G5-G6 Basic

G6-G7 Advanced

Helping With Math

GRADES

Spatial Skill:
Surface Area

Suitable for students
aged 9-12

Kwanzaa is an annual event of African-American culture that is celebrated from December 26 to January 1

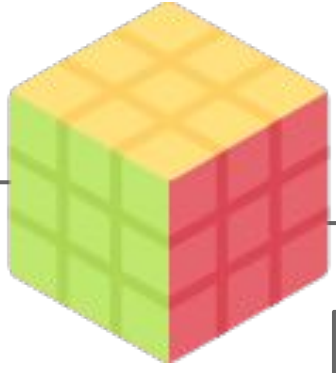
This pack is suitable for learners aged 9-12 years old or 5th to 7th graders. The content covers fact files and relevant basic and advanced activities of surface area topics that aim to develop and strengthen the learners' spatial skills.

The Celebration of African-American Culture

- The word Kwanzaa is Swahili for "the first fruits" of the harvest.
- Kwanzaa is a yearly holiday being held primarily in the United States from December 26 to January 1.
- This celebration marks the significance of Pan-Africanism --- the idea that people of African descent have shared interests and should be unified.
- Aside from the United States, Kwanzaa is also celebrated in Canada, the Caribbean, and in other places where there's a large population of African descendants.

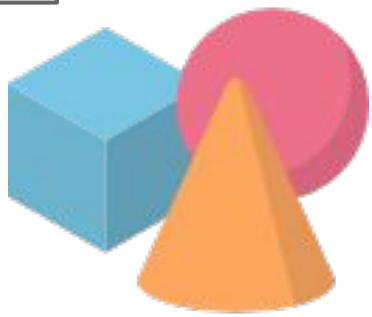
SPATIAL SKILL

Spatial skill is the ability to comprehend, reason, and recall spatial relations among objects or space.



There are four types of spatial skills: spatial perception, spatial visualization, mental folding and mental rotation.

According to experts, children use geometrical strategies to solve math problems, some includes mental number lines, geometric figures, and information about locations in space.



SPATIAL SKILL

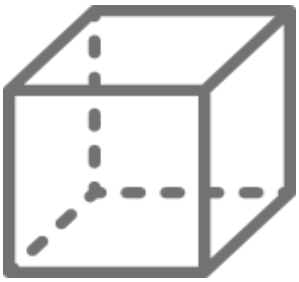
Experts also concluded that people who use spatial representation (including spatial relationships) in dealing with math problems are more likely to get better scores.

- Children who have displayed better spatial skills when compared to their peers have better academic achievement in math.
- How do we develop the spatial skills of young learners? Researchers suggest that children must play with building blocks, puzzles, video games, and other spatial materials to help develop their spatial skills.

Which among these items do you play and enjoy the most? Why? Share your answer below.

SURFACE AREA OF SOLID FIGURES

Solid figures are three-dimensional objects with length, width, and height. Some of the commonly recognized solid shapes are pyramid, prisms, cone, sphere, etc.



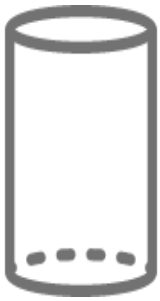
Cube

Prism

Cone

Pyramid

Sphere



Cylinder

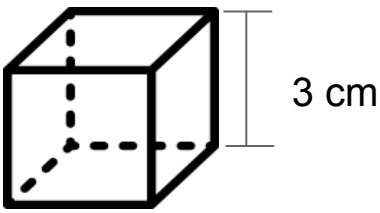
Surface Area

It is a measure of the total area that the surface of the object occupies.

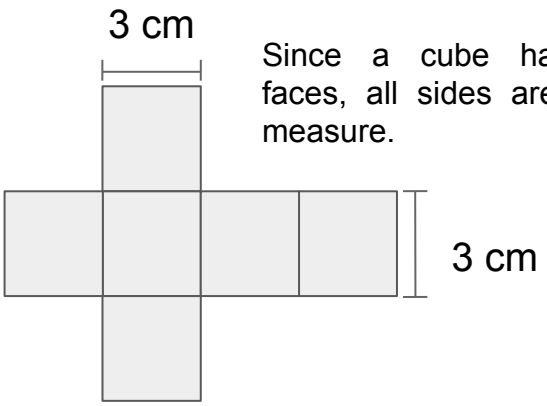
SAMPLE/APPLICATION

Solid Figure	Surface Area Formula
Cube (with side length,s)	$6s^2$
Rectangular Prism (with length, l, width, w, and height, h)	$2 (lw + lh + wh)$
Regular Square Pyramid (with perimeter of the base, P, area of the base, B, and and slant height, s)	$\frac{1}{2} Ps + B$
Cone (with radius, r, and slant height, s)	$\pi r^2 + \pi rs$
Sphere (with radius, r)	$4\pi r^2$
Cylinder (with radius, r, and height, h)	$2\pi r^2 + 2\pi rh$

Examples: Calculate the surface area of the following solid figures.



When you cut a cube and make it a flat figure, the image on the right will likely be the result.



Since a cube has square faces, all sides are 6 cm in measure.

SAMPLE/APPLICATION

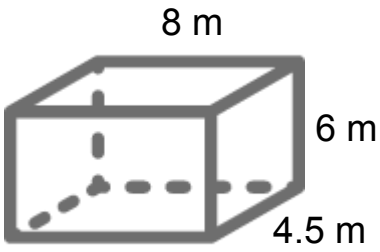
To solve for the cube's surface area use the formula S.A. = $6s^2$,

S.A. = $6(3\text{ cm})^2$

= $6(9\text{ cm})^2$

= **54 cm^2**

S.A. = 2(LH + LW +HW)



L = 8 m H = 6 m W = 4.5 m

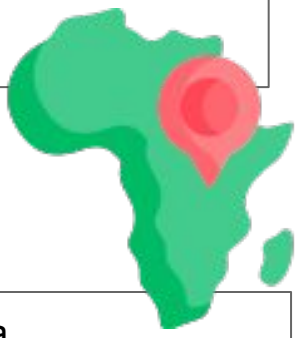
S.A. = 2(LH + LW +HW)

= 2[(8 m)(6 m) + (8 m)(4.5 m) + (6 m)(4.5 m)]

= 2 (48 + 36 + 27) sq.m

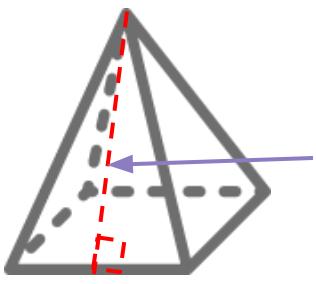
= 2 (111) sq. m

= 222 sq. m



Try This!

Note: the altitude is 15 in



Solve for the surface area.

TABLE OF ACTIVITIES

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10	Celebrating Kwanzaa	

THE AFRICAN-AMERICAN CULTURE

G5-G6 Basic

Celebrate the mixture of the African-American culture as you match the details of column A to column B. Write the letter of your answer in the box.

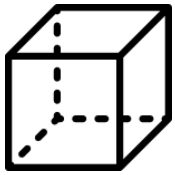
1. S.A. of a Cube		A. ½ Ps + B
2. S.A. of a Sphere		B. $2\pi r^2 + 2\pi rh$
3. S.A. of a Cone		C. $6s^2$
4. S.A. of a Pyramid		D. 2(LH + LW +HW)
5. S.A. of a Cylinder		E. $4\pi r^2$
6. S.A. of Prism		F. $\pi r^2 + \pi rs$

FIRST-FRUITS CELEBRATION

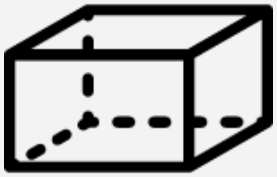
G5-G6 Basic

Below are the outlines of the storage of different fruits for the celebration of Kwanzaa. Can you solve for their surface area?

1. s = 14 in



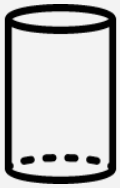
2. L = 20 in W = 14 in H = 10 in

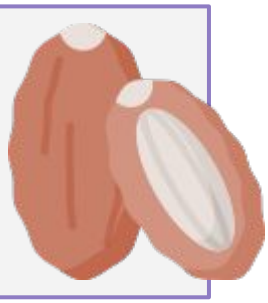


3. r = 2.5 ft

*Fruits such as **bananas, plums, figs and dates** are just some of the popular fruits in the African continent.*

4. r = 1.58 yd h = 3.5 yd



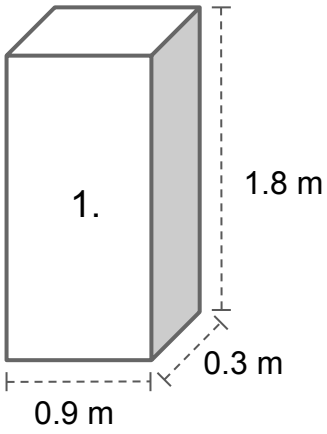


THE ZAWADI

G5-G6
Basic

During the seventh day of Kwanzaa, gifts are given that symbolize growth, achievement, and success. Handmade gifts are encouraged to be given. The following are the boxes for the Zawadi. How much gift wrapper should each box use?
Note: you may solve it using the concepts of surface area.

1.)



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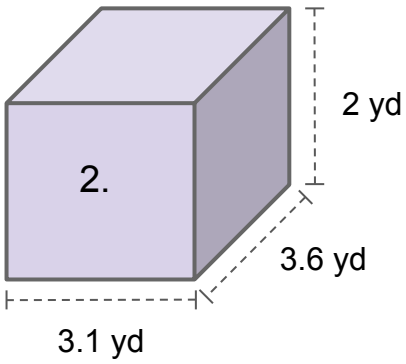
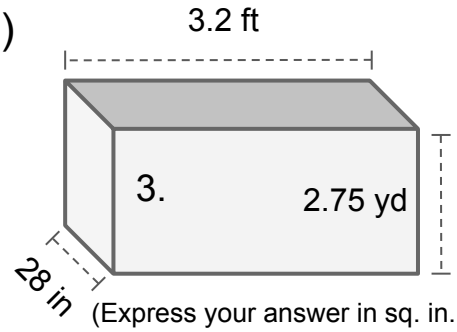


3.)



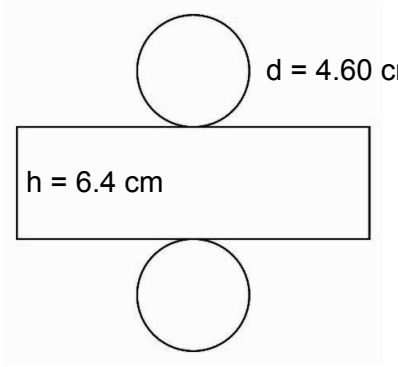
(Express your answer in sq. in.)

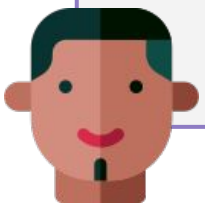
HAPPY KWANZAA!

G5-G6
Basic

Celebrate Kwanzaa with this African-American family by solving the sketching the equivalent solid figure of these geometric nets. Remember to put the dimensions on your drawing.

1.





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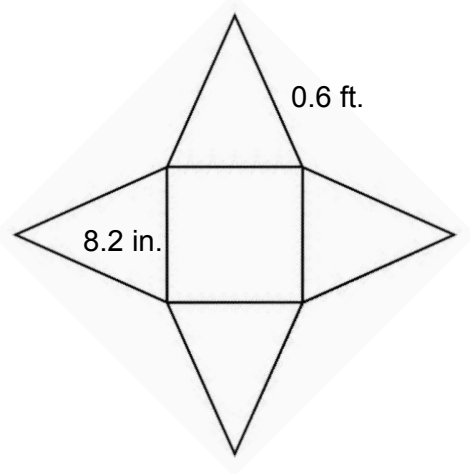

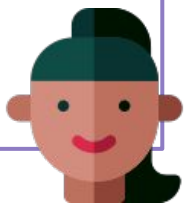

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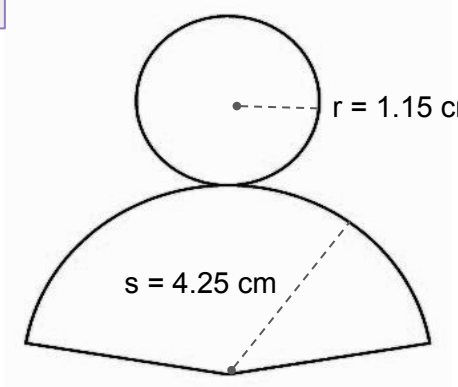


THE KINARA

G5-G6
Basic

Lit the seven candles of the Kinara by solving these seven questions. Find the surface area of these regular square pyramid.

1. One side of the square base is 16 cm, the slant height is 0.18 m. Express your answer in cm.

2. P = 24 in, s = 8 in.

3. B = 0.81 yd, s = 12 ft Express your answer in ft.

4. One side of the square base is 20 cm, the slant height is 0.1 m. Express your answer in cm.

5. P = 48 in, s = 25 in.

6. B = 0.64 yd, s = 9 ft Express your answer in ft.

7. One side of the square base is 30 cm, the slant height is 0.15 m. Express your answer in cm.

THE AFRICAN-AMERICAN HERITAGE

G6-G7 Advanced

Celebrate Kwanzaa as the feast of the rich culture of African-American heritage by solving the unknown on the following problems.

1. The surface area of a cube-like box that will be used for the gift-giving this Kwanzaa is 1014 sq. in. What is the length of its side?

2. A Zawadi box that is in the shape of rectangular prism has a surface area of 1558 sq.in. If the height and the width of the box is 14 in and 16 in respectively, how long is the box?

3. The diameter of a right cylinder is 11 in. Its surface area is approximately 708.43 sq. in. How high is the given figure?

4. What is the diameter of a sphere-like object if its surface area is 907.92 sq. in?

GIFT-GIVING AND FEAST

G6-G7 Advanced

These are commonly seen objects/foods during the celebration of Kwanzaa. What type of solid figure are they? What is their surface area?

1. L = 28 cm W = 20 cm H = 15 cm

2. d = 7.62 cm h = 10 in

3. r = 10.16 cm h = 12 in

4. d = 8.5 cm

THE FIRST KWANZAA

G6-G7 Advanced

Calculate the surface area of these cylinders and find out when was the first-ever Kwanzaa celebrated.

38.1 cm

30.25 in

1.

7.5 ft

8.67 yd

2.

8 ft

10.36 m

3.

Kwanzaa is a week-long celebration of African-American heritage. What year was the first Kwanzaa celebrated?

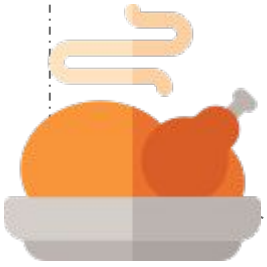
_ _ _ _

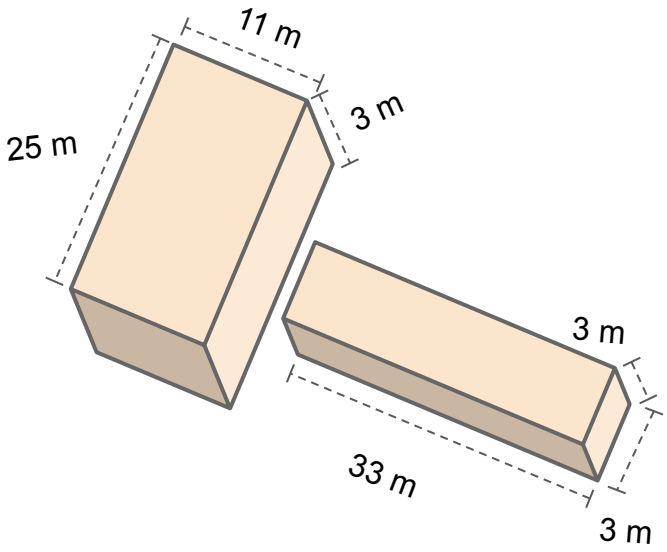
DECEMBER 26 - JANUARY 1

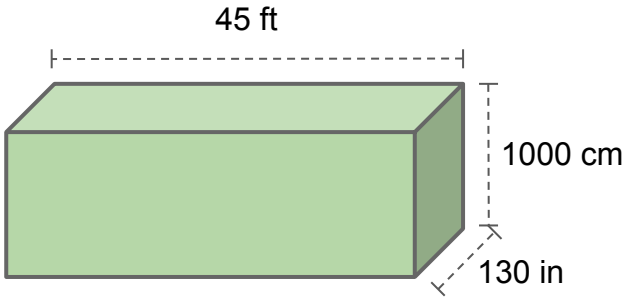
G6-G7 Advanced

Kwanzaa is celebrated from December 26 to January 1. Prepare for the coming of this holiday by calculating the surface area of these figures.

1.

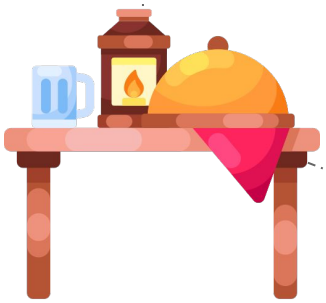






(Express your answer in sq. ft.)

2.



CELEBRATING KWANZAA

G6-G7
Advanced

These are some usual events during the preparation of Kwanzaa. Use your understanding of surface area to solve each problem.

1. A Zawadi is to be delivered for the celebration of Kwanzaa. The box is a cube which has six congruent face. Each has a length and width of 6.5 inches. What is the surface area of the gift box?

2. Another box came in. This has to be covered by a special colorful paper. The top and bottom of the box is 8 in by 3 in, the sides are both 3 in by 2 in, and the front and back are 8 in by 2 in. Make a sketch of the box. What is the minimum amount of paper needed to wrap the present?

3. A set of tomato sauce can was received by Danny. It has a radius of 2.5 in and a height of 5 in. How much metal was used to make the can? If there are six cans in a set, what is the total amount of metal used?

ANSWER GUIDE

Activity 1

1. C 2. E 3. F 4. A 5. B 6. D

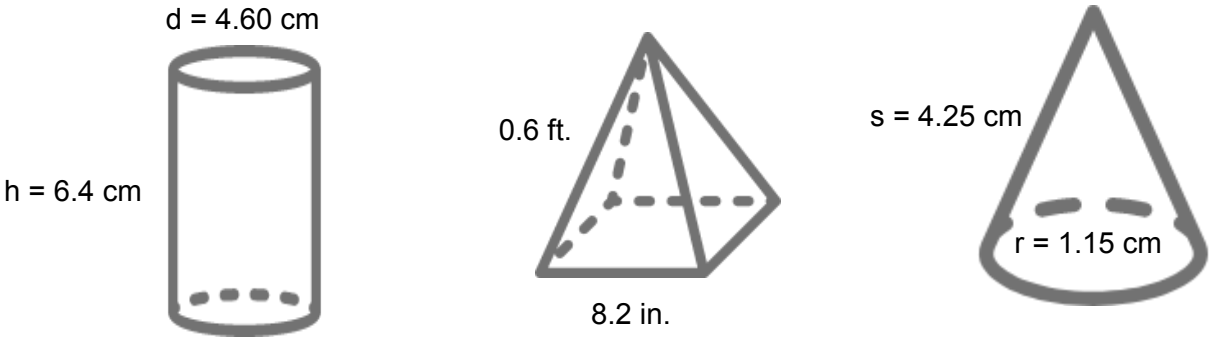
Activity 2

1. 1176 sq. in
2. 1240 sq. in
3. 78.54 sq. ft
4. 50.43 sq. yd

Activity 3

1. 4.86 sq. m 2. 49.12 sq. yd 3. 15297.6 sq. in

Activity 4



Activity 5

1. 886.33 sq. cm
2. 138.53 sq. in
3. 72.5 sq. ft
4. 965.69 sq. cm
5. 761.04 sq. in
6. 49.34 sq. yd
7. 2172.79 sq. cm

ANSWER GUIDE

Activity 6

1. S = 13 in 2. L = 18.5 in 3. H = 15 in 4. 17 in

Activity 7

1. 2560 sq. cm
2. 245.04 sq. in
3. 402.12 sq. in
4. 226.98 sq. cm

Activity 8

1. 4264.71 sq. in 2. 1579.12 sq. ft 3. 2110.65 sq. ft **1966**

Activity 9

1. 766 + 414 = 1180 sq. m 2. 4638.26 sq. ft

Activity 10

1. 253.5 sq. in 2. 92 sq. in
3. 117.81 sq. in per can. So the total is 708.86 sq. in

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