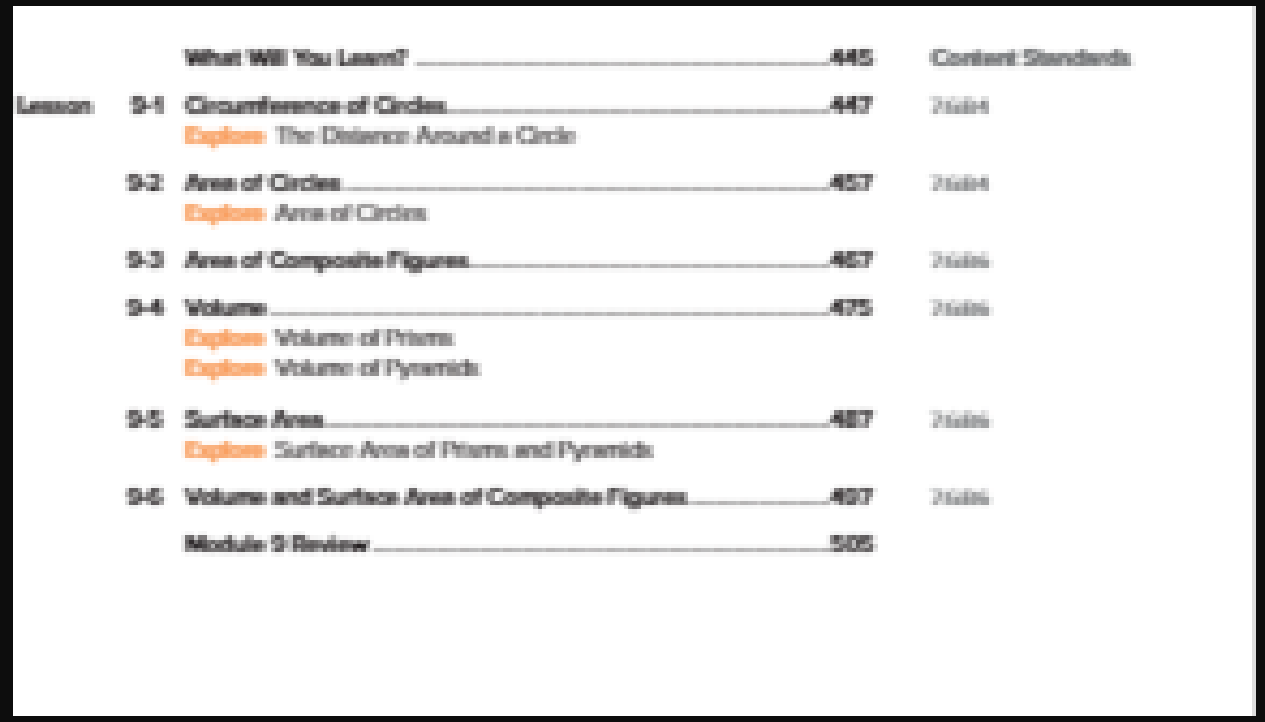
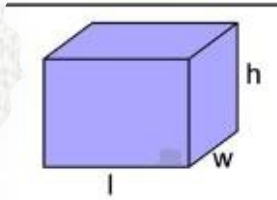
Measure Figures



		What Will You Learn?	445	Content Standards
Lesson	9-1	Circumference of Circles	447	7.G.B.4
		Explore The Distance Around a Circle		
	9-2	Area of Circles	457	7.G.B.4
		Explore Area of Circles		
	9-3	Area of Composite Figures	467	7.G.B.6
	9-4	Volume	475	7.G.B.6
		Explore Volume of Prisms		
		Explore Volume of Pyramids		
	9-5	Surface Area	487	7.G.B.6
		Explore Surface Area of Prisms and Pyramids		
	9-6	Volume and Surface Area of Composite Figures	497	7.G.B.6
		Module 9 Review	505	

Academic Year العام الدراسي	2023/2024
Term الفصل	3
Subject المادة	Mathematics/Reveal الرياضيات/ريفيل
Grade الصف	7
Stream المسار	General العام
Number of MCQ عدد الأسئلة الموضوعية	15
Marks of MCQ درجة الأسئلة الموضوعية	4
Number of FRQ عدد الأسئلة المقالية	5
Marks per FRQ الدرجات للأسئلة المقالية	(6-10)
Type of All Questions نوع كافة الأسئلة	MCQ/ الأسئلة الموضوعية FRQ/ الأسئلة المقالية
Maximum Overall Grade الدرجة القصوى الممكنة	100
Exam Duration - مدة الامتحان	150 minutes
Mode of Implementation - طريقة التطبيق	SwiftAssess & Paper-Based

Grade 7
2024-2025
Al Ataa School
Ms Maysa
Daher

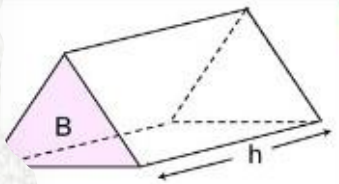


Rectangular Solid (Prism)

$$V = lwh$$

$$SA = 2lh + 2hw + 2lw$$

This formula assumes a "closed box", with all 6 sides.



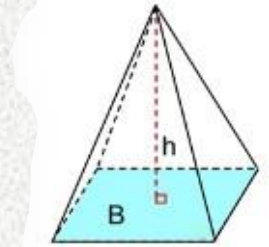
Prism (all forms)

$$V = Bh$$

B = area of end face; h = height (depth)

SA = sum of all surface areas

(2 triangular end faces and 3 rectangular faces)



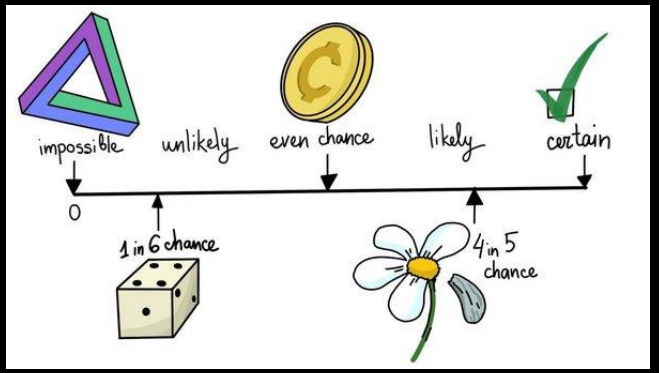
Pyramid

$$V = \frac{1}{3}Bh$$

B = area of base; h = height

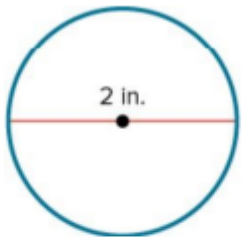
SA = sum of all surface areas

(1 base and all triangular faces)



1	Circumference of Circles	1 - 7	455

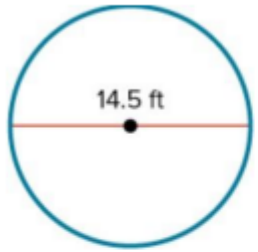
1) **Find the circumference** of the watch face. Use 3.14 for π. Round to the nearest hundredth if necessary.



SOLUTION:

$C = \pi d$
$C = \pi(2)$
$C = 2\pi$
$C \approx 2(3.14)$
$C \approx 6.28$ in

2) A circular fence is being used to surround a doghouse. **How much fencing is needed** to build the fence? Use 3.14 for π.



SOLUTION:

$C = \pi d$
$C = \pi(14.5)$
$C = 14.5\pi$
$C \approx 14.5(3.14)$
$C \approx 45.53$ ft

3) **Find the circumference** of a circle with a radius $31\frac{1}{2}$ yards. Use 3.14 for π. Round to the nearest hundredth if necessary.

SOLUTION:

$C = 2\pi r$
$C = 2\pi\left(31\frac{1}{2}\right)$
$C = 63\pi$
$C \approx 63(3.14)$
$C \approx 197.82$ yd

4) **Find the circumference** of a circle with a radius of 4.4 inches. Use 3.14 for π.Round to the nearest hundredth .

SOLUTION:

$C = 2\pi r$
$C = 2\pi(4.4)$
$C = 8.8\pi$
$C \approx 8.8(3.14)$
$C \approx 27.63$ in

5) The world's largest flower, the Rafflesia, has a circumference of 286 centimeters. **Find the approximate diameter of the flower**.Use 3.14 for π.

SOLUTION:

$d = \frac{C}{\pi}$
$d \approx \frac{286}{3.14}$
$d \approx 91.08$ cm

6) A helicopter pad has acircumference of $47\frac{1}{2}$ yards. **Find the approximate diameter of the** helicopter pad. Use 3.14 for π. Round to the nearest hundredth.

$d = \frac{C}{\pi}$
$d \approx \frac{47.5}{3.14}$
$d \approx 15.13$ yd

2	Area of Circles	1 - 7	465

1) **Find the area** of the circle. Use 3.14 for π. Round to the nearest hundredth.

SOLUTION:

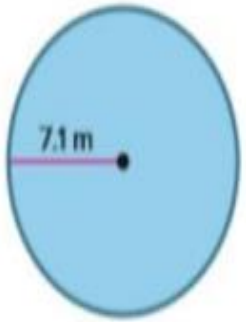
$A = \pi r^2$

$A = \pi(7.1)^2$

$A = 50.41\pi$

$A \approx 50.41(3.14)$

$A \approx 158.29 \ m^2$



2) **Find the area** of the circle. Use 3.14 for π. Round to the nearest hundredth.

SOLUTION:

$A = \pi r^2$

$A = \pi(4.25)^2$

$A = 18.0625\pi$

$A \approx 18.0625(3.14)$

$A \approx 56.72 \ in^2$

3) **What is the area** of the drumhead on the drum? Use 3.14 for π. Round to the nearest hundredth.

SOLUTION:

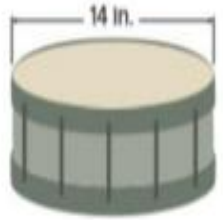
$A = \pi r^2$

$A = \pi(7)^2$

$A = 49\pi$

$A \approx 49(3.14)$

$A \approx 153.86 \ in^2$



4) **What is the area** of one side of the penny . Use 3.14 for π. Round to the nearest hundredth.

SOLUTION:

The radius is 19 ÷ 2 or 9.5 millimeters.

$A = \pi r^2$

$A = \pi(9.5)^2$

$A = 90.25\pi$

$A \approx 90.25(3.14)$

$A \approx 283.39 \ mm^2$

5) Mr. Ling is adding a pond in the shape of a semicircle in his backyard. **What is the area** of the pond? Use 3.14 for π.Round to the nearest hundredth.

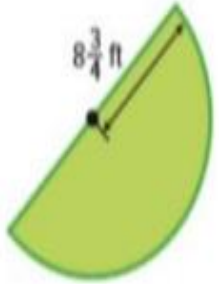
$A = \frac{1}{2}\pi r^2$

$A = \frac{1}{2}\pi(8.75)^2$

$A = 38.28125\pi$

$A \approx 38.28125(3.14)$

$A \approx 120.20 \ ft^2$



6) Vidur needs to buy mulch for his garden. **What is the area** of his garden? Use 3.14 for π. Round to the nearest hundredth if necessary.

SOLUTION:

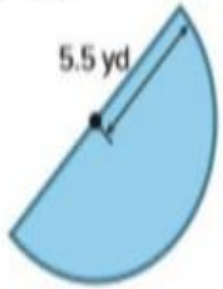
$A = \frac{1}{2}\pi r^2$

$A = \frac{1}{2}\pi(5.5)^2$

$A = 15.125\pi$

$A \approx 15.125(3.14)$

$A \approx 47.49 \ yd^2$



7) The exact circumference of a circle is 18π inches. **What is the approximate area of the circle?** Use 3.14 for π.Round to the nearest hundredth.

$C = 2\pi r$

$18\pi = 2\pi r$

$\frac{18\pi}{2\pi} = \frac{2\pi r}{2\pi}$

$9 = r$

$A = \pi r^2$

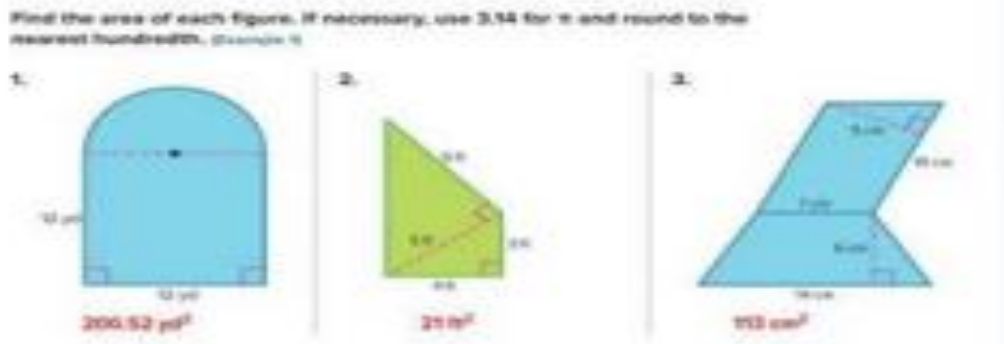
$A = \pi(9)^2$

$A = 81\pi$

$A \approx 81(3.14)$

$A \approx 254.34 \ in^2$

3	Area of Composite Figures	1 - 8	473



4) **Find the area of the figure**. If necessary, use 3.14 for π and round to the nearest hundredths.

Triangle

$A = \frac{1}{2}bh$

$= \frac{1}{2} \cdot 4 \cdot 10$

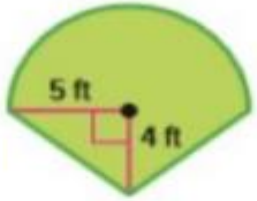
$= 20$

Semicircle

$A = \frac{1}{2}\pi r^2$

$= \frac{1}{2} \cdot 3.14$

$= 39.25$



Find the area of the composite figure.

$20 + 39.25 = 59.25 \ ft^2$

5) **Find the area of the figure**. If necessary, use 3.14 for π and round to the nearest hundredths.

Triangle

$A = \frac{1}{2}bh$

$= \frac{1}{2} \cdot 6 \cdot 4$

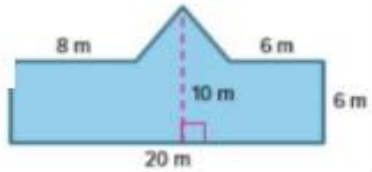
$= 12$

Rectangle

$A = \ell w$

$= 6 \cdot 20$

$= 120$



Find the area of the composite figure.

$12 + 120 = 132 \ m^2$

6) **Find the area of the figure**. If necessary, use 3.14 for π and round to the nearest hundredths.

Triangle

$A = \frac{1}{2}bh$

$= \frac{1}{2} \cdot 1.1 \cdot 4.8$

$= 2.64$

$A = \frac{1}{2}h(b_1 + b_2)$

$= \frac{1}{2} \cdot 5.9(4.8 + 3.6)$

$= \frac{1}{2} \cdot 5.9(21)$

$= 24.70$

Find the area of the composite figure.

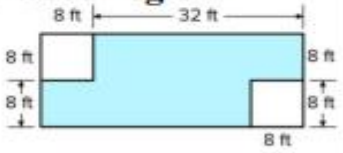
$2.64 + 24.70 = 27.42 \ cm^2$

7) **Find the area of the shaded region**.

$A = \ell w$

$= (40)(16)$

$= 640$



$A = s^2$

$= 8^2$

$= 64$

The area of the shaded region

=640-64-64=512 ft^2

8) **Find the area of the shaded region**.

$A = \frac{1}{2}h(b_1 + b_2)$

$= \frac{1}{2}(16)(20 + 40)$

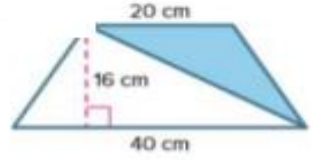
$= \frac{1}{2}(16)(60)$

$= 480$

$A = \frac{1}{2}bh$

$= \frac{1}{2} \cdot 40 \cdot 16$

$= 320$



Area of shaded

=480-320=160 cm^2

4	Volume	1 - 2	485
		11-12	486

1) A cooler is in the shape of a rectangular prism. **What is the volume** of the cooler? Round to the nearest tenth if necessary.

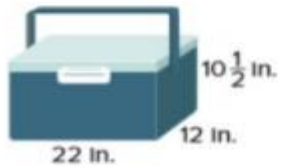
SOLUTION:

$V = Bh$

$V = (\ell w)h$

$V = (22 \cdot 12)10\frac{1}{2}$

$V = 2{,}772 \quad in^3$



2) A cereal box is in the shape of a rectangular prism. **What is the volume** of the cereal box? Round to the nearest tenth .

SOLUTION:

$V = Bh$

$V = (\ell w)h$

$V = (8 \cdot 1\frac{3}{4})12\frac{1}{8}$

$V = 169.8 \ in^3$

3) **Find the volume** of the figure. Round to the nearest tenth if necessary.

SOLUTION:

$V = Bh$

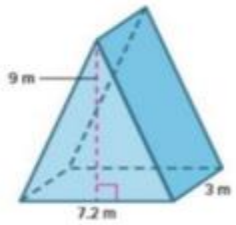
$V = (\frac{1}{2} \cdot 7.2 \cdot 9)h$

9.

$V = (32.4)h$

$V = (32.4)3$

$V = 97.2 \quad m^3$



4) **Find the volume** of the figure. Round to the nearest tenth if necessary.

SOLUTION:

$V = Bh$

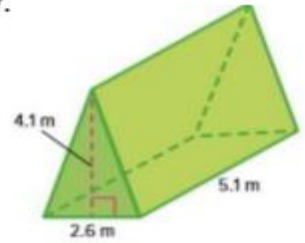
$V = (\frac{1}{2} \cdot 2.6 \cdot 4.1)h$

4.1.

$V = (5.33)h$

$V = (5.33)5.1$

$V = 27.2 \quad m^3$



5) **Find the volume** of the figure. Round to the nearest tenth if necessary.

SOLUTION:

$V = \frac{1}{3}Bh$

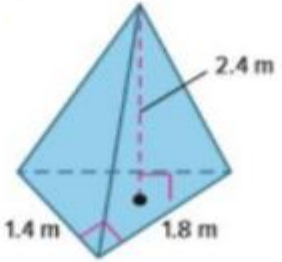
$V = \frac{1}{3}(\frac{1}{2} \cdot 1.4 \cdot 1.8)h$

1.8.

$V = \frac{1}{3}(1.26)h$

$V = \frac{1}{3}(1.26)2.4$

$V = 1.0 \quad m^3$



6) **Find the volume** of the figure. Round to the nearest tenth if necessary.

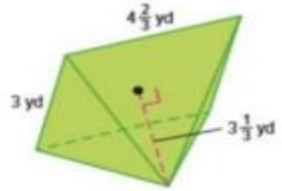
SOLUTION:

$V = \frac{1}{3}Bh$

$V = \frac{1}{3}(\ell w)h$

$V = \frac{1}{3}(4\frac{2}{3} \cdot 3)3\frac{1}{3}$

$V = 15.6 \quad yd^3$



10) A triangular box of sticky notes is shown. The volume of the box of sticky notes is 54.6 cubic inches. **What is the height of the box of sticky notes?**

SOLUTION:

$V = Bh$

$V = (\frac{1}{2} \cdot 5.2 \cdot 3.5)h$

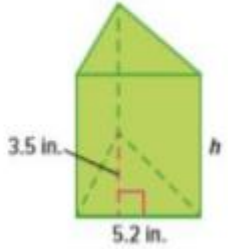
$V = (9.1)h$

$54.6 = (9.1)h$

$\frac{54.6}{9.1} = \frac{9.1h}{9.1}$

$6 = h$

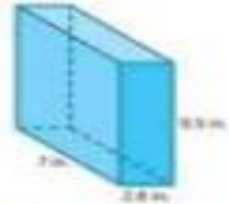
Height =6 in



Apply *indicates multi-step problem

*11. Sasha is mailing a photo box that has the dimensions shown in a rectangular box that is 12.5 inches long, 4.2 inches wide, and 12.5 inches tall. If one bag of packing material holds 75 cubic inches of material, how many bags does Sasha need to buy to fill the space around the photo box?

7 bags



*12. The cargo bed of a commercial truck is shaped like a rectangular prism. The dimensions are shown. Billy has 80 cubic meters of mulch to take to his house. How many trips will he have to make until all the mulch is at his house?

6 trips

5	Volume	3 - 10	485

1) A cooler is in the shape of a rectangular prism. **What is the volume** of the cooler? Round to the nearest tenth if necessary.

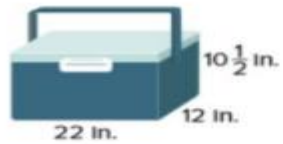
SOLUTION:

$V = Bh$

$V = (\ell w)h$

$V = (22 \cdot 12)10\frac{1}{2}$

$V = 2{,}772 \quad in^3$



2) A cereal box is in the shape of a rectangular prism. **What is the volume** of the cereal box? Round to the nearest tenth .

SOLUTION:

$V = Bh$

$V = (\ell w)h$

$V = (8 \cdot 1\frac{3}{4})12\frac{1}{8}$

$V = 169.8 \ in^3$

3) **Find the volume** of the figure. Round to the nearest tenth if necessary.

SOLUTION:

$V = Bh$

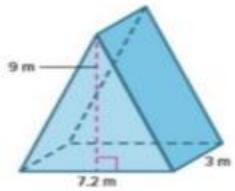
$V = (\frac{1}{2} \cdot 7.2 \cdot 9)h$

9.

$V = (32.4)h$

$V = (32.4)3$

$V = 97.2 \quad m^3$



4) **Find the volume** of the figure. Round to the nearest tenth if necessary.

SOLUTION:

$V = Bh$

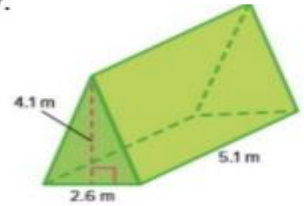
$V = (\frac{1}{2} \cdot 2.6 \cdot 4.1)h$

4.1.

$V = (5.33)h$

$V = (5.33)5.1$

$V = 27.2 \quad m^3$



5) **Find the volume** of the figure. Round to the nearest tenth if necessary.

SOLUTION:

$V = \frac{1}{3}Bh$

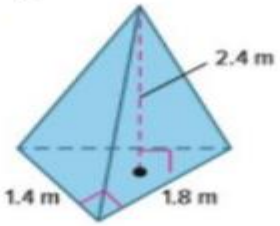
$V = \frac{1}{3}(\frac{1}{2} \cdot 1.4 \cdot 1.8)h$

1.8.

$V = \frac{1}{3}(1.26)h$

$V = \frac{1}{3}(1.26)2.4$

$V = 1.0 \quad m^3$



6) **Find the volume** of the figure. Round to the nearest tenth if necessary.

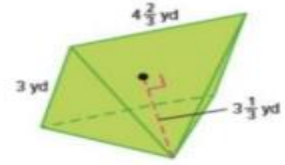
SOLUTION:

$V = \frac{1}{3}Bh$

$V = \frac{1}{3}(\ell w)h$

$V = \frac{1}{3}(4\frac{2}{3} \cdot 3)3\frac{1}{3}$

$V = 15.6 \quad yd^3$



7) A triangular prism has a height of 5.9 meters and volume of 86.376 cubic meters. **What is the area of the base** of the prism?

SOLUTION:

$V = Bh$

$86.376 = B(5.9)$

$86.376 = 5.9B$

$\frac{86.376}{5.9} = \frac{5.9B}{5.9}$

$14.64 = B$

Area of the base =14.64 m^2

8) A rectangular pyramid has a height of 9.5 centimeters and a volume of 494 cubic centimeters. **What is the area of the base** of the pyramid?

SOLUTION:

$V = \frac{1}{3}Bh$

$494 = \frac{1}{3}B(9.5)$

$156 = B$

Area of the base =156 cm^2

9) Aglass stand to display a doll is in the shape of a right triangular pyramid as shown. The volume of the stand is 202.5 cubic inches. **What is the height of the stand**?

SOLUTION:

$V = \frac{1}{3}Bh$

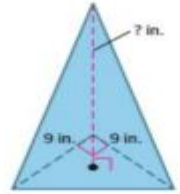
$V = \frac{1}{3}(\frac{1}{2} \cdot 9 \cdot 9)h$

$202.5 = 13.5h$

$\frac{201.5}{13.5} = \frac{13.5h}{13.5}$

$15 = h$

Height =15 in



10) A triangular box of sticky notes is shown. The volume of the box of sticky notes is 54.6 cubic inches. **What is the height of the box of sticky notes?**

SOLUTION:

$V = Bh$

$V = (\frac{1}{2} \cdot 5.2 \cdot 3.5)h$

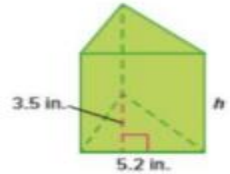
$V = (9.1)h$

$54.6 = (9.1)h$

$\frac{54.6}{9.1} = \frac{9.1h}{9.1}$

$6 = h$

Height =6 in



6	Surface Area	1 -7	495

1) **Find the surface area** of the prism. Round to the nearest tenth if necessary.

SOLUTION:

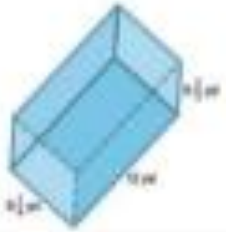
$S.A. = 2\ell h + 2\ell w + 2hw$

$= 2(12 \cdot 6\frac{2}{3}) + 2(12 \cdot 8\frac{1}{4}) + 2(6\frac{2}{3} \cdot 8\frac{1}{4})$

$= 160 + 198 + 110$

$= 468$ yd^2

S.A= 468



2) **Find the surface area** of the prism. Round to the nearest tenth if necessary.

SOLUTION:

$S.A. = 2\ell h + 2\ell w + 2hw$

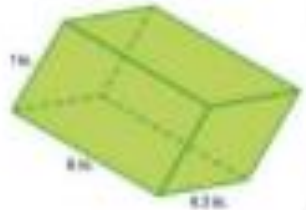
$= 2(6 \cdot 3.7) + 2(6 \cdot 4.3) + 2(3.7 \cdot 4.3)$

$= 44.4 + 51.6 + 31.82$

$= 127.82$

$= 127.8$

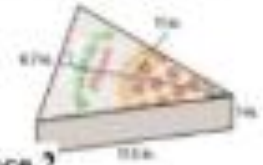
S.A= 127.8 in^2



3) **How much cardboard** is needed to make the single slice of pizza box shown?

Area Bases:

$A = 2(\frac{1}{2} \cdot 6.7 \cdot 11)$



Area of Face 1

$A = 6.7 \cdot 1$

$= 6.7$ in^2

Area of Face 2

$A = 11.5 \cdot 1$

$= 11.5$ in^2

Area of Face 3

$A = 11.5 \cdot 1$

$= 11.5$ in^2

S.A= 73.7+6.7+11.5+11.5

S.A= 103.4 in^2

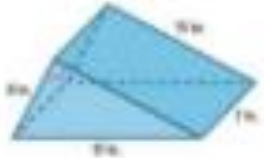
4) **What is the surface area** of the triangular prism-shaped toy car ramp shown?

Area Bases:

$A = 2(\frac{1}{2} \cdot 8 \cdot 15)$

$= 2(60)$

$= 120$



Area of Face 1

$A = 8 \cdot 7$

$= 56$ in^2

Area of Face 2

$A = 17 \cdot 7$

$= 119$ in^2

Area of Face 3

$A = 15 \cdot 7$

$= 105$ in^2

S.A= 120+56+119+105

S.A= 400 in^2

5) **Find the surface area** of the pyramid. Round to the nearest tenth if necessar

$A = s^2$

$= 15.75 \cdot 15.75$

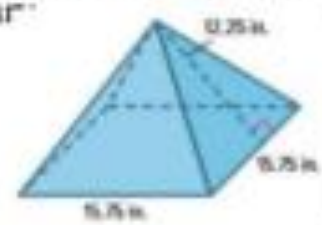
$= 248.0625$

$A = 4(\frac{1}{2}bh)$

$= 4(\frac{1}{2} \cdot 15.75 \cdot 12.25)$

$= 4(96.46875)$

$= 385.875$



S.A= 248.1+385.9

S.A= 634 in^2

6) **Find the surface area** of the pyramid. Round to the nearest tenth if necessary.

$A = \frac{1}{2}bh$

$= \frac{1}{2} \cdot 12.2 \cdot 10.6$

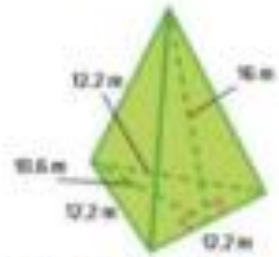
$= 64.66$

$A = 3(\frac{1}{2}bh)$

$= 3(\frac{1}{2} \cdot 12.2 \cdot 16)$

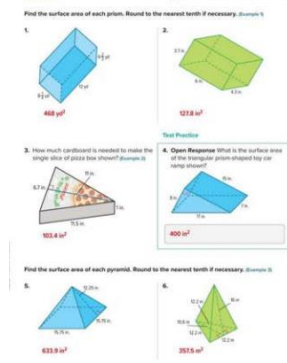
$= 3(97.6)$

$= 292.8$



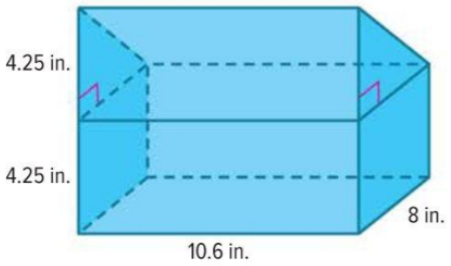
S.A= 64.7+ 292.8

S.A= 357.5



7	Volume and Surface Area of Composite Figures	Learn	499
		1 - 8	503-504

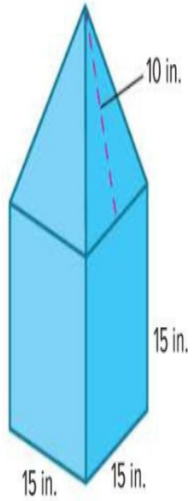
1. Mya's lunchbox is shown. What is the volume of the lunchbox? Round to the nearest tenth if necessary. (Example 1)



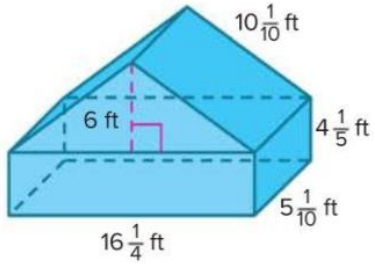
2. Anson's toy rocket is shown. What is the volume of the rocket? Round to the nearest tenth if necessary. (Example 1)

Apply

7. For a charity drive, each classroom is given a coin box made of cardboard like the one shown. The student council wants to construct a version of the coin box that has a scale factor of 3 times the classroom coin box. Is 100 square feet of cardboard enough to build the new coin box? Write an argument that can be used to defend your solution.

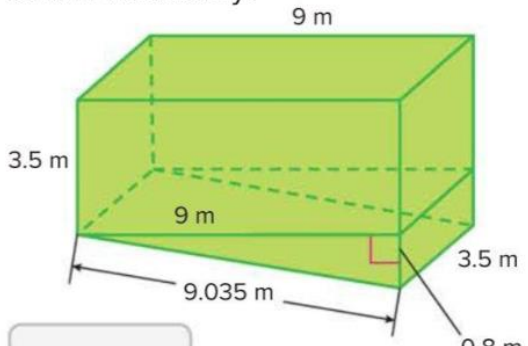


5. Find the surface area of the composite figure. Round to the nearest tenth if necessary. (Example 2)

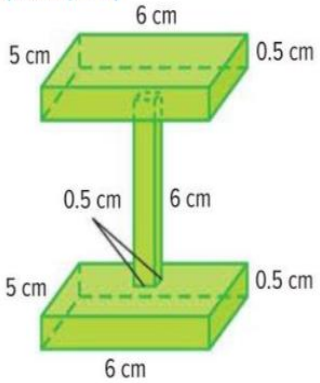


Test Practice

6. Open Response Find the surface area of the composite figure. Round to the nearest tenth if necessary.



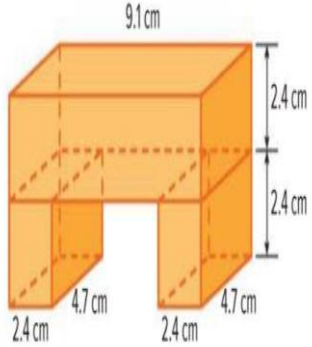
4. Zahir made this wooden perch for his pet bird. What is the volume of the bird perch? Round to the nearest tenth if necessary. (Example 1)



Check

What is the volume of the composite figure? Round to the nearest hundredth if necessary.

Show your work here



Probability

What Will You Learn? 509

Lesson 10-1 Find Likelihoods 511

Explore Chance Events

10-2 Relative Frequency of Simple Events 515

Explore Experiments and Likelihood

10-3 Theoretical Probability of Simple Events 529

Explore Long-Run Relative Frequencies

10-4 Compare Probabilities of Simple Events 539

8	Relative Frequency of Simple Events	1 - 2	527

Practice

Go Online You can complete your homework online.

The spinner shown is spun once. Classify the likelihood of each event as *impossible*, *unlikely*, *equally likely*, *likely*, or *certain*. Example 1

1. the spinner landing on *dog* **equally likely**
2. the spinner landing on *hamster* **unlikely**
3. the spinner landing on *dog* or *cat* **likely**
4. the spinner landing on *bird* **impossible**
5. the spinner landing on an animal **certain**
6. the spinner landing on *cat* or *hamster* **equally likely**

Test Practice

For Exercises 7 and 8, a card is randomly selected from the ones shown.

7. **Multiselect** Select all events that are unlikely to happen.
   - [x] selecting the letter B
   - [ ] selecting the letter T
   - [ ] selecting a vowel or S
   - [ ] selecting a consonant or vowel
   - [ ] selecting a consonant or A
   - [x] selecting the letter Q or R

9	Relative Frequency of Simple Events	EX 3	519
		3-5	527

1) The spinner shown is spun once. Classify the likelihood of the spinner **landing on dog** as *impossible*, *unlikely*, *equally likely*, *likely*, or *certain*.

the event is equally likely

2) The spinner shown is spun once. Classify the likelihood of the spinner **landing on hamster**.

the event is unlikely

3) The spinner shown is spun once. Classify the likelihood of the spinner **landing on dog or catas .**

the event is likely

4) The spinner shown is spun once. Classify the likelihood of the spinner **landing on bird.**

the event is impossible

5) The spinner shown is spun once. Classify the likelihood of the spinner **landing on an animal.**

the event is certain

6) The spinner shown is spun once. Classify the likelihood of the spinner **landing on cat or hamster.**

the event is equally likely

10	Theoretical probability of Simple Events	1 - 4	537

1) A spinner with four equal sections of blue, green, yellow, and red is spun 100 times. It lands on blue 14 times, green 10 times, yellow 8 times, and red 68 times. **What is the relative frequency of landing on red? green?**

$$\text{relative frequency of rolling a red} = \frac{\text{number of times red occured}}{\text{total number of spins}}$$

$$= \frac{68}{100}$$

$$= 68\%$$

$$\text{relative frequency of rolling a green} = \frac{\text{number of times green occured}}{\text{total number of spins}}$$

$$= \frac{10}{100}$$

$$= 10\%$$

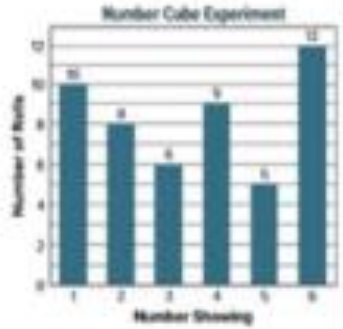
2) The frequency table shows the results of a survey about favorite exhibits. **Find the relative frequency that a randomly selected student's favorite exhibit was either butterflies or trains, as a percent**

Exhibit	Frequency
Butterfly	12
Dinosaurs	25
Planets	17
Trains	6

$$\frac{\text{number of students that chose butterflies or trains}}{\text{total number of students}} = \frac{18}{60}$$

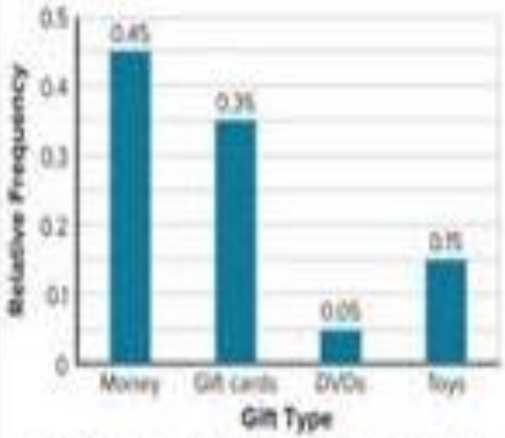
So, the relative frequency is $\frac{18}{60}$, 0.3, or 30%.

3) The graph shows the results of an experiment in which a number cube labeled 1 through 6 is rolled a number of times. **Find the relative frequency of rolling a number greater than 3.**



$$\frac{\text{number of rolls of 4 ,5, and 6}}{\text{total number of rolls}} = \frac{26}{50} = \frac{13}{25}$$

4. A random selection of students was asked the question "What type of gift did you last receive?" and the results were recorded in the relative frequency bar graph.



What is the experimental probability that a student chosen at random received a gift card or money? (Example 4) **0.80; 80%**

11	Theoretical probability of Simple Events	5- 10	537-538

Apply *Indicates multi-step problem

*6. The table shows the number of each type of snack bag that was sold this month at lunch. The school makes $0.75 profit on each bag sold and expects to sell 1,200 bags next month. Based on last month's results, how much profit can the school expect to make on potato chips next month?

$382.50

Snack Bag	Number Sold
Cheese Curls	250
Popcorn	125
Potato Chips	340
Pretzels	85

*7. A laundry detergent company's 32-ounce bottles pass inspection $\frac{98}{100}$ of the time. If the bottle does not pass inspection, the company loses the unit cost for each bottle of laundry detergent that does not pass inspection, which is $3.45. If 800 bottles of laundry detergent are produced, about how much money can the company expect to lose?

$55.20

Higher-Order Thinking Problems

8. MP **Make Use of Structure** A spinner with three sections marked orange, yellow, and purple is spun 32 times. Purple is spun 24 times, orange is spun 4 times, and yellow is spun 4 times. Draw what the spinner might look like based on the relative frequencies.

Sample answer:

9. **Create** Write and solve a problem where you use probability to estimate and make predictions.

Sample answer: Based on last year's class, a teacher determines that if a student plays a sport, the probability that they are also in a club is 75%. If there are 24 students who play a sport in this year's class, how many students would you expect to also be in a club?; about 18 students

10. MP **Persevere with Problems** A number cube is rolled 24 times and lands on 6 three times. Find the experimental probability of not landing on a 6. Express your answer as fraction, decimal, and percent.

$\frac{7}{8}$, 0.875, 87.5%

11. MP **Persevere with Problems** The experimental probability of flipping a red-yellow counter and landing on yellow is $\frac{9}{16}$. If the counter landed on red 35 times, find the number of tosses.

80 tosses

12	Compare Probabilities of Simple Events	1 - 3	545-546

1) The spinner shown is spun once. **What is the sample space?**

The sample space is 1, 2, 3, 4, 5.

2) Each letter in the word MISSISSIPPI is written on a piece of paper and placed into a bag. A letter is drawn at random. **What is the sample space?**

The sample space is M, I, S, P.

3) A teacher placed the letter cards E, L, O, R, U, and W in a bag. A card is drawn at random. **Determine the theoretical probability for drawing a card that has a vowel on it?**

$$P(\text{vowel}) = \frac{3}{6}$$

$$= \frac{1}{2}; 0.5, 50\%$$

4) A player in a board game rolls a six-sided number cube labeled 1 through 6 once. **Determine the theoretical probability of rolling a 1 or 2?**

$$P(1 \text{ or } 2) = \frac{2}{6}$$

are 6 numbers total.

$$= \frac{1}{3}, 0.\overline{3}, 33\frac{1}{3}\%$$

5) The table shows the lengths of time for rides at a fair. Zane will choose a ride at random and wants to find the probability of choosing a ride that lasts less than 200 seconds. **What is the probability of the complement of the event?**

Ride	Time (seconds)
Bumper Cars	195
Circus Carousel	240
Log Ride	120
Roller Coaster	55
Swings	225
Train	300
Zero Gravity Spinner	65

$P(\text{not lasts less than 200 seconds}) = \frac{3}{8}$

the probability of the complement is

$\frac{3}{8}$, 0.37, or 37.5%.

6) Red is spun on a spinner with five equal–size sections labeled red, yellow, blue, green, and purple. **What is the probability of the complement of the event?**

$$P(\text{not red}) = \frac{4}{5}$$

the probability of the complement is $\frac{4}{5}$, 0.8, or 80%.

Sampling and Statistic

What Will You Learn? 573

Lesson 11-1 Biased and Unbiased Samples 575

11-2 Make Predictions 585

11-3 Generate Multiple Samples 593

Explore Multiple Samples

Explore Sample Size in Multiple Samples

11-4 Compare Two Populations 603

Explore Compare Means of Two Populations

11-5 Assess Visual Overlap 613

Module 11 Review 619

13	Make Predictions		
		1 - 5	591

1) A school librarian is purchasing new books for her book clubs in the coming year. In order to determine how many books she needs, she randomly surveys 25 students who plan to participate in one of her book clubs in the coming year. The table shows the results. **Predict how many science fiction books she will need to purchase if 125 students participate in book club next year**

Book Club Type	Number of Students
Autobiography	2
Graphic Novel	7
Mystery	10
Science Fiction	6

$$\frac{6}{25} = \frac{s}{125}$$

The school librarian should buy 30 science fiction books.

2) A smart tablet manufacturer tests 1 out of every 25 screens for flaws. Out of 125 tablets tested, 2 had defective screens. How many defective screens should the manufacturer expect out of 45,000 smart tablet.

$$\frac{2}{125} = \frac{d}{45{,}000}$$

The manufacturer should expect 720 tablets to be defected

3) The superintendent of a school district wants to project for next year's middle school lunch count. The graph shows the results of a survey of randomly selected middle students. If the district has 5,000 middle school students next year, **about how many students plan to buy lunch 1–2 days a week?**

$$\frac{37}{100} = \frac{n}{5{,}000}$$

about 1,850 students

4) The guidance department conducted a random survey of the student body and found that 16% of the students plan to volunteer at the school festival. **Predict how many volunteer positions they should plan for a population of 950 students.**

$$\frac{16}{100} = \frac{n}{950}$$

about 152 positions.

5) The owner of a travel agency randomly surveyed its customers. The survey showed that 55% of the company's customers were planning an overseas vacation the following year. **Predict how many of the travel company's 12,400 travelers will vacation overseas the following year.**

$$\frac{55}{100} = \frac{n}{12{,}400}$$

about 6,820 customers

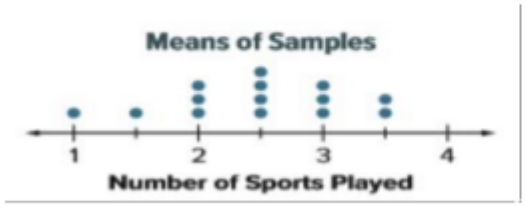
6) Every 30 minutes, a box of crayons is pulled from the assembly line to check the quality. Of 240 checked boxes of crayons, 2 did not pass inspection. **How many boxes out of 12,000 should the crayon company expect to not pass inspection?.**

$$\frac{2}{240} = \frac{d}{12{,}000}$$

The manufacturer should expect 100 boxes not to pass

14	Generate Multiple Samples		
		1 -2	601

1) The dot plot displays data from 14 random samples, each consisting of 30 middle school students. Each dot represents the mean number of sports played per year by students in the sample



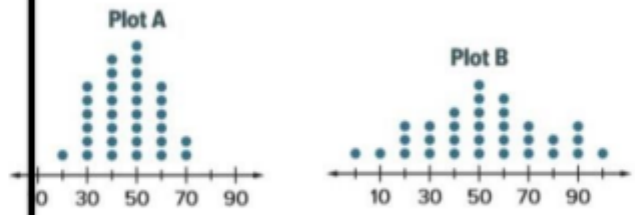
A) Which number best represents the mean number of sports played by middle school students?

the mean of the population should be close to 2.5 sports.

B) Find and interpret the variability in the distribution

MAD=0.54 sports;
The majority of the sample means are within 0.5 sport of the mean. This means our estimate is likely not far off from the true mean.

2) Below are two dot plots containing sample means from the same population.



A) How many samples are represented in each plot?

there are 32 samples for both plot A and Plot B because each dot represents one sample.

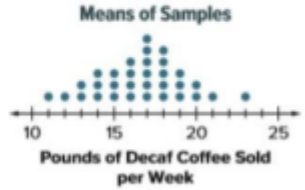
B) Which dot plot has higher variability?

Plot B has a higher variability.

C) One plot contains samples of size 25, and the other plot contains samples of size 60. Which dot plot contains the samples of size 60?

Plot A contains the samples of 60. There is less variability between the means among the samples of 60.

3) A large company is trying to determine the mean number of pounds of decaf coffee sold per week in its stores. The dot plot shows the mean pounds of decaf coffee sold per week from 32 samples of 50 stores each



A) Describe the variability of the dot plot.

The majority of the data are clustered between 14 and 19 pounds.

B) How might the dot plot be different if each of the 32 samples contained data from 200 stores.

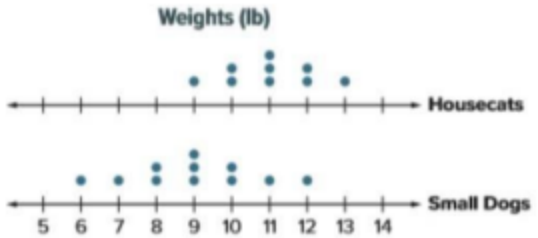
The data would be more tightly clustered between 15 and 18 pounds.

D) The company samples 200 stores and finds a mean of 17 pounds of decaf coffee sold per week. Based on your answer to Part B, what range of values might describe the mean for all stores in the company

The store might expect to sell between 16 and 18 pounds of decaf coffee

15	Generate Multiple Samples	Example 1	597
		3-5	602

1) The double dot plot shows the weights in pounds of several housecats and small dogs. **Compare their centers and variability**. What are some appropriate inferences you can make about the data



housecat

The mean for the housecat data is 11 lb.

The MAD for the housecat data is 0.9 lb.

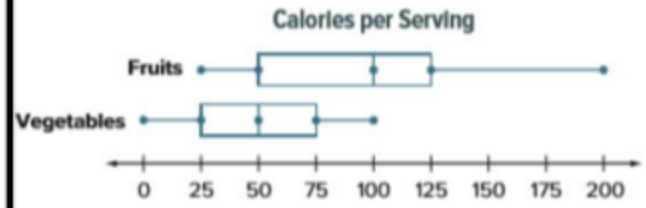
small dog

The mean for the small dog data is 9 lb.

The MAD for the small dog data is 1.3 lb.

the housecats weigh more with less variation.

2) The double box plot shows the number of Calories per serving for various fruits and vegetables. **What are some appropriate inferences you can make about the data**



Fruits The median is 100 Calories.

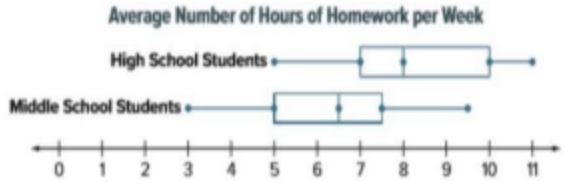
IQR = 125 – 50 = 75 $\quad$ IQR = $Q_3 - Q_1$

Vegetables The median is 50 Calories.

IQR = 75 – 25 = 50 $\quad$ IQR = $Q_3 - Q_1$

the fruits have a higher number of Calories with a greater variation

3) The double dot plot represents the average number of hours of homework each week for high school students and middle school students. Use the measures of center and variability of these samples to select the age group(s) to which each statement applies.



	Middle School	High School
The median is greater.		☐
The IQR is 2.5.	☐	
The data have greater variability.		☐
A person from this sample is more likely to have more than 7 hours of homework a week.		☐
The data are more symmetric.	☐	

FRQ الأسئلة المقالية

16	Area of Composite Figures	1-6	473

الأسئلة المقالية

FRQ

17	Theoretical probability of Simple Events	EX3	534
		1-6	537

1) A spinner with four equal sections of blue, green, yellow, and red is spun 100 times. It lands on blue 14 times, green 10 times, yellow 8 times, and red 68 times. **What is the relative frequency of landing on red? green?**

$$\text{relative frequency of rolling a red} = \frac{\text{number of times red occured}}{\text{total number of spins}}$$

$$= \frac{68}{100}$$

$$= 68\%$$

$$\text{relative frequency of rolling a green} = \frac{\text{number of times green occured}}{\text{total number of spins}}$$

$$= \frac{10}{100}$$

$$= 10\%$$

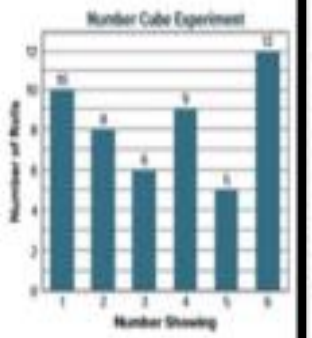
2) The frequency table shows the results of a survey about favorite exhibits. **Find the relative frequency that a randomly selected student's favorite exhibit was either butterflies or trains, as a percent**

Exhibit	Frequency
Butterfly	12
Dinosaurs	25
Planets	17
Trains	6

$$\frac{\text{number of students that chose butterflies or trains}}{\text{total number of students}} = \frac{18}{60}$$

So, the relative frequency is $\frac{18}{60}$, 0.3, or 30%.

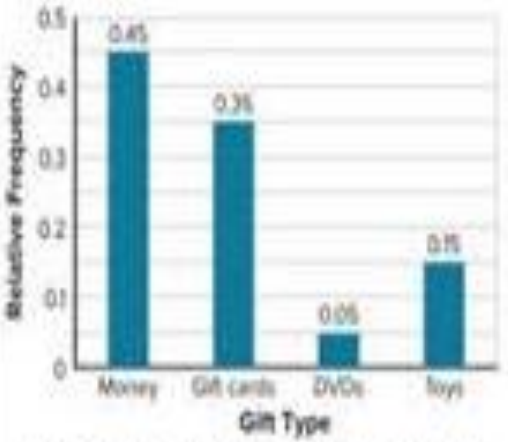
3) The graph shows the results of an experiment in which a number cube labeled 1 through 6 is rolled a number of times. **Find the relative frequency of rolling a number greater than 3.**



$$\frac{\text{number of rolls of 4 ,5, and 6}}{\text{total number of rolls}} = \frac{26}{50}$$

$$= \frac{13}{25}$$

4. A random selection of students was asked the question "What type of gift did you last receive?" and the results were recorded in the relative frequency bar graph.



What is the experimental probability that a student chosen at random received a gift card or money? (Example 4) **0.80; 80%**

Apply *Indicates multi-step problem

*6. The table shows the number of each type of snack bag that was sold this month at lunch. The school makes $0.75 profit on each bag sold and expects to sell 1,200 bags next month. Based on last month's results, how much profit can the school expect to make on potato chips next month?

$382.50

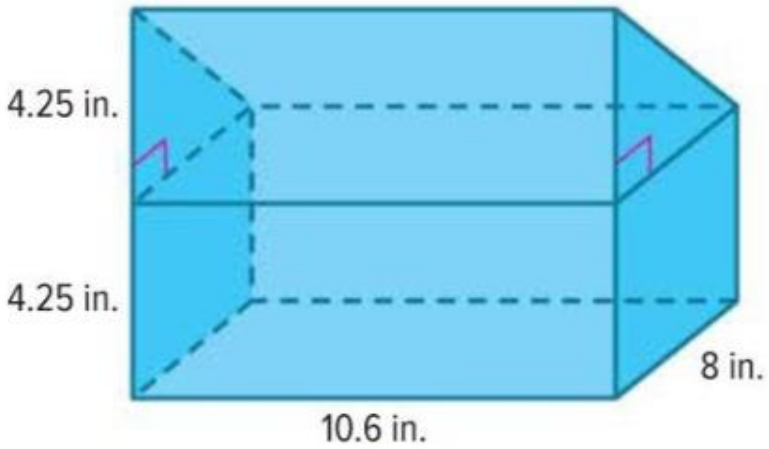
Snack Bag	Number Sold
Cheese Curls	250
Popcorn	125
Potato Chips	340
Pretzels	85

الأسئلة المقالية

FRQ

18	Volume and Surface Area of Composite Figures	1-4	503-504

1. Mya's lunchbox is shown. What is the volume of the lunchbox? Round to the nearest tenth if necessary. **(Example 1)**



Step 1: Identify the solids that compose the lunchbox.

The lunchbox is composed of a rectangular prism and a triangular prism.

Step 2: Find the volume of each solid.

Volume of the rectangular prism

V = B h Volume of a prism

V = (ℓ.w) h The base is a rectangle, so B = ℓ.w

V = (10.6)(8)(4.25) Replace ℓ with 10.6, w with 8, h with 4.25

V = 360.4 Simplify.

Volume of the triangular prism

V = B h Volume of a prism

V = $(\frac{1}{2} \cdot b \cdot h)\ h$ The base is a triangle, so B = $\frac{1}{2}$ bh

V = $(\frac{1}{2} \cdot 4.25 \cdot 8)\ 10.6$ Replace b with 4.25, h with 8, h with 10.6

V = 4 • 4.25 • 10.6 Simplify.

V = 180.2 Simplify.

So, the volume of the rectangular prism is about 360.4 in^3 and the volume of the triangular prism is about 180.2 in^3.

Step 3: Find the volume of the lunchbox.

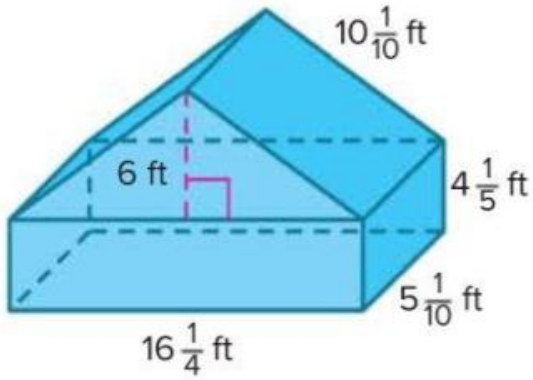
So, the total volume of the lunchbox is about 360.4 + 180.2 = 540.6 in^3.

الأسئلة المقالية

FRQ

18	Volume and Surface Area of Composite Figures	1-4	503-504

5. Find the surface area of the composite figure. Round to the nearest tenth if necessary. (Example 2)



For the rectangular prism:

Step 1: Find the area of each pair of opposite faces.

Area of sides: $2(5\frac{1}{10} \cdot 4\frac{1}{5}) = 2(\frac{51}{10} \cdot \frac{21}{5}) = 2(\frac{1071}{50}) = (\frac{1071}{25}) = 42.84\ ft^2$

Area of top and bottom: $(16\frac{1}{4} \cdot 5\frac{1}{10}) = (\frac{65}{4} \cdot \frac{51}{10}) = (\frac{13}{4} \cdot \frac{51}{2}) = (\frac{663}{8}) = 82.875\ ft^2$

Area of front and back: $2(16\frac{1}{4} \cdot 4\frac{1}{5}) = 2(\frac{65}{4} \cdot \frac{21}{5}) = 2(\frac{13}{4} \cdot \frac{21}{1}) = 2(\frac{273}{4}) = (\frac{273}{2}) = 136.5\ ft^2$

Step 2: Find the sum of the areas of the faces.

The total **surface area** of the prism is:

$42.84 + 82.875 + 136.5 = 262.215\ ft^2$.

For the triangular prism:

Step 1: Find the area of the bases and faces.

In this triangular prism, there are two congruent triangular bases. There are three rectangular faces, two of which are congruent.

Area of the bases:

Area = $2(\frac{1}{2} b \cdot h)$	There are 2 triangular bases.
Area = $2(\frac{1}{2} \cdot 16\frac{1}{4} \cdot 6)$	Substitute.
$= 2(\frac{1}{2} \cdot \frac{65}{4} \cdot 6)$	Simplify.
$= (\frac{65}{4} \cdot 6)$	Simplify.
$= (\frac{65}{2} \cdot 3)$	Simplify.
$= (\frac{195}{2})$	Simplify.
$= 97.5$	Simplify.

The combined area of the two triangular bases is 97.5 ft^2.

Area of the two rectangular Faces:

$A = 2\ (10\frac{1}{10} \cdot 5\frac{1}{10}) = 2\ (\frac{101}{10} \cdot \frac{51}{10}) = 2\ (\frac{5151}{100}) = \frac{5151}{50} = 103.02\ ft^2$

The areas of the rectangular faces is 103.02 ft^2.

Step 2: Find the sum of the areas of the faces.

The total surface area of the prism is:

$97.5 + 103.02 = 200.52\ ft^2$ of cardboard is needed to make the pizza box.

Find the total surface area of the solid.

The total surface area of the solid is $262.215 + 200.52 = 462.735\ ft^2 \approx 462.7\ ft^2$.

18	Volume and Surface Area of Composite Figures	1-4	503-504

الأسئلة المقالية

FRQ

For the rectangular prism:

Step 1: Find the area of each pair of opposite faces.

Area of sides: $2(3.5 \cdot 3.5) = 2(12.25) = 24.5\ m^2$

Area of top and bottom: $(9 \cdot 3.5) = 31.5\ m^2$

Area of front and back: $2(9 \cdot 3.5) = 2(31.5) = 63\ m^2$

Step 2: Find the sum of the areas of the faces.

The total **surface area** of the prism is:

$24.5 + 63 + 31.5 = 119\ m^2$.

For the triangular prism:

Step 1: Find the area of the bases and faces.

In this triangular prism, there are two congruent triangular bases.

There are three rectangular faces, two of which are congruent.

Area of the bases:

$\text{Area} = 2(\frac{1}{2} b \cdot h)$	There are 2 triangular bases.
$\text{Area} = 2(\frac{1}{2} \cdot 0.8 \cdot 9)$	Substitute.
$= 2(\frac{1}{2} \cdot 7.2)$	Simplify.
$= 7.2$	Simplify.

The combined area of the two triangular bases is $7.2\ m^2$.

Area of Face 1: $A = (3.5 \cdot 0.8) = 2.8\ m^2$

Area of Face 2: $A = (3.5 \cdot 9.035) = 31.6225\ m^2$

The areas of the rectangular faces is $34.4225\ m^2$.

Step 2: Find the sum of the areas of the faces.

The total surface area of the prism is:

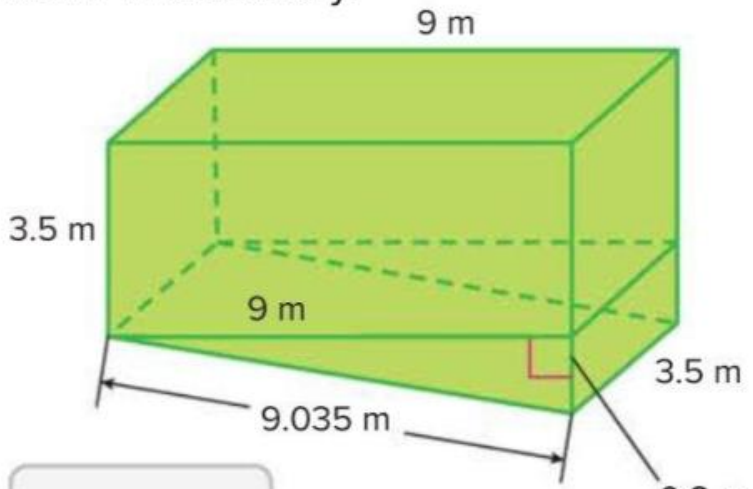
$7.2 + 34.4225 = 41.6225\ m^2$ of cardboard is needed to make the pizza box.

Find the total surface area of the solid.

The total surface area of the solid is $119 + 41.6225 = 160.6225\ ft^2 \approx 160.6\ \text{m}^2$.

Test Practice

6. Open Response Find the surface area of the composite figure. Round to the nearest tenth if necessary.



FRQ

الأسئلة المقالية

18	Volume and Surface Area of Composite Figures	1-4	503-504

2. Anson's toy rocket is shown. What is the volume of the rocket? Round to the nearest tenth if necessary. **(Example 1)**

$1.1^2 \times 8.2$ Math + $\frac{1}{3} \times 1.1^2 \times 2.1$ Math = 10.769

الأسئلة المقالية FRQ

19	Make Predictions	1-4	591

1) A school librarian is purchasing new books for her book clubs in the coming year. In order to determine how many books she needs, she randomly surveys 25 students who plan to participate in one of her book clubs in the coming year. The table shows the results. **Predict how many science fiction books she will need to purchase if 125 students participate in book club next year**

Book Club Type	Number of Students
Autobiography	2
Graphic Novel	7
Mystery	10
Science Fiction	6

$$\frac{6}{25} = \frac{s}{125}$$

The school librarian should buy 30 science fiction books.

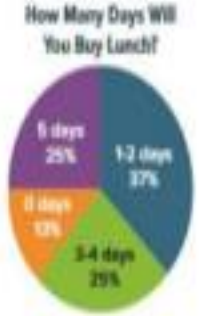
2) A smart tablet manufacturer tests 1 out of every 25 screens for flaws. Out of 125 tablets tested, 2 had defective screens. How many defective screens should the manufacturer expect out of 45,000 smart tablet.

$$\frac{2}{125} = \frac{d}{45{,}000}$$

The manufacturer should expect 720 tablets to be defected

3) The superintendent of a school district wants to project for next year's middle school lunch count. The graph shows the results of a survey of randomly selected middle students. If the district has 5,000 middle school students next year, **about how many students plan to buy lunch 1–2 days a week?**

$$\frac{37}{100} = \frac{n}{5{,}000}$$



about 1,850 students

4) The guidance department conducted a random survey of the student body and found that 16% of the students plan to volunteer at the school festival. **Predict how many volunteer positions they should plan for a population of 950 students.**

$$\frac{16}{100} = \frac{n}{950}$$

about 152 positions.

FRQ

الأسئلة المقالية

20	Surface Area	1-4	495

1) **Find the surface area** of the prism. Round to the nearest tenth if necessary.

SOLUTION:

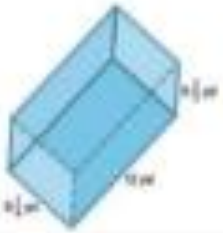
$S.A. = 2\ell h + 2\ell w + 2hw$

$= 2(12 \cdot 6\frac{2}{3}) + 2(12 \cdot 8\frac{1}{4}) + 2(6\frac{2}{3} \cdot 8\frac{1}{4})$

$= 160 + 198 + 110$

$= 468$

S.A= 468 yd^2



2) **Find the surface area** of the prism. Round to the nearest tenth if necessary.

SOLUTION:

$S.A. = 2\ell h + 2\ell w + 2hw$

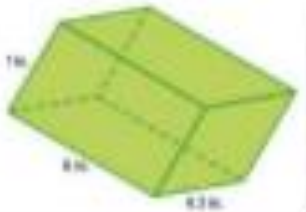
$= 2(6 \cdot 3.7) + 2(6 \cdot 4.3) + 2(3.7 \cdot 4.3)$

$= 44.4 + 51.6 + 31.82$

$= 127.82$

$= 127.8$

S.A= 127.8 in^2



3) **How much cardboard** is needed to make the single slice of pizza box shown?

Area Bases:

$A = 2(\frac{1}{2} \cdot 6.7 \cdot 11)$

Area of Face 1

$A = 6.7 \cdot 1$

$= 6.7\ in^2$

Area of Face 2

$A = 11.5 \cdot 1$

$= 11.5\ in^2$

Area of Face 3

$A = 11.5 \cdot 1$

$= 11.5\ in^2$

S.A= 73.7+6.7+11.5+11.5

S.A= 103.4 in^2

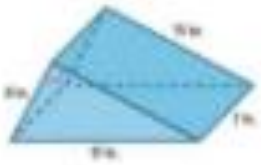
4) **What is the surface area** of the triangular prism-shaped toy car ramp shown?

Area Bases:

$A = 2(\frac{1}{2} \cdot 8 \cdot 15)$

$= 2(60)$

$= 120$



Area of Face 1

$A = 8 \cdot 7$

$= 56\ in^2$

Area of Face 2

$A = 17 \cdot 7$

$= 119\ in^2$

Area of Face 3

$A = 15 \cdot 7$

$= 105\ in^2$

S.A= 120+56+119+105 S.A= 400 in^2

5) **Find the surface area** of the pyramid. Round to the nearest tenth if necessar

$A = s^2$

$= 15.75 \cdot 15.75$

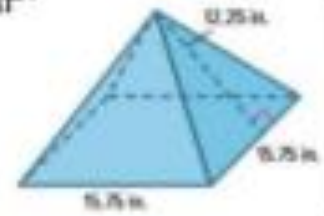
$= 248.0625$

$A = 4(\frac{1}{2}bh)$

$= 4(\frac{1}{2} \cdot 15.75 \cdot 12.25)$

$= 4(96.46875)$

$= 385.875$



S.A= 248.1+385.9

S.A= 634 in^2

6) **Find the surface area** of the pyramid. Round to the nearest tenth if necessary.

$A = \frac{1}{2}bh$

$= \frac{1}{2} \cdot 12.2 \cdot 16$

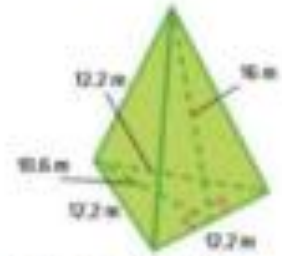
$= 64.96$

$A = 3(\frac{1}{2}bh)$

$= 3(\frac{1}{2} \cdot 12.2 \cdot 16)$

$= 3(97.6)$

$= 292.8$



S.A= 64.7+ 292.8

S.A= 357.5