = 4 cm x 6 cm

= 24 cm^2

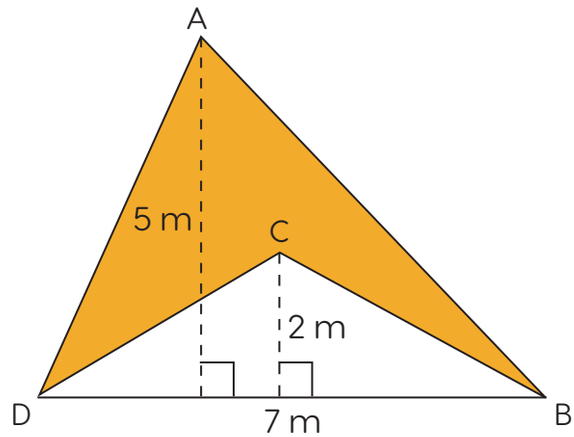
Area R = $\frac{1}{2}$ x 4 cm x 6 cm

= 12 cm^2

Area of figure = 9 cm^2 + 24 cm^2 + 12 cm^2

= 45 cm^2

Find the area of figure ABCD.



Area of figure ABCD = Area of triangle ABD – Area of triangle CBD

Area of triangle ABD $= \frac{1}{2} \times 7\text{ m} \times 5\text{ m}$

$= \frac{1}{2} \times 35\text{ m}^2$

$= 17.5\text{ m}^2$

Area of triangle CBD $= \frac{1}{2} \times 7\text{ m} \times 2\text{ m}$

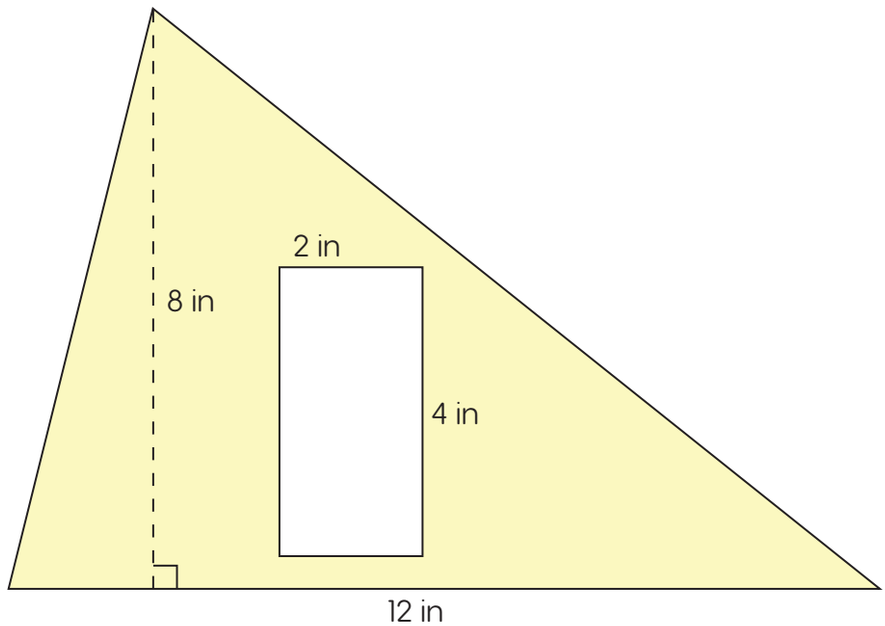
$= \frac{1}{2} \times 14\text{ m}^2$

$= 7\text{ m}^2$

Area of figure ABCD $= 17.5\text{ m}^2 - 7\text{ m}^2$

$= 10.5\text{ m}^2$

Find the area of the yellow figure.



Area of yellow figure = Area of triangle – Area of rectangular hole

Area of triangle $= \frac{1}{2} \times 12 \text{ in} \times 8 \text{ in}$

$= \frac{1}{2} \times 96 \text{ in}^2$

$= 48 \text{ in}^2$

Area of rectangle $= 2 \text{ in} \times 4 \text{ in}$

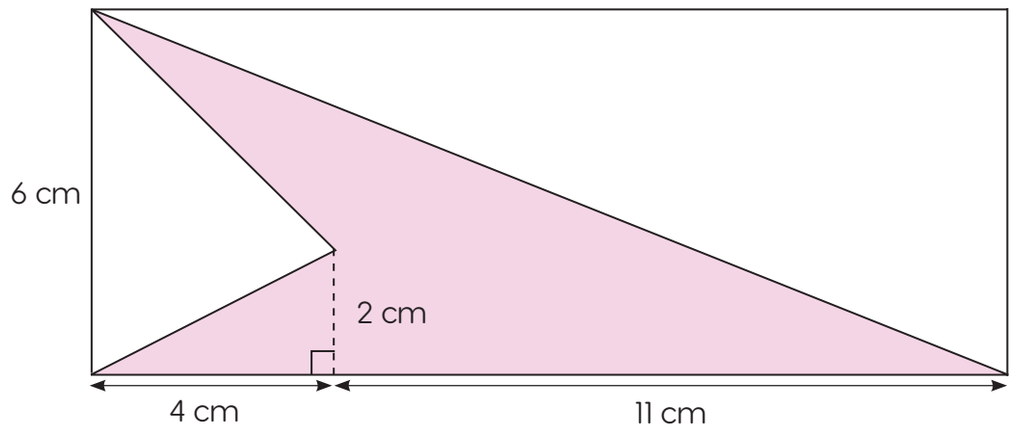
$= 8 \text{ in}^2$

Area of yellow figure $= 48 \text{ in}^2 - 8 \text{ in}^2$

$= 40 \text{ in}^2$

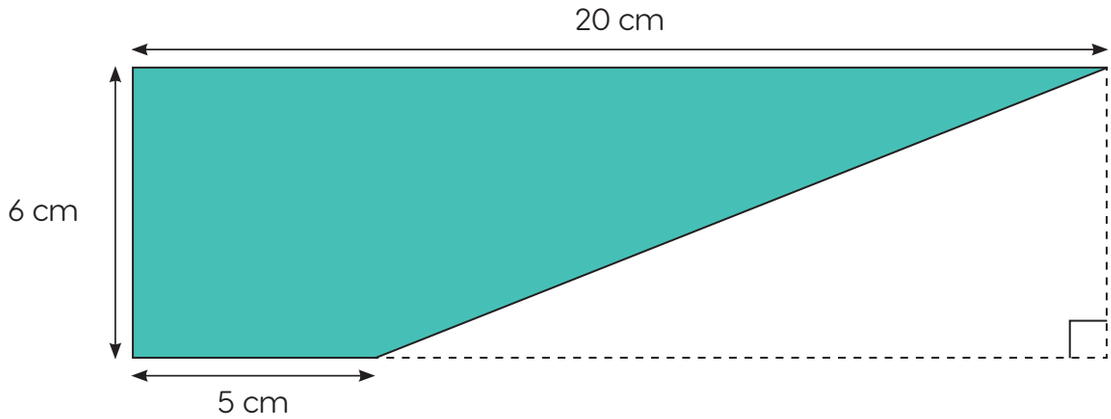
Let's Practice

1. The pink figure is drawn with straight lines inside a rectangle. Find the area of the pink figure.



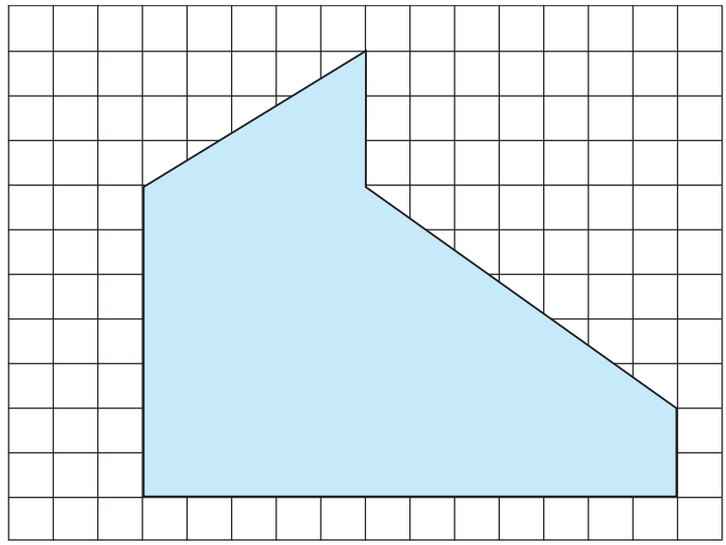
The area of the pink figure = _____ cm^2.

2. Find the area of the figure.



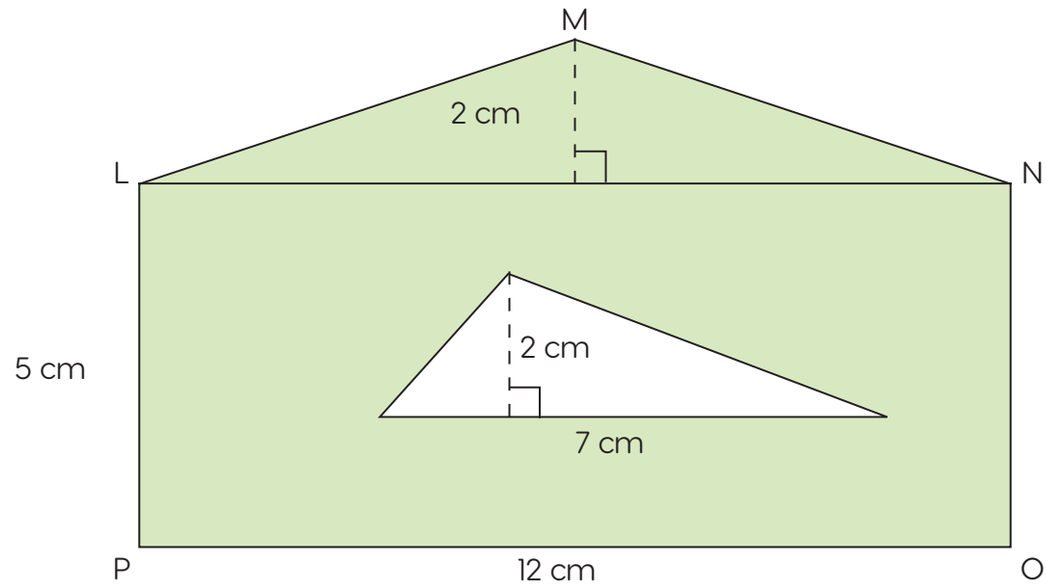
Area = _____ cm^2

3. The side of a factory wall needs to be painted.
The dimensions of the wall are shown in the grid below.
Each square on the grid represents 1 square meter.
Find the total area of the wall.



The area of the wall = _____ .

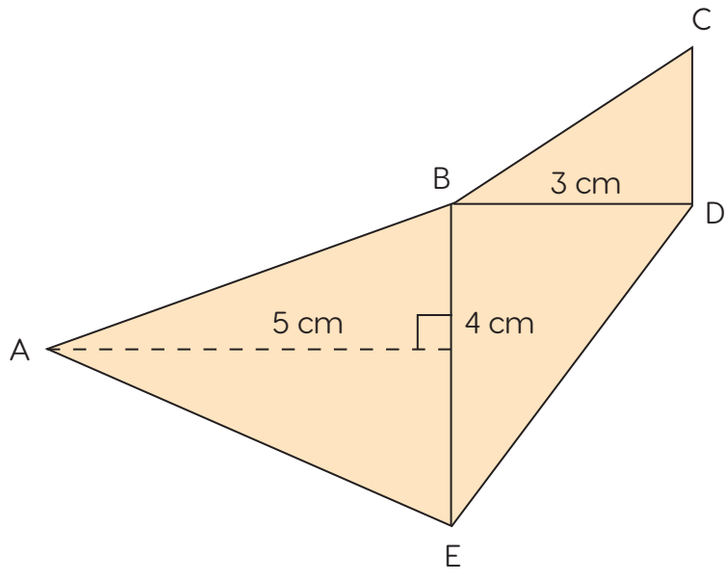
4. Find the area of the colored part of figure LMNOP.



Area of colored figure = _____ .

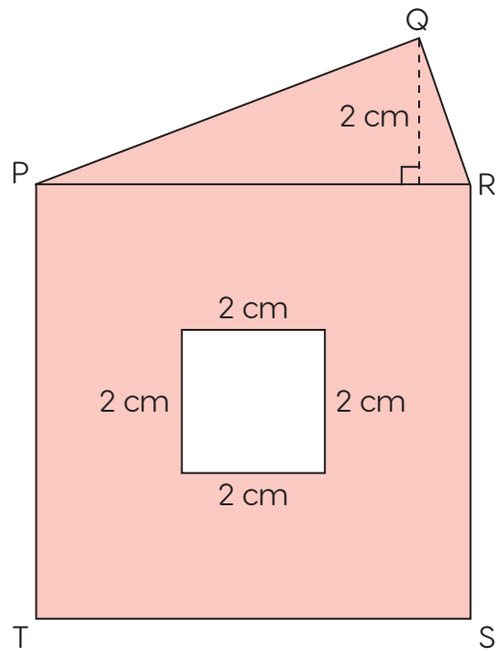
Solve It!

1. ABCDE is composed of the triangles ABE, BCD and BDE.
Triangle BDE is twice the area of triangle BCD.
Find the area of the figure ABCDE.



Area ABCDE = _____ .

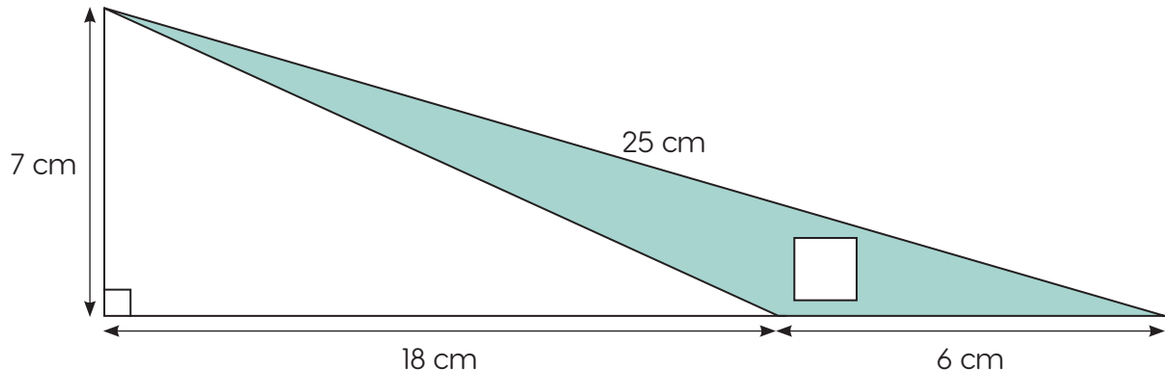
2. Figure PQRST is composed of triangle PQR and square PRST.
The area of the colored part of PQRST is 38 cm^2.
Find the side length of the square PRST.



The side length of the square PRST = _____ .

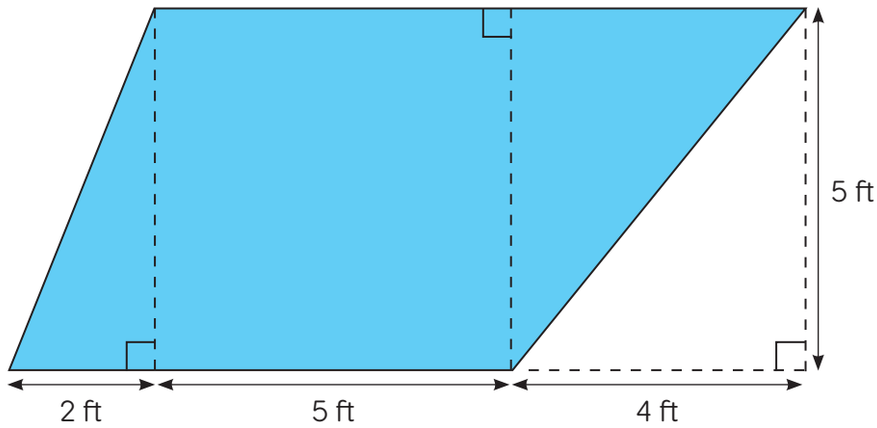
At Home

1. The figure below is a triangle with a 1 cm by 1 cm square hole. Find the area of the figure.



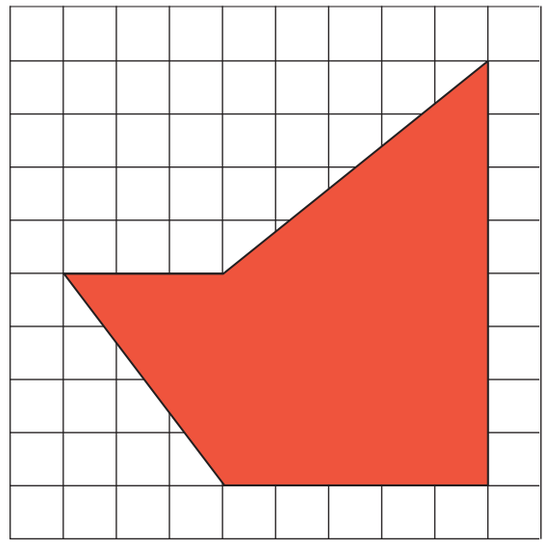
Area = _____

2. Find the area of the blue figure.



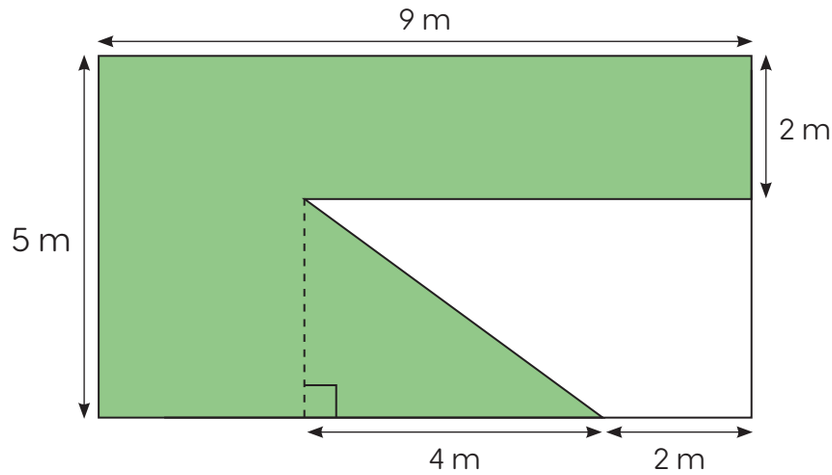
Area = _____

3. Each square in the grid has a side length of 1 inch. Find the area of the figure.



Area = _____

4. The green figure below is drawn inside a rectangle.
Find the area of the figure.

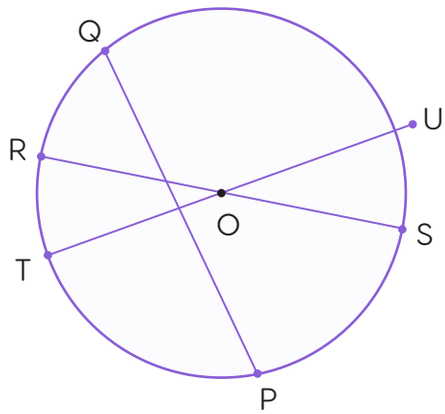


Area = _____

Looking Back

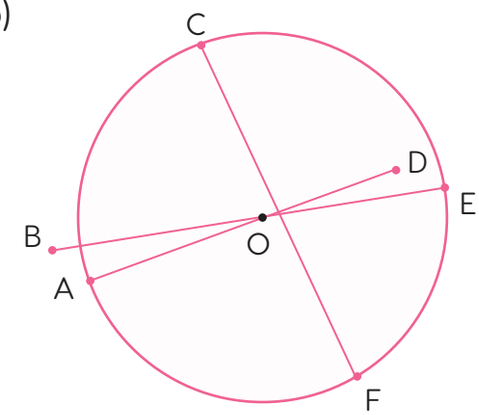
1. O is a point on the center of each circle. Labeled lines are straight lines. Identify the diameter of each circle.

(a)



diameter = _____

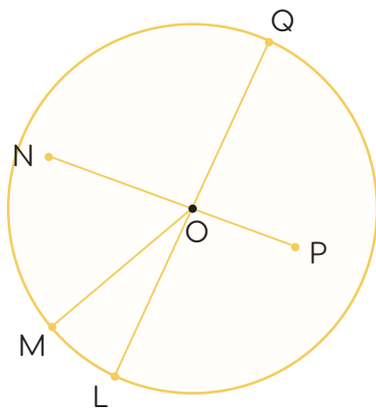
(b)



diameter = _____

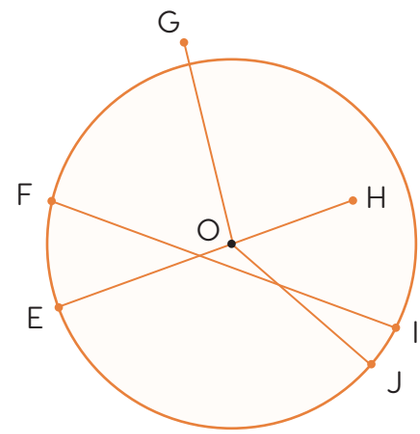
2. O is a point on the center of each circle. Labeled lines are straight lines. Identify the radius of each circle.

(a)



radius = _____

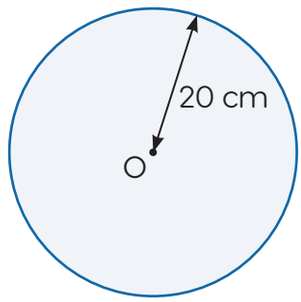
(b)



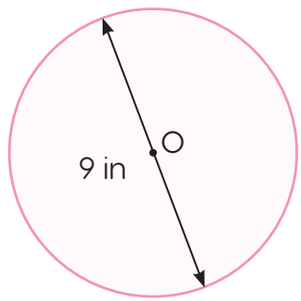
radius = _____

3. Find the area of each circle.
Take π = 3.14 and round off your answer to 1 decimal place.

(a)

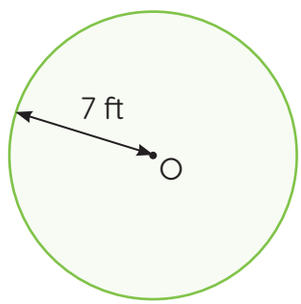


(b)

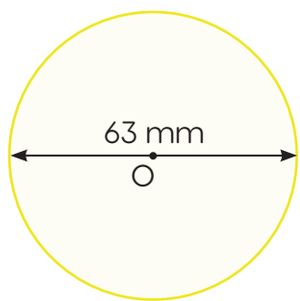


4. Find the area of each circle. Take $\pi = \frac{22}{7}$.

(a)



(b)



5. A pie has a diameter of 11 cm. Find the area.
Take π = 3.14 and round off your answer to 1 decimal place.

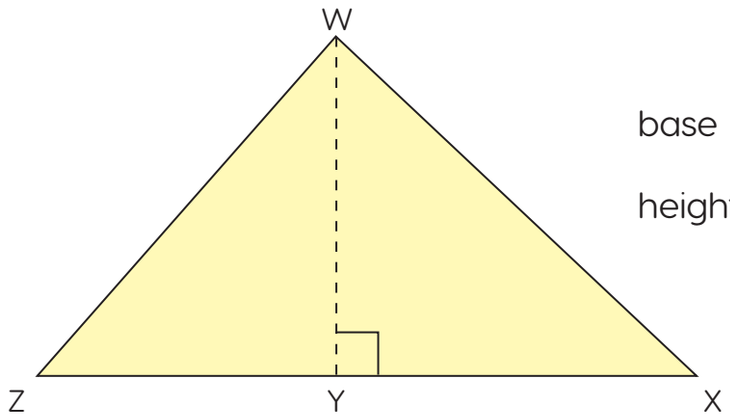
6. A round sticker has a radius of 16 mm. Find the area.
Take π = 3.14 and round off your answer to 1 decimal place.

7. A plate has a diameter of 28 cm. Find area. Take $\pi = \frac{22}{7}$.

8. A dart board has a radius 14 in. Find the area. Take $\pi = \frac{22}{7}$.

9. Identify the base and height of the triangles.

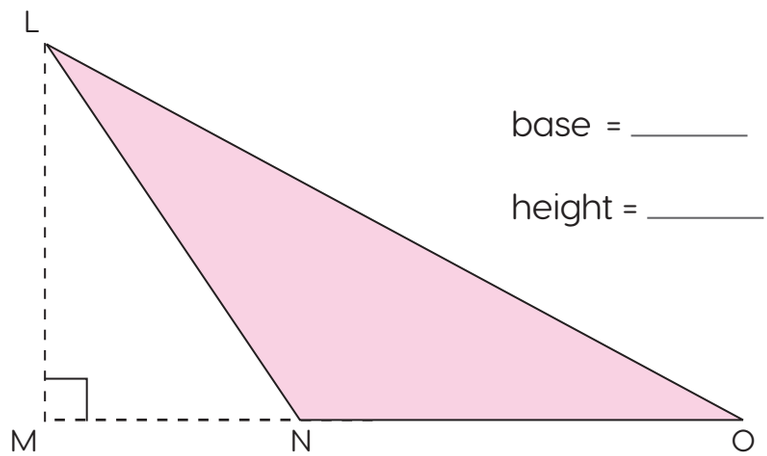
(a)



base = _____

height = _____

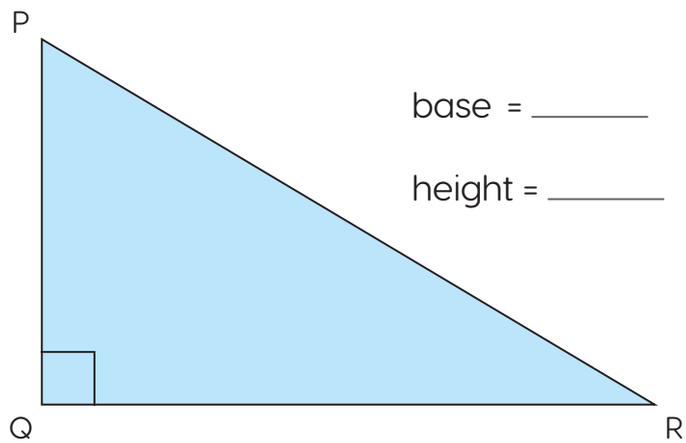
(b)



base = _____

height = _____

(c)

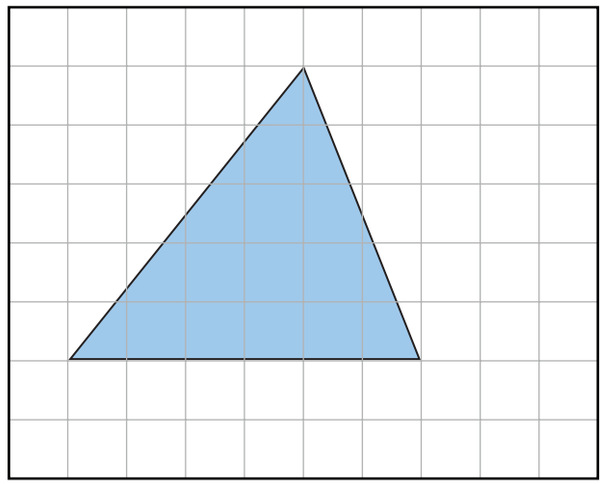


base = _____

height = _____

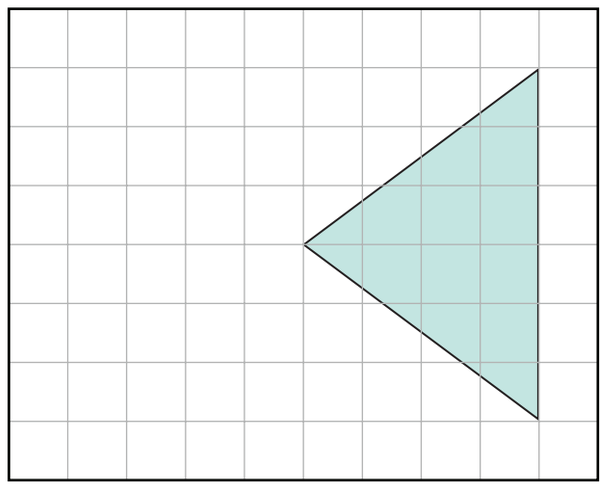
10. Each square in the grids is 1 in by 1 in.
Find the area of the triangles.
Show your working in the space provided.

(a)



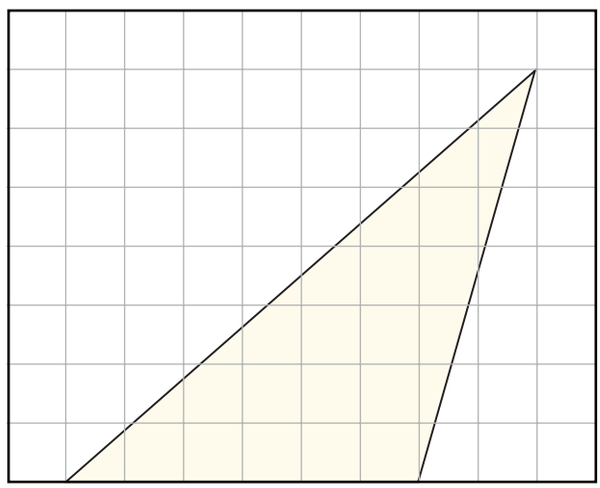
Area = _____

(b)



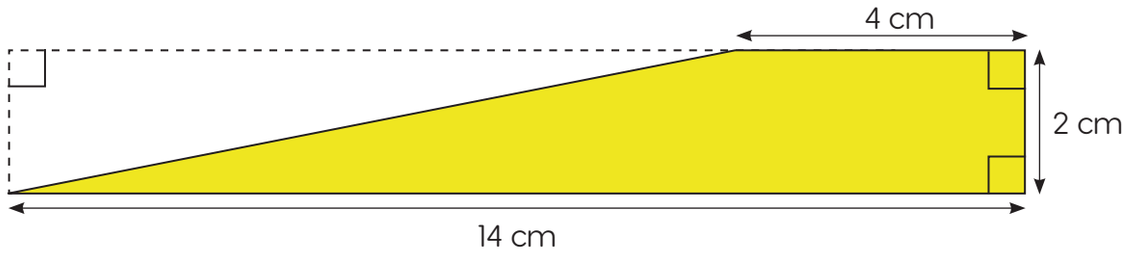
Area = _____

(c)



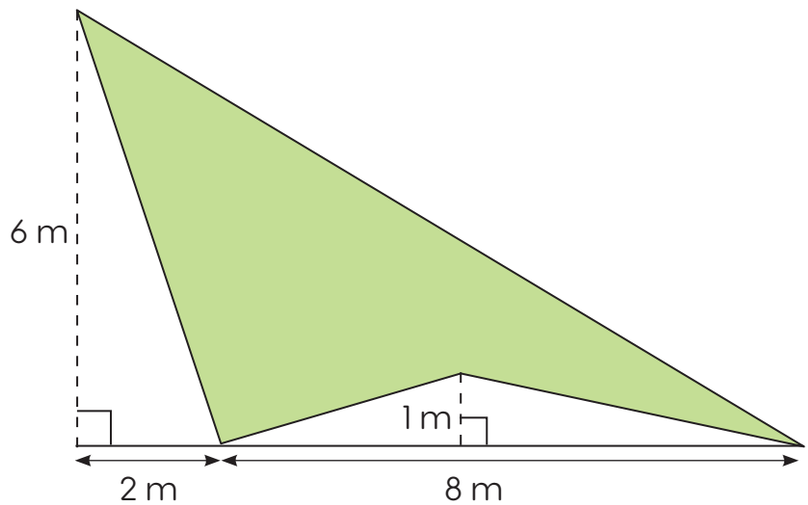
Area = _____

11. Find the area of the figure.



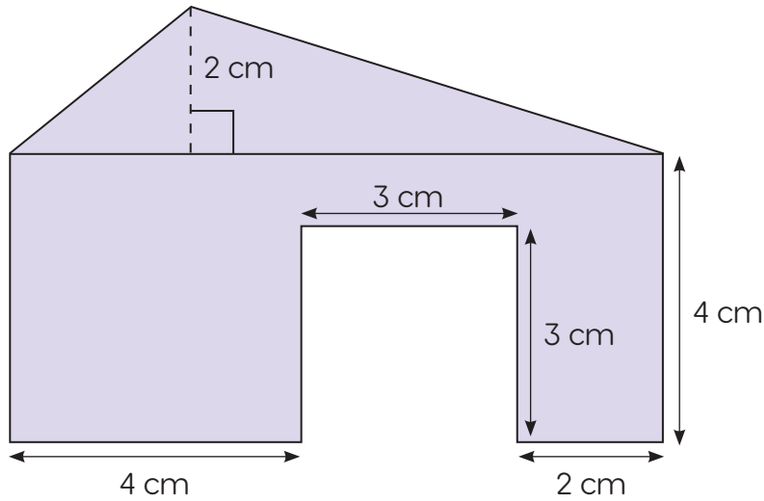
Area = _____

12. Find the area of the figure.



Area = _____

13. Find the area of the figure.



Area = _____