G5 Basic

G6 Advanced

Helping With Math

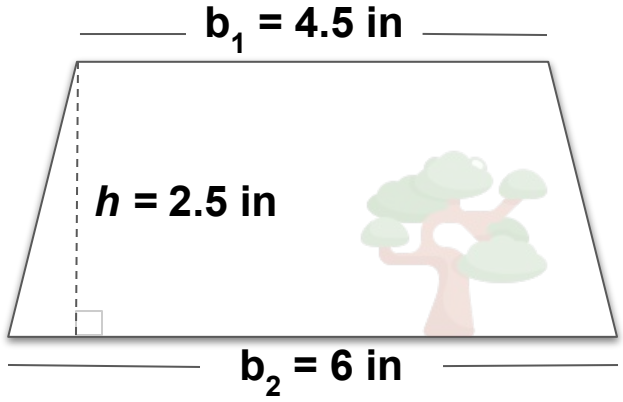
USA GRADES

Area of a Trapezoid

Suitable for students **aged 9-11**

This pack is suitable for learners aged 9-11 years old or 5th to 6th grades (USA). The content covers fact files and relevant basic and advanced activities involving the area of a trapezoid.

A **trapezoid** is a quadrilateral with only one pair of parallel sides.



The **area of a trapezoid** is the total number of square units occupied by the flat surface of a trapezoid shape.

It is the product of half the sum of its parallel sides multiplied by its height.

Area of a Trapezoid: $\frac{1}{2}(b_1 + b_2)\, h$

Example: *a = 4.5 in, b = 6 in, h = 2.5 in*

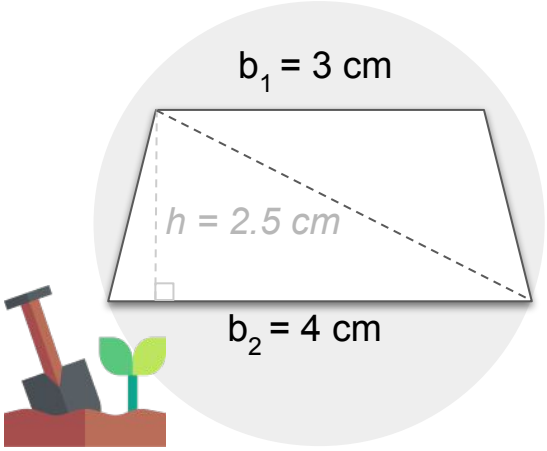
- ½ x (4.5 in + 6 in) x 2.5 in
- ½ x (10.5 in x 2.5 in)
- ½ (26.25 in^2)

Area = 13.125 in^2

Arbor Day *is an annual event observed around the world that usually happens on the* ***last Friday of April*** *or in spring depending on the weather. It is a day encouraging individuals or groups to plant trees.*

AREA OF A TRAPEZOID

The formula of trapezoid's area is based on the area formula of a triangle, which is ½ (b x h). If we cut the trapezoid into two, we have two triangles sharing the same height. Therefore, we can simply form one triangle that combines the two parallel bases.



Area of a Trapezoid: ½ (b_1 + b_2) h

Example:

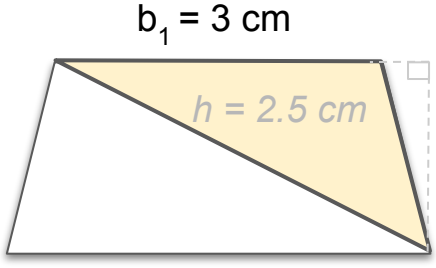
b_1 = 3 cm, b_2 = 4 cm, h = 2.5 cm

- ½ (3 cm + 4 cm) x 2.5 cm
- ½ (7 cm x 2.5 cm)
- ½ (17.5 cm^2)

  Area = 8.75 cm^2

Let us check the area of two triangles that creates this trapezoid.

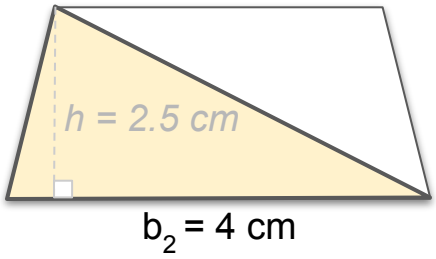
Triangle 1: *b^1 = 3 cm, h = 2.5 cm*



- Area of a triangle formula: ½ (b x h)
- ½ (3 cm x 2.5 cm)
- ½ (7.5 cm^2)

  Area of Triangle 1: 3.75 cm^2

Triangle 2: *b_2 = 4 cm, h = 2.5 cm*



- Area of a triangle formula: ½ (b x h)
- ½ (4 cm x 2.5 cm)
- ½ (10 cm^2)

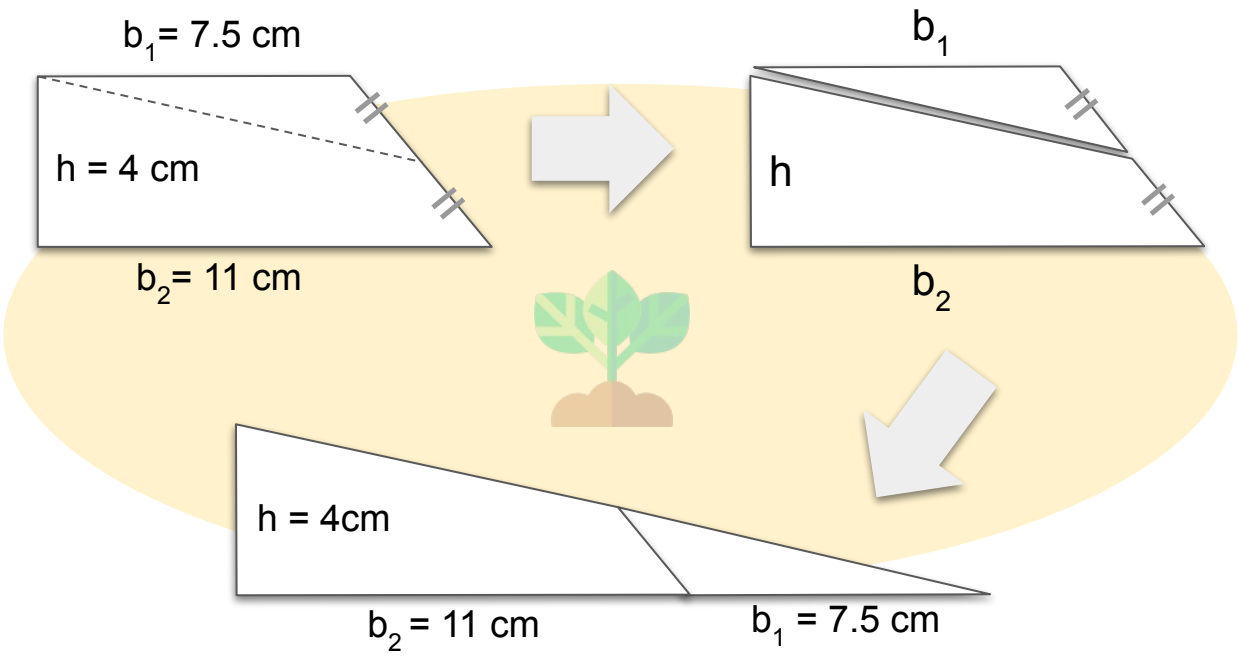
  Area of Triangle 2: 5 cm^2

Total area of Triangle 1 & Triangle 2:

- **3.75 cm^2 + 5 cm^2 = 8.75 cm^2**
- **Area = 8.75 cm^2**

AREA OF A TRAPEZOID

This is another way to visualize how the area of a trapezoid is derived from the formula of the area of a triangle. As we can see below, we can split the trapezoid to form one triangle.



After forming one triangle, the parallel sides of the trapezoid are combined as the triangle's base. Based on the area of a triangle formula: ½ (b x h), we can see that the base (b) is simply replaced by the combined values of the trapezoid's parallel sides (b_1 + b_2).

Area of a Triangle: ½ (b x h)

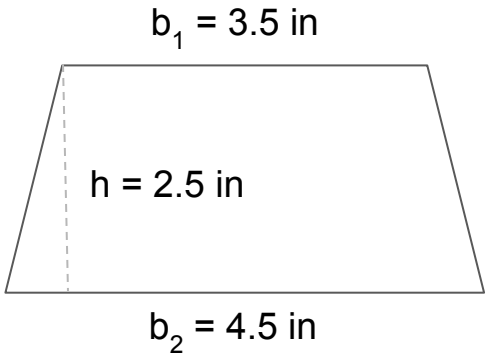
Area of a Trapezoid: ½ (b_1 + b_2) h

Example: ***b*** *= 11 cm + 7.5 cm or 18.5 cm,* ***h*** *= 4cm*

- ½ (11 cm + 7.5 cm) x 4 cm
- ½ (18.5 cm x 4 cm)
- ½ (74 cm^2)
- **Area = 37 cm^2**

CALCULATING THE AREA OF A TRAPEZOID

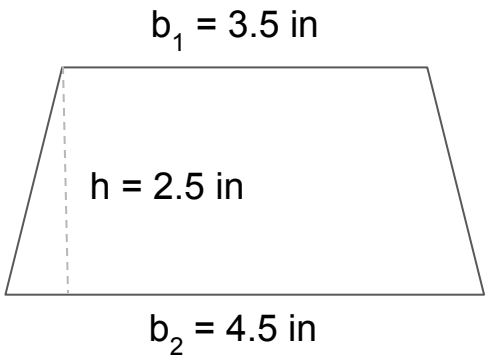
1. Check for the measurements of the parallel sides and the height of the trapezoid. Make sure that all measurements are of the same units.



2. Depending on the measurements that you are using to find the area, replace the formula with the corresponding measurements.

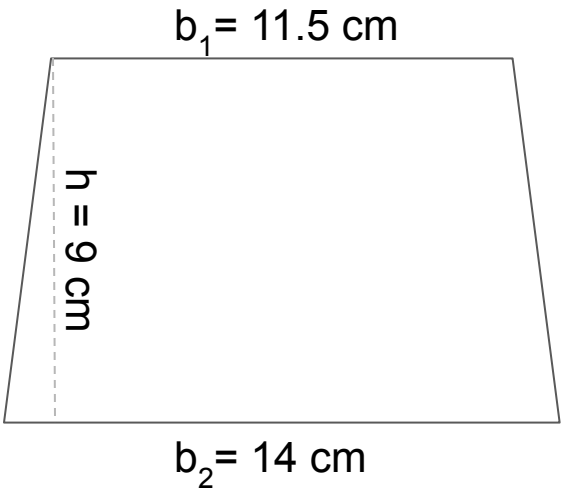
3. Area of a Trapezoid: ½ (b_1 + b_2) h

- ½ (3.5 in + 4.5 in) x 2.5 in
- ½ (8 in x 2.5 in)
- ½ (20 in^2)
- **Area = 10 in^2**



FINDING THE AREA EXERCISE

Compute for the area of the below trapezoid:



Solution:

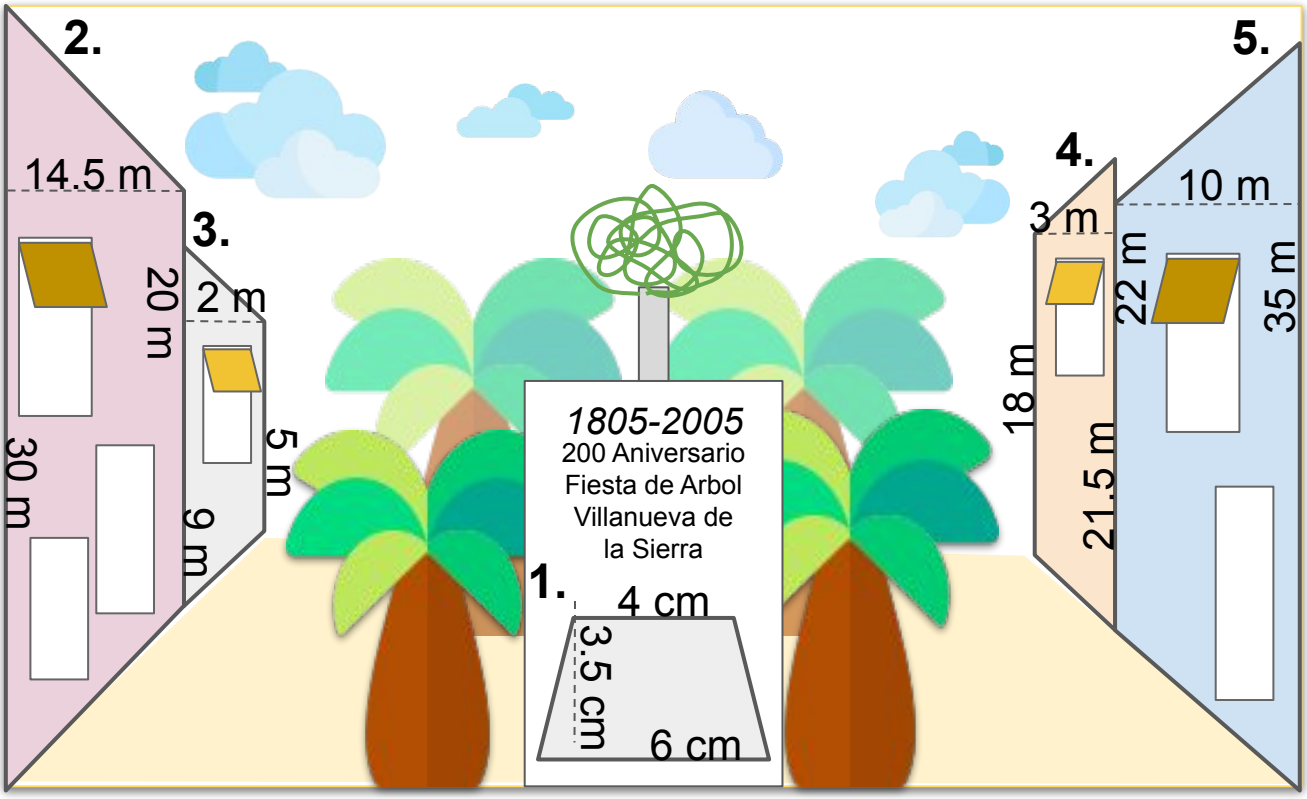
TABLE OF ACTIVITIES

Ages 9-10 (Basic)		5th Grade
1	Villanueva de la Sierra	
2	Hundred Years of Trees	
3	Sylvan Day	
4	Tree of Life	
5	Worldwide Arbor Day	
Ages 10-11 (Advanced)		6th Grade
6	Dig A Hole	
7	Sow The Seeds	
8	Water A Tree	
9	Let It Grow	
10	Future Forests	

VILLANUEVA DE LA SIERRA

G5 Basic

The first known Arbor Day was in a little Spanish village called Villanueva de la Sierra. They have a small monument commemorating that special day, similar to the photo below. Calculate the area of each trapezoid labeled with a number in the photo. Show your solutions in the space provided.

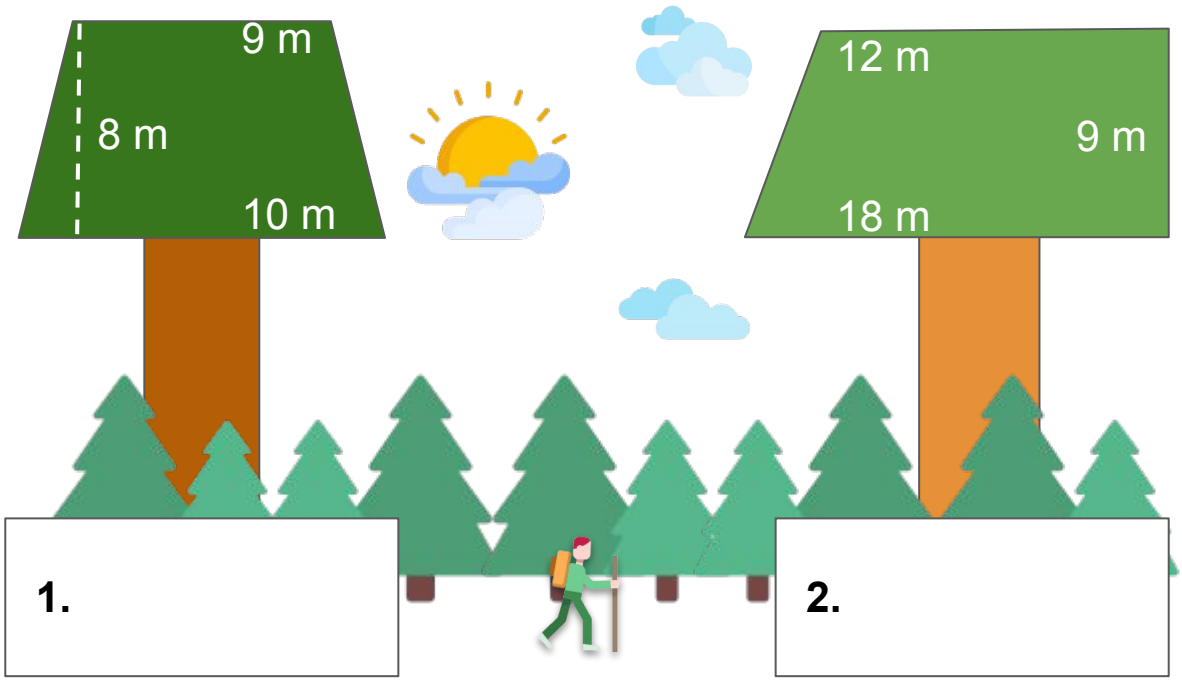


1.
2.
3.
4.
5.

HUNDRED YEARS OF TREES

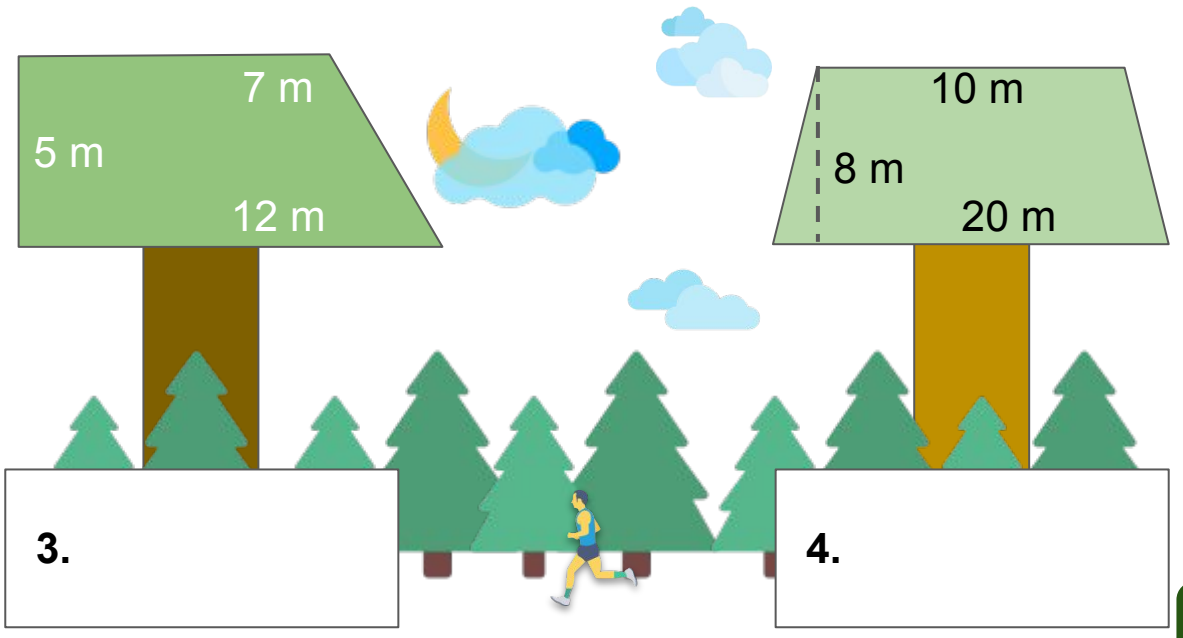
G5 Basic

The first American Arbor Day was on April 10, 1872, in Nebraska. It's been over 150 years since that day when a million trees were planted and those may still be standing now. Calculate the area of the biggest and oldest trapezoid trees that you'll find in the forest below. Write down your answers in the space provided.



1.

2.



3.

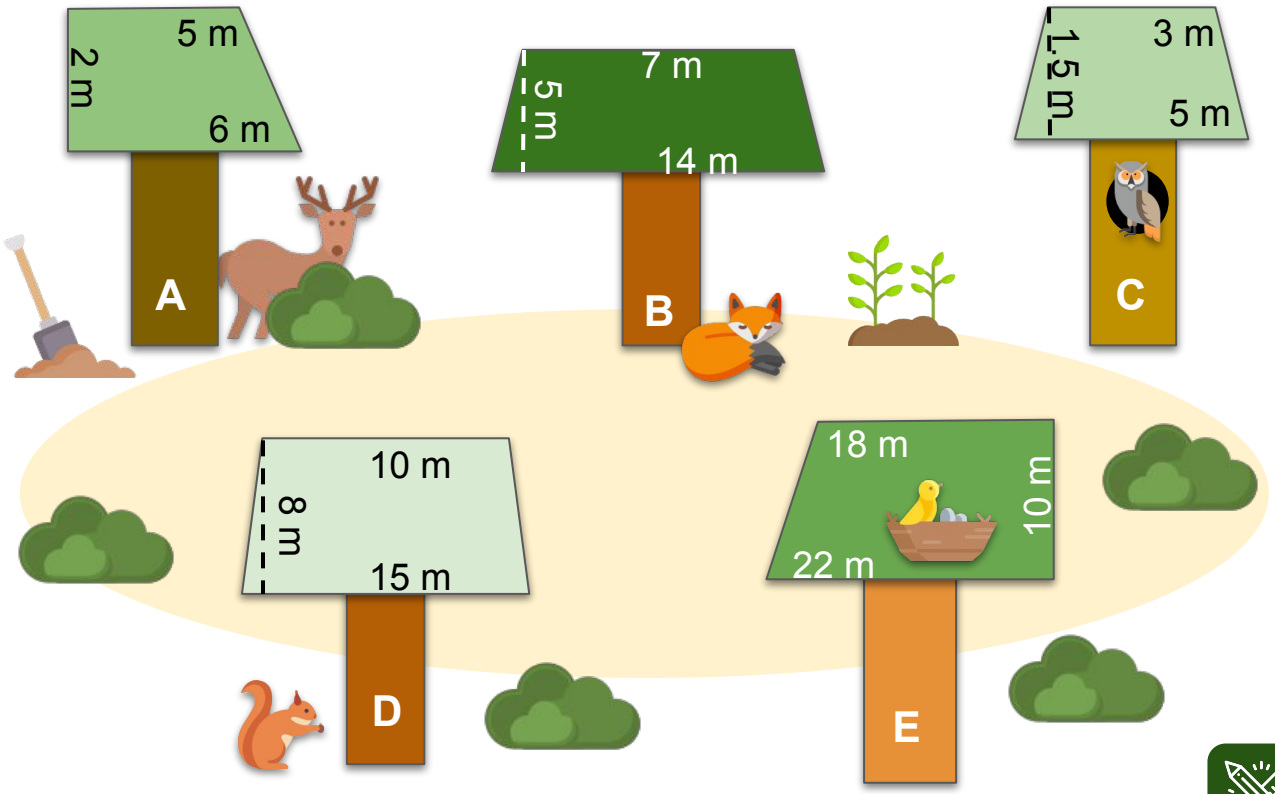
4.

SYLVAN DAY

G5 Basic

Arbor Day was supposed to be called *Sylvan Day*, referring to the woodlands. It was later agreed to call it Arbor Day to focus more on the appreciation of trees. Each Arbor Day participant below planted a tree last year. Calculate the area of the trapezoid on each tree and match it with the participant. Write your answers in the space provided.

Participant	1	2	3	4	5
Area	6 m^2	200 m^2	100 m^2	11 m^2	52.5 m^2
Answer					

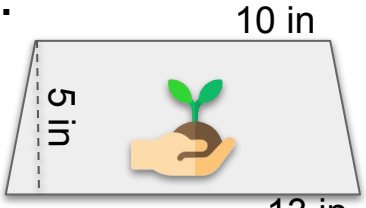


TREE OF LIFE

G5 Basic

Arbor Day is a day to appreciate trees and encourage people to plant trees. We may not notice it immediately, but trees provide us with things that provide us with a good life. Read about the benefits we get from trees. Connect each trapezoid on the left to their corresponding area on the right by drawing a line.

1.



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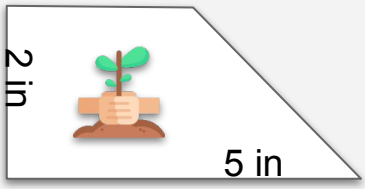

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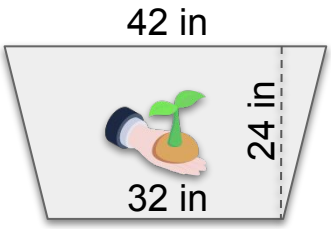

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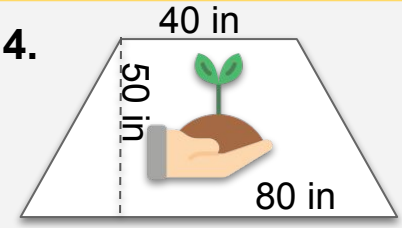
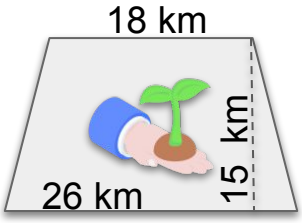


5.



888 in^2

Good Health & Well-Being

330 in^2

Support Wildlife and Aquatic Life

57.5 in^2

Clean Air

6.5 in^2

Prevent Floods

3000 in^2

Pull out carbon dioxide from the atmosphere

WORLDWIDE ARBOR DAY

G5 Basic

Arbor Day is not only celebrated in Europe and North America. It is celebrated on different days and in several countries all over the world. Read about some of them below and calculate the area of a trapezoid in each number.

1. A trapezoid has a height of eight meters. The measurement of its bases is nine meters and eleven meters. What is the area of this trapezoid?

Solution:

April 5
Singmogil

2. The area of a trapezoid is 150 cm^2. Its height is 12 cm. One of its bases is 15 cm. What is the length of the other base?

Solution:

September 1 to 7
National Arbor Week

3. A trapezoid has one base of 20 in, and the other is 25 in. Its height is 10 in. What is the area of this trapezoid?

Solution:

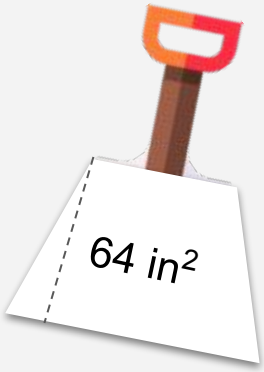
July 2
Día del Árbol

DIG A HOLE

G6 Advanced

Join the Arbor Day celebrations and plant trees. Before we could plant a tree, we first need to dig a hole in the ground. Grab a shovel by encircling the correct measurements, which corresponds to the area of the trapezoid in each number.

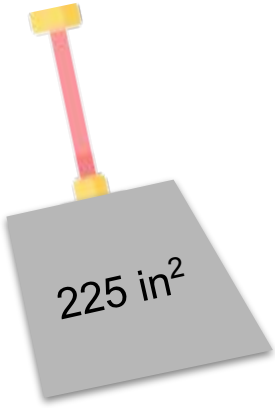
1.



a. b_1: 5 in | b_2: 9 in
h: 7 in

b. b_1: 6 in | b_2: 10 in
h: 8 in

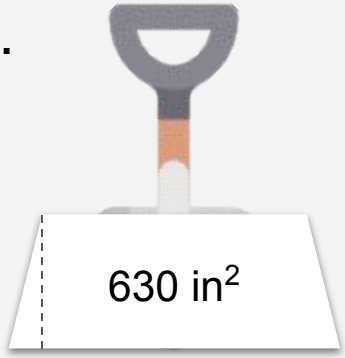
2.



a. b_1: 10 in | b_2: 20 in
h: 15 in

b. b_1: 11 in | b_2: 22 in
h: 10 in

3.



a. b_1: 10 in | b_2: 15in
h: 8 in

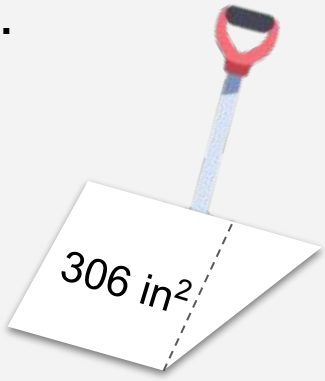
b. b_1: 17 in | b_2: 25 in
h: 30 in

4.

a. b_1: 70 in | b_2: 88 in
h: 40 in

b. b_1: 60 in | b_2: 25 in
h: 30 in

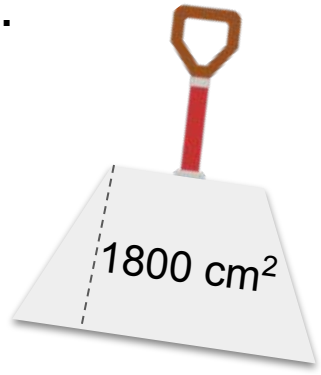
5.



a. b_1: 12 in | b_2: 22 in
h: 18 in

b. b_1: 10 in | b_2: 25 in
h: 32 in

6.



a. b_1: 22 in | b_2: 62 in
h: 32 in

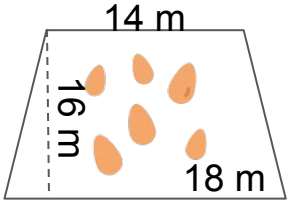
b. b_1: 25 in | b_2: 65 in
h: 40 in

SOW THE SEEDS

G6 Advanced

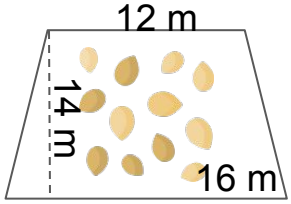
Once you dig a hole, you can plant the seeds or tree. Choose your plants and sow the seeds by encircling the trapezoid with the wrong area. Based on its measurements, calculate for the correct area and show your solutions.

1. Area: 256 m^2



a.

Area: 190 m^2

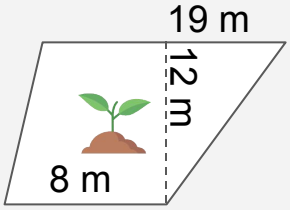


b.

Solution:

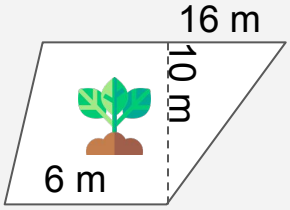
Correct Area:

2. Area: 162 m^2



a.

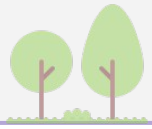
Area: 100 m^2



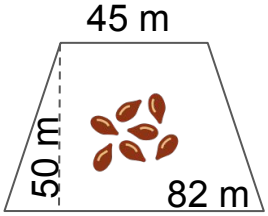
b.

Solution:

Correct Area:

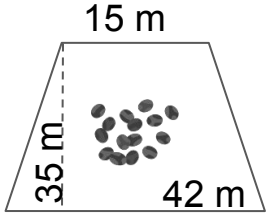


3. Area: 3150 m^2



a.

Area: 997.5 m^2

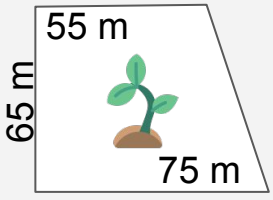


b.

Solution:

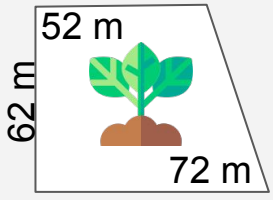
Correct Area:

4. Area: 4200 m^2



a.

Area: 3844 m^2



b.

Solution:

Correct Area:

WATER A TREE

G6 Advanced

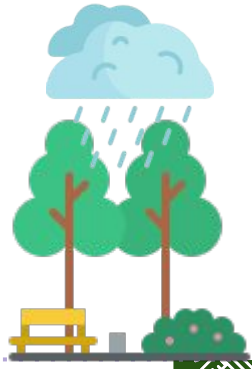
After planting a tree, it needs water to grow. Help the people hydrate their newly planted trees. Solve the word problems and show your solutions.

1. Susie planted a new tree on Arbor Day in her small garden and is watering it right now. She has a trapezoid-shaped garden with a height of five meters. The shorter base is three meters long while the longer base is 6 meters long. What is the area of Susie's garden?

Solution:

2. The upcoming Arbor Day event at Alexis' town is at the Trapezoid Park. They have set to plant the trees today as it is forecasted to rain tomorrow, which will be good for the new trees. The park's area is 22 km^2. The shorter base is 5 km, and the height is 4 km. What is the length of the longer base?

Solution:



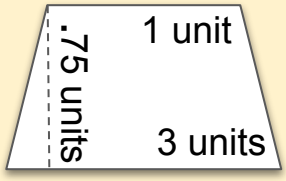
LET IT GROW

G6 Advanced

Once we've successfully planted the trees, let them grow! We and the people after us will benefit a lot from them. Learn more about how we are now benefiting from trees planted by our ancestors. The answer for each number is based on the area of the trapezoid. Calculate the area of the trapezoid and encircle the letter of the correct answer. Show your solutions.

1. New York City gets its clean drinking water from a forested watershed. They have one of the best quality tap water in the world, thanks to the trees! How much does it cost them to preserve this area?

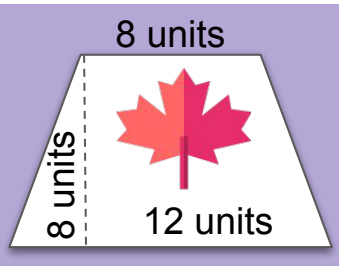
Solution:



a. $ 6 Billion
b. $ 1 Billion
c. $ 1.5 Billion
d. $ 7 Billion

2. In British Columbia, Canada, wildlife depends so much on trees. Around how many species depend on wildlife trees?

Solution:



a. 20 Species
b. 50 Species
c. 100 Species
d. 80 Species

FUTURE FORESTS

G6 Advanced

We should maintain our trees for the future. Arbor Days will build forests that will truly help our environment and many communities. Draw your version of a forest and make sure to incorporate three trapezoids. Be creative! Measure these trapezoids using a ruler and compute their area. Write your answers in the space provided.

Trapezoid	Trapezoid 1		Trapezoid 2		Trapezoid 3	
Bases						
Height						
Area						

ANSWER GUIDE

Activity 1

1. ½ (4 cm + 6 cm) x 3.5 cm = 17.5 cm^2
2. ½ (20 m + 30 m) x 14.5 = 362.5 m^2
3. ½ (5 m + 9 m) x 2 m = 14 m^2
4. ½ (18 m + 21.5 m) x 3 m = 59.25 m^2
5. ½ (22 m + 35 m) x 10 m = 285 m^2

Activity 2

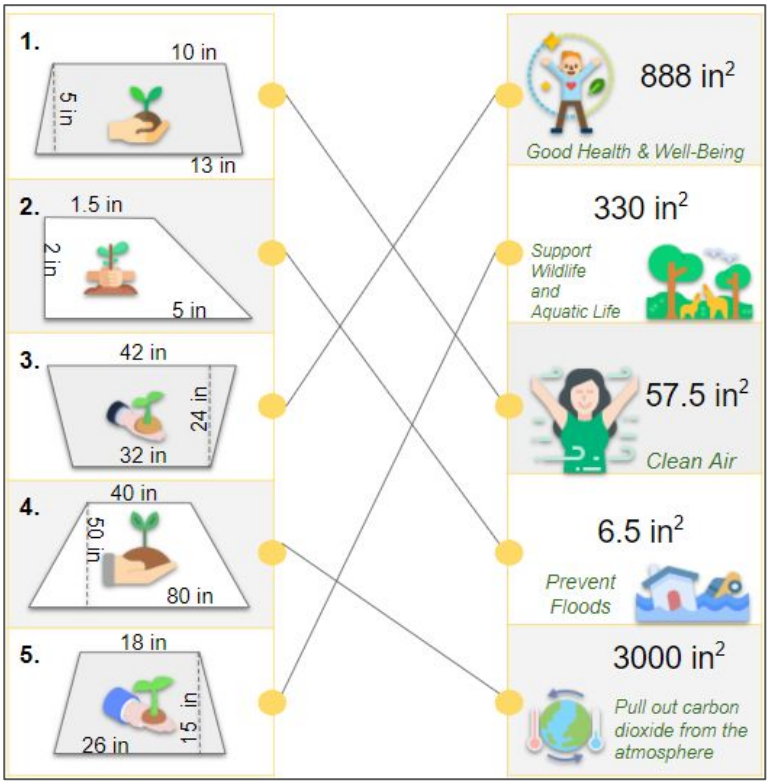
1. ½ (9 m + 10 m) x 8 m = 76 m^2
2. ½ (12 m + 18 m) x 9 m = 135 m^2
3. ½ (7 m + 12 m) x 5 m = 47.5 m^2
4. ½ (10 m + 20 m) x 8 m = 120 m^2

Activity 3

1. C. 6 m^2
2. E. 200 m^2
3. D. 100 m^2
4. A. 11 m^2
5. B. 52.5 m^2

ANSWER GUIDE

Activity 4



1. 57.5 in^2
2. 6.5 in^2
3. 888 in^2
4. 3000 in^2
5. 330 in^2

Activity 5

1. h: 8 m, b_1: 9 m, b_2: 11 m

   ½ (9 m + 11 m) x 8 m
   ½ (20 m x 8 m)
   ½ (160)
   Area: 80 m^2

2. Area: 150 cm^2, h: 12 cm, b_1: 15 cm

   150 cm^2 x 2 = 300 cm^2
   300 cm^2 / 12 cm = 25 cm
   25 cm - 15 cm = 10 cm
   b_2= 10 cm

3. b_1: 20 in, b^2: 25 in, h: 10 in

   ½ (20 in + 25 in) x 10 in
   ½ (45 in x 10 in)
   ½ (450 in^2)
   Area: 225 in^2

ANSWER GUIDE

Activity 6

1. B
2. A
3. B
4. A
5. A
6. B

Activity 7

1. B / Correct Area: 196 m^2
2. B / Correct Area: 110 m^2
3. A / Correct Area: 3175 m^2
4. A / Correct Area: 4225 m^2

Activity 8

1. h: 5 m, b_1: 3 m, b_2: 6 m
   ½ (3 m + 6 m) x 5 m
   ½ (9 m x 5 m)
   ½ (45 m^2)
   Area: 22.5 m^2

   Susie's garden is 22.5 m^2

2. Area: 22 km^2, b_1: 5 km, h: 4 km
   22 km^2 x 2 = 44 km^2
   44 km^2 / 4 km = 11 km
   11 km - 5 km = 6 km
   b_2: 6 km

   The length of the longer base of Trapezoid Park is 6km.

ANSWER GUIDE

Activity 9

1. ½ (1 unit + 3 units) x .75 units
   ½ (4 units x .75 units)
   ½ (3 units)
   Area: 1.5 units^2

   Answer: C. $1.5 Billion

2. ½ (8 units + 12 units) x 8 units
   ½ (20 units x 8 units)
   ½ (160 units)
   Area: 80 units^2

   Answer: D. 80 Species

Activity 10

Answers may vary.

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