

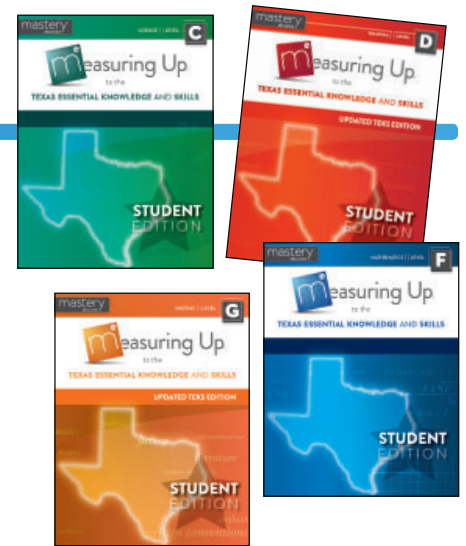
Measuring Up to the TEKS Sample Pack

Mathematics | Grade 7 | Lessons 9, 27, 31

The sample pack features:

- 3 full student lessons with complete Teacher Edition lessons
- 1 full Table of Contents for your grade level
- Lesson Correlations

Developed to meet the rigor of the TEKS, **Measuring Up** employs support for using and applying critical thinking skills with direct standards instruction that elevate and engage student thinking.



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- ✓ Step-by-Step Problem Solving
- ✓ Demonstrate Higher-Order Thinking Skills
- ✓ Multi-Step and Dual-Coded Questions
- ✓ Focus on Financial Literacy

Guided Instruction and Independent Learning strengthen learning with:

- ✓ Deep thinking prompts
- ✓ Collaborative learning
- ✓ Self-evaluation
- ✓ Demonstration of problem-solving logic
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Lesson 9 Similar Figures

- 7.5(A) Generalize the critical attributes of similarity, including ratios within and between similar shapes.
- 7.5(C) Solve mathematical and real-world problems involving similar shape and scale drawings.



Understand the TEKS

You can use proportions to solve problems involving **similar** figures.

Two figures that are similar have the same shape, but not necessarily the same size. **Corresponding** dimensions or angles in similar figures are the pair that in the same relative positions in the figure. In similar figures, corresponding angles have equal measures and the measures of corresponding dimensions are **proportional**.

Words to Know

similar
corresponding
proportional

If $\triangle ABC$ is similar to $\triangle DEF$, then the pairs of corresponding angles with equal measures are: $\angle A$ and $\angle D$, $\angle B$ and $\angle E$, and $\angle C$ and $\angle F$. The corresponding sides are \overline{AB} and \overline{DE} , \overline{BC} and \overline{EF} , and \overline{CA} and \overline{FD} . Since their measures are proportional, ratios with corresponding sides are equal. So, for $\triangle ABC$ and $\triangle DEF$: $\frac{AB}{DE} = \frac{BC}{EF}$ and $\frac{AB}{BC} = \frac{DE}{EF}$.

To solve for unknown side lengths of similar figures, set up a proportion, use a variable for the missing length, and then cross multiply to solve the proportion.



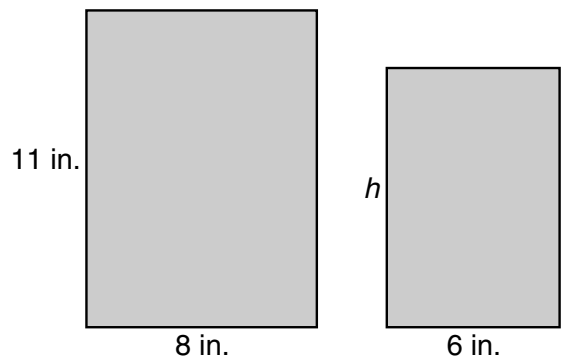
Guided Instruction

Problem 1

Two books are similar in size. The larger book is 8 inches wide and 11 inches tall. The smaller book is 6 inches wide. Will the smaller book fit on a shelf that is 9 inches tall?

Use the fact that corresponding sides of similar figures are proportional.

- Step 1** Draw a diagram to model the situation.
- Mark the given information on the diagram.
- Let h = the height of the smaller book.



- Step 2** Identify corresponding sides of the similar figures to write a proportion.

$$- = \frac{11}{h}$$

- Step 3** Solve the proportion to find the value of h .

$$8h = 6 \times \underline{\hspace{2cm}}$$

$$8h = \underline{\hspace{2cm}}$$

$$h = \underline{\hspace{2cm}}$$

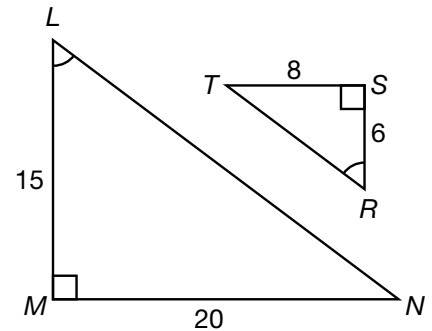
The smaller book is $\underline{\hspace{2cm}}$ inches tall.

Solution

Will the smaller book fit on a shelf that is 9 inches tall? $\underline{\hspace{2cm}}$

Problem 2

The triangles shown are similar triangles. How does the ratio of LM to MN compare to the ratio of RS to ST ? How does the ratio of LM to RS compare to the ratio of MN to ST ?



Step 1 Write each ratio in fractional form.

$$\frac{LM}{MN} = \underline{\hspace{1cm}}$$

$$\frac{RS}{ST} = \underline{\hspace{1cm}}$$

$$\frac{LM}{RS} = \underline{\hspace{1cm}}$$

$$\frac{MN}{ST} = \underline{\hspace{1cm}}$$

Step 2 Simplify each ratio.

$$\frac{LM}{MN} = \underline{\hspace{1cm}}$$

$$\frac{RS}{ST} = \underline{\hspace{1cm}}$$

$$\frac{LM}{RS} = \underline{\hspace{1cm}}$$

$$\frac{MN}{ST} = \underline{\hspace{1cm}}$$

Step 3 Compare the ratios.

$$\frac{LM}{MN} \underline{\hspace{1cm}} \frac{RS}{ST}$$

$$\frac{LM}{RS} \underline{\hspace{1cm}} \frac{MN}{ST}$$

Note that because $\angle L$ and $\angle R$ are marked as congruent, similarity is such that $\triangle LMN$ is similar to $\triangle RST$. Therefore, the ratios defined in this problem relate corresponding sides: LM and RS as well as MN and ST .

How does the ratio of LM to MN compare to the ratio of RS to ST ?

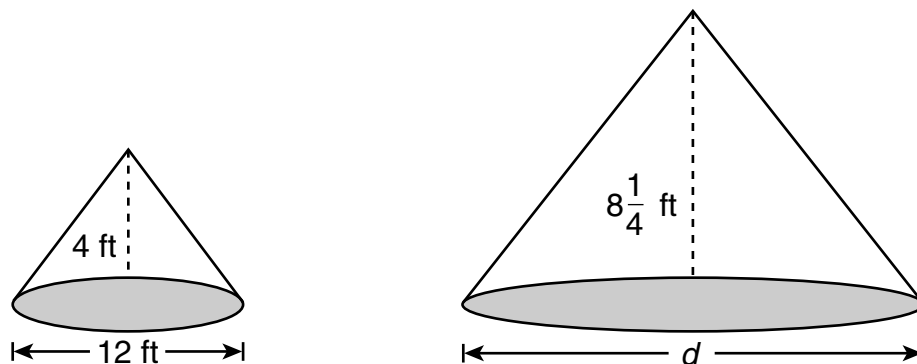
How does the ratio of LM to RS compare to the ratio of MN to ST ?

Solution

Another Example

At the park, there are two similar fountains. The smaller fountain has a diameter of 12 feet and a height of 4 feet. The larger fountain has a height of $8\frac{1}{4}$ feet. Estimate the diameter of the larger fountain.

Since the fountains are similar, we know that their dimensions are proportional.



Since the larger fountain's height is approximately twice the height of the smaller fountain, its diameter is approximately twice the diameter of the smaller fountain.

$$12 \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

The larger fountain's diameter is about feet.



Critical Thinking

Solve each problem.



- 1.** In triangle MAY , $MA = 4$ feet, $AY = 8$ feet, and $MY = 10$ feet. It is similar to triangle ROW . Jackie said that $RO = 8$ feet, $OW = 4$ feet, and $RW = 20$ feet. Find the error in her reasoning.



- 2.** Work with a partner to create similar rectangles and analyze the areas. One partner cuts out a small rectangle and record the measurements. The other partner cuts out a rectangle with dimensions that are doubled. Use observation to record the number of small rectangles that would fit inside the area of the large rectangle. Record the areas of both rectangles. Now, repeat the activity - this time creating a large rectangle with dimensions that are tripled. Is the ratio of corresponding dimensions ratios the same as the ratio of areas? Record your observations in your math journal.



- 3.** You can find the height of an object without measuring it if you can measure its shadow and another object's height and shadow. Work with a partner. Find an object that is too tall to be measured directly, but that is casting a shadow with a length you can measure (e.g., school building, flagpole, etc.). Then, measure the height of one of you and your shadow. Use similar triangles to find the height of the immeasurable object. Make a poster of your findings and discuss your results with the class. Did you all come up with the same ratio to use in your proportion?



- 4.** Work in groups. Open a spreadsheet file and set up 4 columns with the following headings: Furniture Item, D, W, H. Using the standard measurements for furniture below, set up a formula to find the sizes of similar figures for miniature replicas. Use a $\frac{1}{12}$ (.083) ratio. You will need two rows for each piece of furniture: full size and miniature size. Make sure to place each measurement in a separate cell so you can apply the formula.

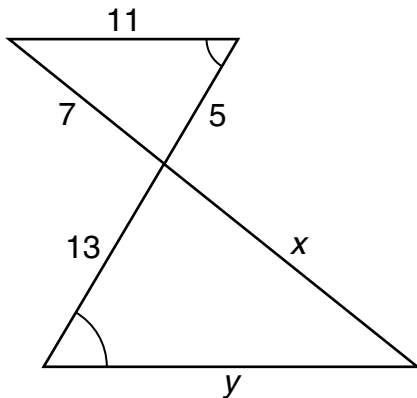
Standard measurements: Couch: $36''$ D \times $84''$ W \times $36''$ H; Loveseat: $36''$ D \times $60''$ W \times $36''$ H
 Armchair: $36''$ D \times $36''$ W \times $36''$ H; Coffee table: $30''$ W \times $48''$ L \times $18''$ H



★ Practice

DIRECTIONS Read each question. Then circle the letter for the correct answer.

- 1** Two similar triangular pastures meet at a vertex. The dimensions are given in yards. How much fencing would be needed to enclose the larger pasture?



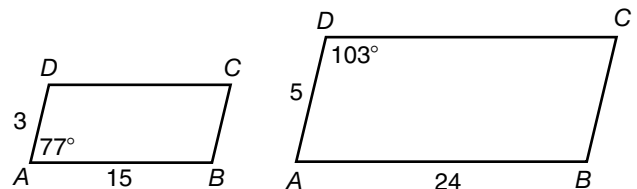
- A** 28.2 yards
B 42.7 yards
C 47 yards
D 59.8 yards
-
- 2** The ratio of the corresponding dimensions of two similar rectangles is 3 : 2. The ratio of the length to width for each is 4 : 3. If the width of the smaller rectangle is 120, what is the length of the larger rectangle?

- F** 135
G 160
H 180
J 240

- 3** A tree casts a shadow 20 feet long. At the same time, a boy 5.5 feet tall casts a shadow 8 feet long. Which proportion CANNOT be used to find the height of the tree?

- A** $\frac{5.5}{8} = \frac{20}{x}$
B $\frac{5.5}{x} = \frac{8}{20}$
C $\frac{8}{5.5} = \frac{20}{x}$
D $\frac{20}{5.5} = \frac{8}{x}$

- 4** Ellen has created a design using two parallelograms. Determine whether the parallelograms in the design are similar or not.



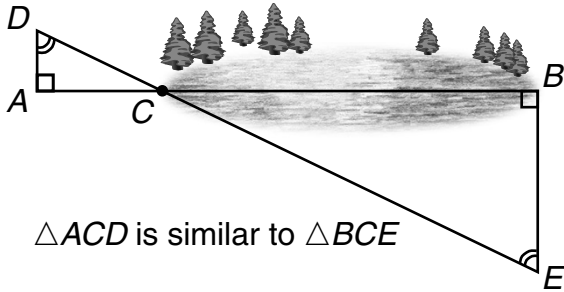
- F** No, because the angles do not have equal measures
G No, because $\frac{15}{24} \neq \frac{3}{5}$
H No, because $5 - 3 \neq 24 - 15$
J Yes, because 3 : 15 is equivalent to 5 : 24



★ Assessment

DIRECTIONS Read each question. Then circle the letter for the correct answer.

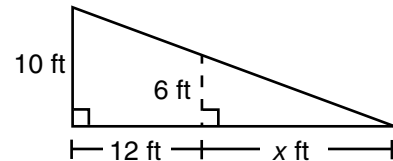
- 1 A surveyor found a distance across a pond by measuring similar triangles ACD and BCE on land.



If $AD = 10$ yards, $AC = 45$ yards, and $BE = 60$ yards, what is the distance across the pond?

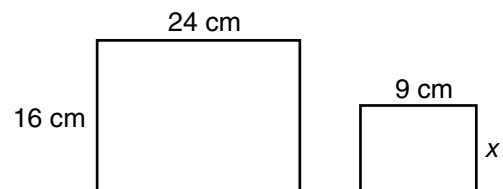
- A 13.33 yards
 B 95 yards
 C 270 yards
 D 360 yards
-
- 2 A man, who is t feet tall, leans against a building by putting his hand h inches up the side of the building. In a photo of the man, he is p feet tall. How many inches up the building is the man's hand in the photo if $h = 9t$?
- F 9
 G $9p$
 H $9tp$
 J $\frac{p}{9}$

- 3 The two right triangles shown are similar.



What is the value of x ?

- A 18
 B 7.2
 C 30
 D 8
-
- 4 The two rectangles shown are similar.



Which relationship could be used to find x ?

- F $\frac{24}{9} = \frac{x}{16}$
 G $16x = 24 \times 9$
 H $\frac{x}{9} = \frac{9}{24}$
 J $24x = 9 \times 16$



Surface Area of Prisms

7.9(D) Solve problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prism, and triangular pyramid by determining the area of the shape's net.



Understand the TEKS

The **surface area** of a solid figure is the sum of the areas of the **lateral faces**, or side faces, plus the total area of the bases. The **lateral area** is the total area of the lateral faces only.

You can use a net to find the surface area of a prism. A **net** is a diagram of a two-dimensional shape that can be folded to form a three-dimensional figure. It allows you to see a three-dimensional solid in two dimensions, which can make it easier to find the area of each face. A net can also be used to derive or understand formulas to calculate surface area.

A prism has two bases and lateral faces. You can use the formula $SA = BA + LA$ to find the surface area of any prism, which shows that the sum of the area of the bases plus the area of the lateral faces is the whole surface area.

You can also use the formula $SA = 2lw + 2lh + 2wh$ to find surface area of a rectangular prism, where l = length, w = width, and h = height.

Words to Know
surface area
lateral face
lateral area
net



Guided Instruction

Problem 1

A company designed a new cereal box that is 11 inches tall, 2 inches deep, and 8 inches wide. How much cardboard is needed to make the box? Use a net to find the answer.

Use a net to find the surface area of the box.

Step 1 A net has been drawn for you.

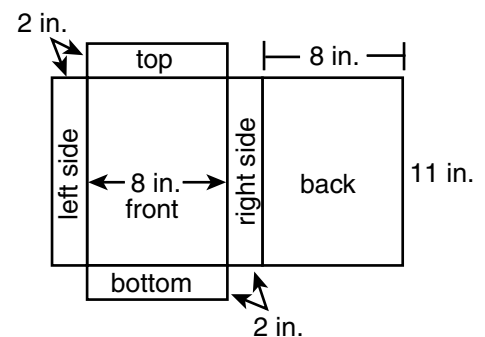
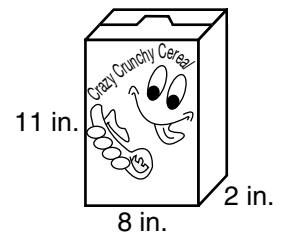
How many faces does the box have? _____

Look for congruent faces that have the same area.

Which face has the same area as the front?

Which face has the same area as the top?

Which face has the same area as the left side?



Step 2 Find the lateral areas and the base areas.

The front and back each has an area of _____ in.²

The left side and right side each has an area of _____ in.²

The top and bottom each has an area of _____ in.²

Step 3 Add the lateral areas and base areas to find the total surface area.

Total surface area: _____ in.² + _____ in.² + _____ in.²
 = _____ in.²

Solution

How much cardboard is needed to make the box? _____

Problem 2

Ralph is building a toy chest made of wood. The toy chest will be $2\frac{1}{2}$ feet high, 3 feet long, and $1\frac{1}{2}$ feet wide. How much wood does Ralph need? Use a formula to find the answer.

Develop and use a formula to find the surface area (S) of a rectangular prism.

Step 1 Look at the three diagrams. Find the areas of each of the opposite faces in terms of l , w , and h .

Complete the formula for surface area as the sum of these areas.

$SA = 2lw + 2lh +$ _____

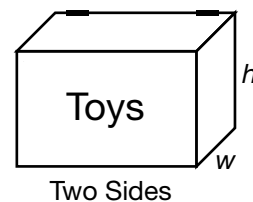
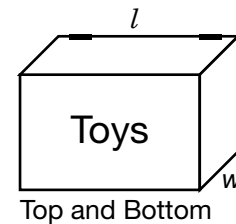
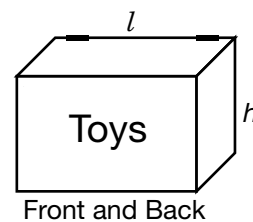
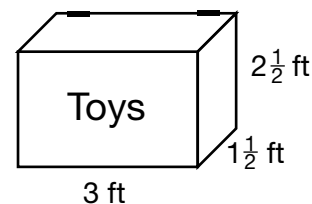
Step 2 Find the surface area.

Substitute the dimensions into the formula above.

$SA = 2(\text{_____} \times \text{_____}) + 2(\text{_____} \times \text{_____})$
 $\text{_____} + 2(\text{_____} \times \text{_____})$

$SA = \text{_____} \text{ ft}^2 + \text{_____} \text{ ft}^2 + \text{_____} \text{ ft}^2$

$SA = \text{_____} \text{ ft}^2$

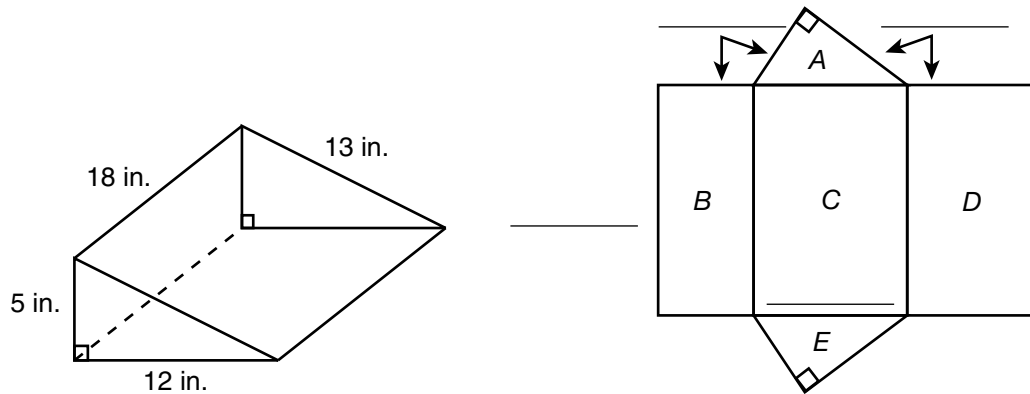


Solution

How much wood does Ralph need? _____

Problem 3

What is the surface area of the plastic container? Label the net.



Use the net to find the surface area.

Step 1 Label the dimensions on the net.

Step 2 Find the lateral areas and the base areas.

$$\text{Area of face A: } \frac{1}{2} \times 5 \text{ in.} \times \underline{\hspace{2cm}} \text{ in.} = \underline{\hspace{2cm}} \text{ in.}^2$$

$$\text{Area of face B: } 5 \text{ in.} \times \underline{\hspace{2cm}} \text{ in.} = \underline{\hspace{2cm}} \text{ in.}^2$$

$$\text{Area of face C: } \underline{\hspace{2cm}} \text{ in.} \times 18 \text{ in.} = \underline{\hspace{2cm}} \text{ in.}^2$$

$$\text{Area of face D: } \underline{\hspace{2cm}} \text{ in.} \times 18 \text{ in.} = \underline{\hspace{2cm}} \text{ in.}^2$$

$$\text{Area of face E: } \underline{\hspace{2cm}} = \underline{\hspace{2cm}} \text{ in.}^2$$

Step 3 Add the lateral areas and base areas to find the total surface area.

$$\text{Total surface area: } \underline{\hspace{10cm}}$$

$$= \underline{\hspace{2cm}} \text{ in.}^2$$

Solution

What is the surface area of the plastic container? _____



Critical Thinking

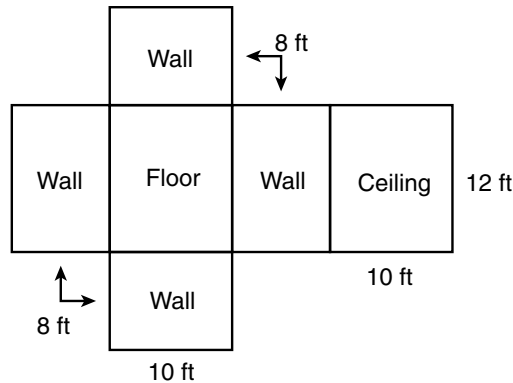
Solve each problem.



1. Work with a partner to write and simplify a formula for the surface area of a cube with side length c . Then, find a three-dimensional solid in your classroom that appears to be a cube. Measure its dimensions, draw a net of the solid on a poster board, and label the side lengths. Find the surface area using the net. Determine whether you could have used the formula you developed. Show your calculations, results, and conclusions on your poster board. Discuss your results with the class.



2. Paul's room is shown. He determines how much paint he will need by finding the total lateral area. What is he painting? Will a gallon of paint be enough if it covers 500 square feet? Explain your reasoning.





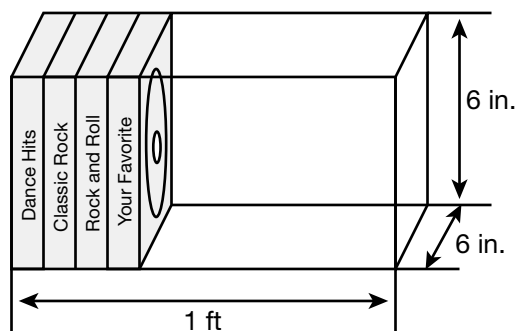
3. Bill has an inground pool in his back yard. The pool is 12 feet wide, 25 feet long, and 4 feet deep. At the beginning of the season, before he fills the pool with water, he hires someone to clean all of the surfaces. The pool cleaner charges \$0.40 per square foot to clean the pool. How much will Bill have to pay to have the pool cleaned? Explain how you found the answer.



★ Practice

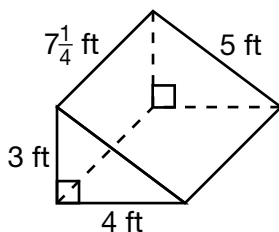
DIRECTIONS Read each question. Then circle the letter for the correct answer.

- 1 Ed built a case for his CDs. He left the two ends of the case open so he could slide in the CDs from either side.



How much wood did he use to make the case?

- A 2 sq ft
 B 2.5 sq ft
 C 24 sq ft
 D 96 sq ft
-
- 2 Which expression represents the surface area for the prism?

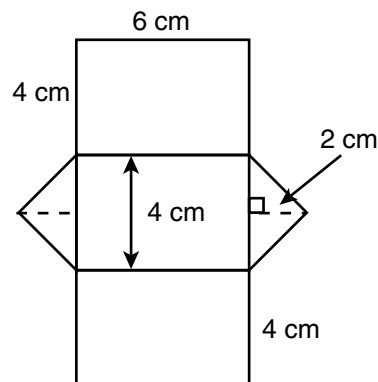


- F $2 \times \left(\frac{1}{2} \times 4 \times 3\right) + 7\frac{1}{4} \times (3 + 4 + 5)$
 G $\left(\frac{1}{2} \times 4 \times 3\right) + 4 \times 3 + 4 \times 7\frac{1}{4} + 4 \times 5$
 H $2 \times (4 \times 3) + 7\frac{1}{4} \times 3 + 7\frac{1}{4} \times 4 + 7\frac{1}{4} \times 5$
 J $7\frac{1}{4} \times 3 + 7\frac{1}{4} \times 4 + 7\frac{1}{4} \times 5$

- 3 The drama club is painting some 3-foot-wide cubes to be used for the school play. One can of paint will cover up to 220 ft². What is the maximum number of whole cubes that can be completely painted with one can of paint?

- A 3 cubes
 B 4 cubes
 C 6 cubes
 D 8 cubes
-

- 4 A plastic toy is in the shape of a triangular prism. Ben drew a net.



What is the surface area of the prism?

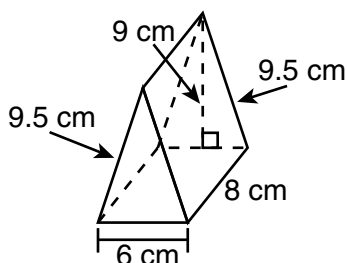
- F 72 cm²
 G 80 cm²
 H 84 cm²
 J 88 cm²
-
- 5 A cube's side length changes from 3 to 5 meters. What happens to the surface area?
- A It increases by 2 m².
 B It increases by 4 m².
 C It increases by 16 m².
 D It increases by 96 m².



★ Assessment

DIRECTIONS Read each question. Then circle the letter for the correct answer.

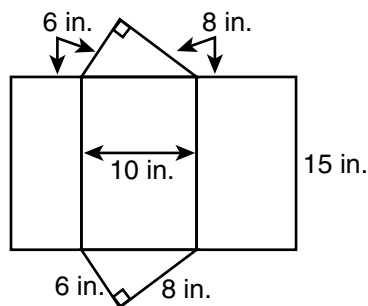
1 An eraser is shown.



What would be the surface area of two erasers?

- A 508 cm²
- B 514 cm²
- C 604 cm²
- D 628 cm²

2 Which expression represents the lateral area of the prism?



- F $\frac{1}{2} \times 10 \times 6 + 10 \times 15 + \frac{1}{2} \times 10 \times 8$
- G $6 \times 10 + 8 \times 10 + 15 \times 10$
- H $2 \times \left(\frac{1}{2} \times 6 \times 8\right) + 15 \times (8 + 10 + 6)$
- J $15 \times (8 + 10 + 6)$

3 Freddie is asked to find the surface area of a prism that has six faces. He is given three unique dimensions: t , $10t$, and $100t$. Which statement best describes whether he can find the surface area with the information given?

- A No, because he cannot determine the type of prism
- B No, because he does not have all of the dimensions
- C Yes, the surface area is $2,220(t)(t)$
- D Yes, the surface area is $1,110(t)(t)$

4 Corrine used 4.86 ft² of wrapping paper to wrap a gift in a cubic box. What is the length of one edge of the box, in feet?

Record your answer and fill in the bubbles on the following grid. Be sure to use the correct place value.

					.		
+	0	0	0	0		0	0
-	1	1	1	1		1	1
	2	2	2	2		2	2
	3	3	3	3		3	3
	4	4	4	4		4	4
	5	5	5	5		5	5
	6	6	6	6		6	6
	7	7	7	7		7	7
	8	8	8	8		8	8
	9	9	9	9		9	9



Lesson 31

Net Worth

7.13(C) Create and organize a financial assets and liabilities record and construct a net worth statement.



Understand the TEKS

An **asset** is something a person owns. You might own a video game system. An adult might own a car. These are assets. Houses, boats, jewelry, and any other valuables are assets. Other assets include cash or any money you have in savings, checking, or other kinds of bank accounts. Money that is owed to you is also an asset. If your sister borrowed \$10 and owes it back to you, the money she owes you is an asset.

A **liability** is an amount you owe, or a debt. You might owe \$5 to your parents. An adult might owe money for a **mortgage**, which is money borrowed to buy a home. A **student loan**, which is money borrowed to pay for college, is also a liability. Any kind of loan, including credit card debt, is a liability. When people use a credit card, they are really borrowing money from a bank. The person pays the money back when the credit card bill is due.

Subtracting the total liabilities from the total assets gives a person's **net worth**. A convenient way of determining net worth is by creating a record of assets and liabilities. This statement is sometimes described as a balance sheet. Suppose Mr. and Mrs. Smith have a home worth \$225,000 and bank accounts and investments totaling \$45,000. They have furniture, art, cars, and other possessions valued at \$30,000. They have a mortgage of \$80,000 and a car loan of \$6,000.

Complete the table below to create a net worth statement for the Smiths.

Assets	Amount (\$)	Liabilities	Amount (\$)
Home		Mortgage	
Bank accounts		Car loan	
Furniture, art, cars, other			
Total Assets		Total Liabilities	

Net worth = total assets – total liabilities

In this example, the Smiths' net worth is \$_____ – \$_____ = \$_____.

Net worth can change over time. Suppose this couple pays off some loans or increases their savings. Then their net worth increases. If instead, they take out a loan for another car or spend some of their savings to take vacation, their net worth can decrease. Ideally, people should work to increase their net worth over time. Keep in mind that the term *net worth* refers to financial status only. It in no way measures the true value of someone as a person.

Words to Know

- asset
- liability
- mortgage
- student loan
- net worth



Guided Instruction

Problem 1

The Jones family listed their assets and liabilities in a chart. What is their net worth?

Item	Amount	Asset or Liability?
Mortgage	\$200,000	
Credit-card balances	\$8,000	
Cash	\$1,200	
Retirement accounts	\$30,000	
Value of home	\$250,000	
Value of cars	\$45,000	
Installment plan for television and sound system	\$3,000	
Value of home furnishings	\$10,000	

Step 1 Label each entry in the table as A for asset or L for liability.

Step 2 Find the total assets.

$$\begin{aligned}
 & \$ \underline{\hspace{2cm}} + \$ \underline{\hspace{2cm}} + \$ \underline{\hspace{2cm}} + \$ \underline{\hspace{2cm}} + \$ \underline{\hspace{2cm}} \\
 & = \$ \underline{\hspace{2cm}}
 \end{aligned}$$

Step 3 Find the total liabilities.

$$\$ \underline{\hspace{2cm}} + \$ \underline{\hspace{2cm}} + \$ \underline{\hspace{2cm}} = \$ \underline{\hspace{2cm}}$$

Step 4 Subtract total liabilities from total assets.

$$\$336,200 - \$211,000 = \$ \underline{\hspace{2cm}}$$

Solution

What is their net worth? \$

Problem 2

Jed is applying for a loan of \$50,000. He must have a net worth that is greater than or equal to the amount of the loan in order to be approved. Jed's assets and liabilities are listed below. What is Jed's net worth? Will Jed be able to get the loan based on his net worth?

Mortgage: \$160,000 _____	Value of furniture: \$5,000 _____	Credit card balances: \$4,000 _____
Motorcycle loan: \$7,600 _____	Value of tools: \$3,000 _____	Value of home: \$205,000 _____
Savings account: \$6,500 _____	Student loan: \$15,000 _____	Value of electronics: \$2,100 _____

Step 1 Label each entry in the table as A for asset or L for liability.

Step 2 Find the total assets.

$$\begin{aligned}
 & \$ \text{_____} + \$ \text{_____} + \$ \text{_____} + \$ \text{_____} + \$ \text{_____} \\
 & = \$ \text{_____}
 \end{aligned}$$

Step 3 Find the total liabilities.

$$\$ \text{_____} + \$ \text{_____} + \$ \text{_____} + \$ \text{_____} = \$ \text{_____}$$

Step 4 Subtract total liabilities from total assets.

$$\$221,600 - \$186,600 = \$ \text{_____}$$

Step 5 Compare his net worth to the amount required for the loan.

Write a symbol to compare the amounts.

$$\$35,000 \text{ _____ } \$50,000$$

Is Jed's net worth great enough to get the loan? _____

Solution

Jed's net worth is \$ _____. Will Jed be able to get the loan based on his net worth?



Critical Thinking

Solve each problem.



- 1.** Debbie has a membership at a local gym. She pays dues of \$30 each month to belong. Explain why this amount is not considered an asset or a liability.



- 2.** Scott's assets and liabilities are shown. Then he refinances his mortgage to reduce it by \$50,000. He spends \$2,500 of his savings to file the documents to refinance the mortgage. What is Scott's net worth before and after he refinances his mortgage? By how much does his net worth change?

Mortgage: \$260,000	Value of electronics: \$4,000	Value of home: \$310,000
Savings account: \$8,000	Value of music collection: \$9,000	Value of furniture: \$8,500
Credit card balances: \$7,000	Student loan: \$9,000	Value of car: \$35,000



- 3.** Tommy collects comic books. His collection is valued at \$825. He borrowed \$100 from his parents to buy some of his books. Based on these two amounts, what is Tommy's net worth? Explain how you found the answer. Predict how his net worth will change if he sells some of his comic books for more than he bought them for.



★ Practice

DIRECTIONS Read each question. Then circle the letter for the correct answer.

- 1** Ben's baseball card collection is valued at \$250. He owes \$50.50 to his parents. He has \$28.75 saved in his piggy bank. What is Ben's net worth?

A \$170.75
B \$228.25
C \$278.78
D \$300.50

- 2** Paula is creating a net worth statement. Which of the following should she list as an asset?

F She has a mortgage on her home.
G She has an installment plan to pay for her furniture.
H She pays \$12 each month to her hiking club.
J She inherited diamond earrings from her grandmother.

- 3** Joe listed some of his assets and liabilities.

Assets	Liabilities
Boat: \$90,000	Boat loan: \$62,000
Electronics: \$3,500	Credit card balances: \$6,800
Investments: \$12,200	

What is Joe's net worth, based on the chart?

A \$36,900 **C** \$105,700
B \$68,800 **D** \$174,500

- 4** Angie has a car worth \$18,200. She has \$525 in cash, and \$2,800 in her savings account. Her only debt is the loan she took out to buy the car.

If Angie's net worth is \$9,025, what is the amount of her loan?

F \$5,850
G \$9,025
H \$11,825
J \$12,500

- 5** Fred just graduated from college and is making a net worth statement. His net worth is currently negative.

Assets	Liabilities
Car: \$15,000	Student loan: \$16,500
Stamp collection: \$1,200	Credit card balances: \$350

What can Fred do with his next paycheck to get his net worth to zero?

A Put \$500 in savings.
B Sell half of his stamp collection.
C Pay \$650 toward his student loan.
D Pay off his credit card balance.



★ Assessment

DIRECTIONS Read each question. Then circle the letter for the correct answer.

- 1** Carlos is creating a net worth statement. Which of the following should he list as a liability?
- A** He has a retirement account worth \$65,000.
- B** He has several savings bonds.
- C** He has a credit card balance of \$3,000.
- D** He spends \$200 per month for childcare.

- 2** Teresa listed some of her assets and liabilities.

Assets	Liabilities
Home: \$180,000	Mortgage: \$145,000
Furnishings: \$2,100	Credit card balances: \$2,400
Savings: \$4,600	Student loan: \$5,500

She takes money out of her savings account to pay her credit-card balance. What happens to her net worth?

- F** It decreases by \$2,400.
- G** It increases by \$2,400.
- H** It increases by \$4,800.
- J** It stays the same.
- 3** Tyler has a car worth \$11,000, \$4,300 in savings, and \$1,200 in skateboard supplies. He is repaying a loan for \$5,800 to buy the car. What is Tyler's net worth?
- A** \$5,800 **C** \$10,700
- B** \$8,300 **D** \$11,300

- 4** Cheryl is making a net worth statement. She lists her savings and retirement accounts along with the value of her home, car, and furniture as assets. She lists her mortgage, car loan, and the amount she spends on painting supplies as liabilities. Which error does she make?
- F** The value of her home is not an asset, because she owes money for it.
- G** The value of her car is not an asset, because she took out a loan for it.
- H** The car loan is not a liability, because she pays it over time.
- J** The amount she spends on painting supplies is not a liability.

- 5** The Diaz family is creating a net worth statement summary.

Assets	Liabilities
Home: \$300,000	Mortgage: \$250,000
Home furnishings: \$12,000	Installment plan for swimming pool: \$20,000
Retirement accounts: \$48,000	Car loans: \$25,000

If their net worth is \$68,100, what are the amounts of their savings and credit card balances?

- A** Savings: \$8,200; Credit Card: \$8,200
- B** Savings: \$8,200; Credit Card: \$5,100
- C** Savings: \$200; Credit Card: \$8,100
- D** Savings: \$9,200; Credit Card: \$3,800

Teacher Edition



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Ⓡ = Readiness standard

Ⓢ = Supporting standard

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Measuring Up Supplements

Practice Tests

These assessments, written to match the STAAR® blueprints, will help students prepare for the rigor of the STAAR® and are included as blackline masters in the Teacher Edition. They are also available in *Measuring Up Insight*®.

Measuring Up Insight

This Web-based formative assessment program allows teachers to administer pre-made tests (including the STAAR®-emulating Practice Tests), and create and assign custom tests. Analytic reports help monitor student results and customize instruction, review, and remediation.

Measuring Up MyQuest®

Student-centered, standards-based Web-based drill with integrated games makes mastering the TEKS fun. Optional linking to Insight makes practice purposeful.



Lesson Correlation to the Grade 7 Texas Essential Knowledge and Skills

This worktext is customized to the *Texas Essential Knowledge and Skills* and will help you prepare for the *State of Texas Assessments of Academic Readiness (STAAR®)* in Mathematics for Grade 7.

Mathematical process standards are not listed under separate lessons. Because application of mathematical process standards is part of each knowledge statement, these standards are incorporated into instruction and practice throughout the lessons.

Texas Essential Knowledge and Skills	Measuring Up Lessons
TEKS 7.2 Number and operations. The student applies mathematical process standards to represent and use rational numbers in a variety of forms.	
(A) extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of rational numbers	1
TEKS 7.3 Number and operations. The student applies mathematical process standards to add, subtract, multiply, and divide while solving problems and justifying solutions.	
(A) add, subtract, multiply, and divide rational numbers fluently	2, 3
(B) apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers	2, 3
TEKS 7.4 Proportionality. The student applies mathematical process standards to represent and solve problems involving proportional relationships.	
(A) represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including $d = rt$	4, 5
(B) calculate unit rates from rates in mathematical and real-world problems	4, 5
(C) determine the constant of proportionality ($k = \frac{y}{x}$) within mathematical and real-world problems	4, 5
(D) solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems	6, 7
(E) convert between measurement systems, including the use of proportions and the use of unit rates	8
TEKS 7.5 Proportionality. The student applies mathematical process standards to use geometry to describe or solve problems involving proportional relationships.	
(A) generalize the critical attributes of similarity, including ratios within and between similar shapes	9
(B) describe π as the ratio of the circumference of a circle to its diameter	5
(C) solve mathematical and real-world problems involving similar shape and scale drawings	9, 10
TEKS 7.6 Proportionality. The student applies mathematical process standards to use probability and statistics to describe or solve problems involving proportional relationships.	
(A) represent sample spaces for simple and compound events using lists and tree diagrams	11
(B) select and use different simulations to represent simple and compound events with and without technology	13
(C) make predictions and determine solutions using experimental data for simple and compound events	16
(D) make predictions and determine solutions using theoretical probability for simple and compound events	16
(E) find the probabilities of a simple event and its complement and describe the relationship between the two	12
(F) use data from a random sample to make inferences about a population	17
(G) solve problems using data represented in bar graphs, dot plots, and circle graphs, including part-to-whole and part-to-part comparisons and equivalents	17
(H) solve problems using qualitative and quantitative predictions and comparisons from simple experiments	11
(I) determine experimental and theoretical probabilities related to simple and compound events using data and sample spaces	12, 13, 14, 15
TEKS 7.7 Expressions, equations, and relationships. The student applies mathematical process standards to represent linear relationships using multiple representations.	
(A) represent linear relationships using verbal descriptions, tables, graphs, and equations that simplify to the form $y = mx + b$	19, 20

Texas Essential Knowledge and Skills	<i>Measuring Up Lessons</i>
TEKS 7.8 Expressions, equations, and relationships. The student applies mathematical process standards to develop geometric relationships with volume.	
(A) model the relationship between the volume of a rectangular prism and a rectangular pyramid having both congruent bases and heights and connect that relationship to the formulas	24
(B) explain verbally and symbolically the relationship between the volume of a triangular prism and a triangular pyramid having both congruent bases and heights and connect that relationship to the formulas	24
(C) use models to determine the approximate formulas for the circumference and area of a circle and connect the models to the actual formulas	25
TEKS 7.9 Expressions, equations, and relationships. The student applies mathematical process standards to solve geometric problems.	
(A) solve problems involving the volume of rectangular prisms, triangular prisms, rectangular pyramids, and triangular pyramids	24
(B) determine the circumference and area of circles	25
(C) determine the area of composite figures containing combinations of rectangles, squares, parallelograms, trapezoids, triangles, semicircles, and quarter circles	25, 26
(D) solve problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prism, and triangular pyramid by determining the area of the shape's net	27, 28
TEKS 7.10 Expressions, equations, and relationships. The student applies mathematical process standards to use one-variable equations and inequalities to represent situations.	
(A) write one-variable, two-step equations and inequalities to represent constraints or conditions within problems	22
(B) represent solutions for one-variable, two-step equations and inequalities on number lines	21
(C) write a corresponding real-world problem given a one-variable, two-step equation or inequality	22
TEKS 7.11 Expressions, equations, and relationships. The student applies mathematical process standards to solve one-variable equations and inequalities.	
(A) model and solve one-variable, two-step equations and inequalities	21, 22
(B) determine if the given value(s) make(s) one-variable, two-step equations and inequalities true	23
(C) write and solve equations using geometry concepts, including the sum of the angles in a triangle, and angle relationships	23
TEKS 7.12 Measurement and data. The student applies mathematical process standards to use statistical representations to analyze data.	
(A) compare two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads	18
(B) use data from a random sample to make inferences about a population	18
(C) compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations	18
TEKS 7.13 Personal financial literacy. The student applies mathematical process standards to develop an economic way of thinking and problem solving useful in one's life as a knowledgeable consumer and investor.	
(A) calculate the sales tax for a given purchase and calculate income tax for earned wages	29
(B) identify the components of a personal budget, including income; planned savings for college, retirement, and emergencies; taxes; and fixed and variable expenses, and calculate what percentage each category comprises of the total budget	30
(C) create and organize a financial assets and liabilities record and construct a net worth statement	31
(D) use a family budget estimator to determine the minimum household budget and average hourly wage needed for a family to meet its basic needs in the student's city or another large city nearby	30
(E) calculate and compare simple interest and compound interest earnings	33
(F) analyze and compare monetary incentives, including sales, rebates, and coupons	32

Lesson 9

Similar Figures

- 7.5(A) Generalize the critical attributes of similarity, including ratios within and between similar shapes.
- 7.5(C) Solve mathematical and real-world problems involving similar shape and scale drawings.

Different aspects of 7.5(C) are covered in different lessons.

Understand the TEKS

You can use proportions to solve problems involving **similar** figures.

Two figures that are similar have the same shape, but not necessarily the same size. **Corresponding** dimensions or angles in similar figures are the pair that in the same relative positions in the figure. In similar figures, corresponding angles have equal measures and the measures of corresponding dimensions are **proportional**.

Words to Know
similar
corresponding
proportional

If $\triangle ABC$ is similar to $\triangle DEF$, then the pairs of corresponding angles with equal measures are: $\angle A$ and $\angle D$, $\angle B$ and $\angle E$, and $\angle C$ and $\angle F$. The corresponding sides are AB and DE , BC and EF , and CA and FD . Since their measures are proportional, ratios with corresponding sides are equal. So, for $\triangle ABC$ and $\triangle DEF$: $\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$.

To solve for unknown side lengths of similar figures, set up a proportion, use a variable for the missing length, and then cross multiply to solve the proportion.

Guided Instruction

Problem 1

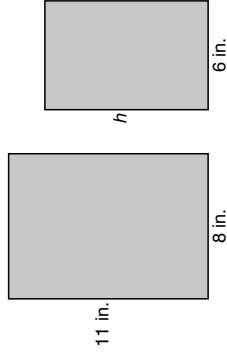
Two books are similar in size. The larger book is 8 inches wide and 11 inches tall. The smaller book is 6 inches wide. Will the smaller book fit on a shelf that is 9 inches tall?

Use the fact that corresponding sides of similar figures are proportional.

Step 1 Draw a diagram to model the situation.

Mark the given information on the diagram.

Let h = the height of the smaller book.



Step 2 Identify corresponding sides of the similar figures to write a proportion.

$$\frac{8}{6} = \frac{11}{h}$$

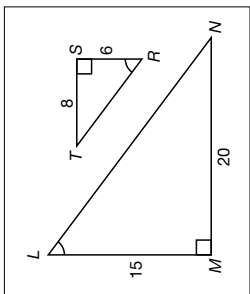
Step 3 Solve the proportion to find the value of h .

$$8h = 6 \times 11$$

$$8h = 66$$

$h = 8.25$
 The smaller book is 8.25 inches tall.

Solution Will the smaller book fit on a shelf that is 9 inches tall? yes



The triangles shown are similar triangles. How does the ratio of LM to MN compare to the ratio of RS to ST ? How does the ratio of LM to RS compare to the ratio of MN to ST ?

Problem 2

Step 1 Write each ratio in fractional form.

$$\frac{LM}{MN} = \frac{15}{20}$$

$$\frac{RS}{ST} = \frac{6}{8}$$

$$\frac{LM}{RS} = \frac{15}{6}$$

$$\frac{MN}{ST} = \frac{20}{8}$$

Step 2 Simplify each ratio.

$$\frac{LM}{MN} = \frac{3}{4}$$

$$\frac{RS}{ST} = \frac{3}{4}$$

$$\frac{LM}{RS} = \frac{5}{2}$$

$$\frac{MN}{ST} = \frac{5}{2}$$

Step 3 Compare the ratios.

$$\frac{LM}{MN} = \frac{RS}{ST}$$

$$\frac{LM}{RS} = \frac{MN}{ST}$$

Note that because $\angle L$ and $\angle R$ are marked as congruent, similarity is such that $\triangle LMN$ is similar to $\triangle RST$. Therefore, the ratios defined in this problem relate corresponding sides: LM and RS as well as MN and ST .

How does the ratio of LM to MN compare to the ratio of RS to ST ?
 The ratios are equal.

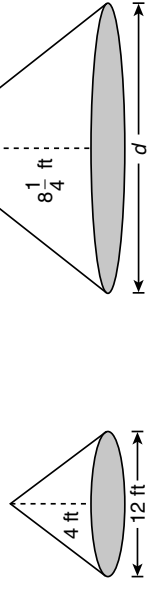
How does the ratio of LM to RS compare to the ratio of MN to ST ?
 The ratios are equal.

Solution

Another Example

At the park, there are two similar fountains. The smaller fountain has a diameter of 12 feet and a height of 4 feet. The larger fountain has a height of $8\frac{1}{4}$ feet. Estimate the diameter of the larger fountain.

Since the fountains are similar, we know that their dimensions are proportional.



Since the larger fountain's height is approximately twice the height of the smaller fountain, its diameter is approximately twice the diameter of the smaller fountain.

$$12 \times 2 = 24$$

The larger fountain's diameter is about 24 feet.

Critical Thinking

Solve each problem.



1. In triangle MAY , $MA = 4$ feet, $AY = 8$ feet, and $MY = 10$ feet. It is similar to triangle ROW . Jackie said that $RO = 8$ feet, $OW = 4$ feet, and $RW = 20$ feet. Find the error in her reasoning.

Sample answer: Two sides in ROW are twice as long as the corresponding sides in MAY . The other is half as long. The sides are not all proportional.
She should have multiplied by 2 to get $OW = 16$ feet.



2. Work with a partner to create similar rectangles and analyze the areas. One partner cuts out a small rectangle and record the measurements. The other partner cuts out a rectangle with dimensions that are doubled. Use observation to record the number of small rectangles that would fit inside the area of the large rectangle. Record the areas of both rectangles. Now, repeat the activity - this time creating a large rectangle with dimensions that are tripled. Is the ratio of corresponding dimensions ratios the same as the ratio of areas? Record your observations in your math journal.



3. You can find the height of an object without measuring it if you can measure its shadow and another object's height and shadow. Work with a partner. Find an object that is too tall to be measured directly, but that is casting a shadow with a length you can measure (e.g., school building, flagpole, etc.). Then, measure the height of one of you and your shadow. Use similar triangles to find the height of the immeasurable object. Make a poster of your findings and discuss your results with the class. Did you all come up with the same ratio to use in your proportion?

Check student answers for reasonableness. Students will come up with different ratios depending on time of day and object and person measured, as well as on the accuracy of their measurements. A certain amount of error may also be introduced if the ground is not level.

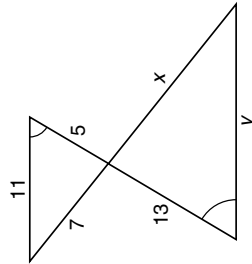


4. Work in groups. Open a spreadsheet file and set up 4 columns with the following headings: Furniture Item, D, W, H. Using the standard measurements for furniture below, set up a formula to find the sizes of similar figures for miniature replicas. Use a $1/12$ (.083) ratio. You will need two rows for each piece of furniture: full size and miniature size. Make sure to place each measurement in a separate cell so you can apply the formula.
 Standard measurements: Couch: $36'' D \times 84'' W \times 36'' H$; Loveseat: $36'' D \times 60'' W \times 36'' H$
 Armchair: $36'' D \times 36'' W \times 36'' H$; Coffee table: $30'' W \times 48'' L \times 18'' H$
Make sure students implement the formula correctly.

★ Practice

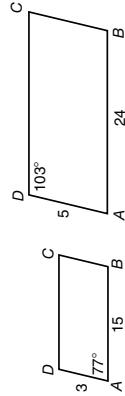
DIRECTIONS Read each question. Then circle the letter for the correct answer.

1 Two similar triangular pastures meet at a vertex. The dimensions are given in yards. How much fencing would be needed to enclose the larger pasture?



- A** $\frac{5.5}{8} = \frac{20}{x}$
- B** $\frac{5.5}{x} = \frac{8}{20}$
- C** $\frac{8}{5.5} = \frac{20}{x}$
- D** $\frac{20}{5.5} = \frac{8}{x}$

4 Ellen has created a design using two parallelograms. Determine whether the parallelograms in the design are similar or not.



2 The ratio of the corresponding dimensions of two similar rectangles is $3 : 2$. The ratio of the length to width for each is $4 : 3$. If the width of the smaller rectangle is 120, what is the length of the larger rectangle?

- F** 135
- G** 160
- H** 180
- J** 240

F No, because the angles do not have equal measures

G No, because $\frac{15}{24} \neq \frac{3}{5}$

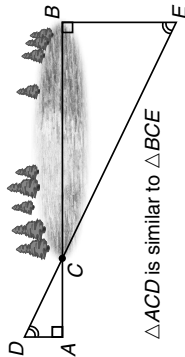
H No, because $5 - 3 \neq 24 - 15$

J Yes, because $3 : 15$ is equivalent to $5 : 24$

★ Assessment

DIRECTIONS Read each question. Then circle the letter for the correct answer.

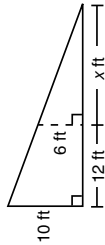
- 1 A surveyor found a distance across a pond by measuring similar triangles ACD and BCE on land.



If $AD = 10$ yards, $AC = 45$ yards, and $BE = 60$ yards, what is the distance across the pond?

- A 13.33 yards
 B 95 yards
 C 270 yards
 D 360 yards

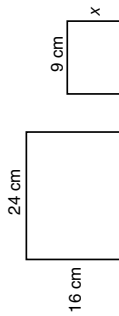
- 3 The two right triangles shown are similar.



What is the value of x ?

- A 18
 B 7.2
 C 30
 D 8

- 4 The two rectangles shown are similar.



Which relationship could be used to find x ?

- F $\frac{24}{9} = \frac{x}{16}$
 G $16x = 24 \times 9$
 H $\frac{x}{9} = \frac{9}{24}$
 J $24x = 9 \times 16$

- 2 A man, who is t feet tall, leans against a building by putting his hand h inches up the side of the building. In a photo of the man, he is p feet tall. How many inches up the building is the man's hand in the photo if $h = 9t$?

- F 9
 G $9p$
 H $9tp$
 J $\frac{p}{9}$

Lesson 27

Surface Area of Prisms

7.9(D) Solve problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prism, and triangular pyramid by determining the area of the shape's net.

Different aspects of this standard are covered in different lessons.

Understand the TEKS

The **surface area** of a solid figure is the sum of the areas of the **lateral faces**, or side faces, plus the total area of the bases. The **lateral area** is the total area of the lateral faces only.

You can use a net to find the surface area of a prism. A **net** is a diagram of a two-dimensional shape that can be folded to form a three-dimensional figure. It allows you to see a three-dimensional solid in two dimensions, which can make it easier to find the area of each face. A net can also be used to derive or understand formulas to calculate surface area.

A prism has two bases and lateral faces. You can use the formula $SA = BA + LA$ to find the surface area of any prism, which shows that the sum of the area of the bases plus the area of the lateral faces is the whole surface area.

You can also use the formula $SA = 2lw + 2lh + 2wh$ to find surface area of a rectangular prism, where l = length, w = width, and h = height.

Words to Know
 surface area
 lateral face
 lateral area
 net

Guided Instruction

Problem 1 A company designed a new cereal box that is 11 inches tall, 2 inches deep, and 8 inches wide. How much cardboard is needed to make the box? Use a net to find the answer.

Use a net to find the surface area of the box.

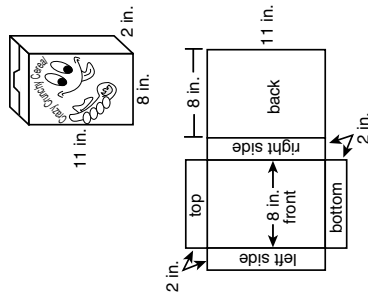
Step 1 A net has been drawn for you.

How many faces does the box have? 6
 Look for congruent faces that have the same area.

Which face has the same area as the front?
back

Which face has the same area as the top?
bottom

Which face has the same area as the left side?
right side



Lesson 27 Surface Area of Prisms

Step 2 Find the lateral areas and the base areas.

The front and back each has an area of 88 in.²

The left side and right side each has an area of 22 in.²

The top and bottom each has an area of 16 in.²

Step 3 Add the lateral areas and base areas to find the total surface area.

Total surface area: 176 in.² + 44 in.² + 32 in.²
 = 252 in.²

Solution How much cardboard is needed to make the box? 252 in.²

Problem 2 Ralph is building a toy chest made of wood. The toy chest will be $2\frac{1}{2}$ feet high, 3 feet long, and $1\frac{1}{2}$ feet wide. How much wood does Ralph need? Use a formula to find the answer.

Develop and use a formula to find the surface area (S) of a rectangular prism.

Step 1 Look at the three diagrams. Find the areas of each of the opposite faces in terms of l , w , and h .

Complete the formula for surface area as the sum of these areas.

$$SA = 2lw + 2lh + 2wh$$

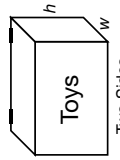
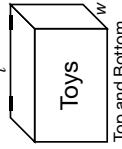
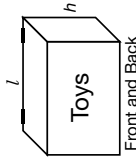
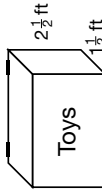
Step 2 Find the surface area.

Substitute the dimensions into the formula above.

$$SA = 2\left(\underline{3} \times \underline{1\frac{1}{2}}\right) + 2\left(\underline{3} \times \underline{2\frac{1}{2}}\right) + 2\left(\underline{1\frac{1}{2}} \times \underline{2\frac{1}{2}}\right)$$

$$SA = \underline{9} \text{ ft}^2 + \underline{15} \text{ ft}^2 + \underline{7\frac{1}{2}} \text{ ft}^2$$

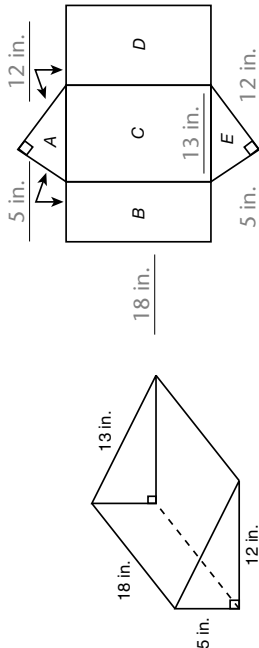
$$SA = \underline{31\frac{1}{2}} \text{ ft}^2$$



Solution How much wood does Ralph need? $31\frac{1}{2} \text{ ft}^2$

Problem 3

What is the surface area of the plastic container? Label the net.



Use the net to find the surface area.

Step 1 Label the dimensions on the net.

Step 2 Find the lateral areas and the base areas.

Area of face A: $\frac{1}{2} \times 5 \text{ in.} \times 12 \text{ in.} = 30 \text{ in.}^2$

Area of face B: $5 \text{ in.} \times 18 \text{ in.} = 90 \text{ in.}^2$

Area of face C: $13 \text{ in.} \times 18 \text{ in.} = 234 \text{ in.}^2$

Area of face D: $12 \text{ in.} \times 18 \text{ in.} = 216 \text{ in.}^2$

Area of face E: $\frac{1}{2} \times 5 \text{ in.} \times 12 \text{ in.} = 30 \text{ in.}^2$

Step 3 Add the lateral areas and base areas to find the total surface area.

Total surface area: $30 \text{ in.}^2 + 90 \text{ in.}^2 + 234 \text{ in.}^2 + 216 \text{ in.}^2 + 30 \text{ in.}^2 = 600 \text{ in.}^2$

Solution

What is the surface area of the plastic container? 600 in.²

Critical Thinking

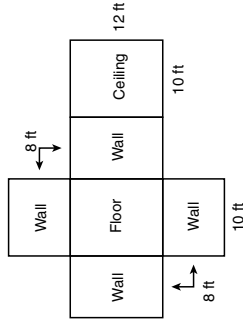
Solve each problem.



1. Work with a partner to write and simplify a formula for the surface area of a cube with side length c . Then, find a three-dimensional solid in your classroom that appears to be a cube. Measure its dimensions, draw a net of the solid on a poster board, and label the side lengths. Find the surface area using the net. Determine whether you could have used the formula you developed. Show your calculations, results, and conclusions on your poster board. Discuss your results with the class.



2. Paul's room is shown. He determines how much paint he will need by finding the total lateral area. What is he painting? Will a gallon of paint be enough if it covers 500 square feet? Explain your reasoning.



Answers will vary. Sample answer: He is painting the walls only because the lateral area is the total area of the sides. One gallon of paint will be enough because the area of the 4 walls is 352 square feet, which is less than 500 square feet.



3. Bill has an inground pool in his back yard. The pool is 12 feet wide, 25 feet long, and 4 feet deep. At the beginning of the season, before he fills the pool with water, he hires someone to clean all of the surfaces. The pool cleaner charges \$0.40 per square foot to clean the pool. How much will Bill have to pay to have the pool cleaned? Explain how you found the answer.

\$238.40; Sample answer: He needs to have the 4 sides cleaned, plus the bottom. In other words, he needs to have the lateral area plus one base cleaned. The total area of the sides of the pool is

$2 \times (12 \times 4) + 2 \times (25 \times 4) = 296 \text{ sq ft}$. The area of the bottom of the pool is $12 \times 25 = 300 \text{ sq ft}$. Therefore, the total area that needs to be cleaned is $296 + 300 = 596 \text{ sq ft}$. The cleaner charges \$0.40 per square foot, so Bill will have to pay $596 \times 0.4 = \$238.40$ to have his pool cleaned.

Lesson 31

Net Worth

7.13(c) Create and organize a financial assets and liabilities record and construct a net worth statement.

Understand the TEKS

An **asset** is something a person owns. You might own a video game system. An adult might own a car. These are assets. Houses, boats, jewelry, and any other valuables are assets. Other assets include cash or any money you have in savings, checking, or other kinds of bank accounts. Money that is owed to you is also an asset. If your sister borrowed \$10 and owes it back to you, the money she owes you is an asset.

A **liability** is an amount you owe, or a debt. You might owe \$5 to your parents.

An adult might owe money for a **mortgage**, which is money borrowed to buy a home. A **student loan**, which is money borrowed to pay for college, is also a liability. Any kind of loan, including credit card debt, is a liability. When people use a credit card, they are really borrowing money from a bank. The person pays the money back when the credit card bill is due.

Subtracting the total liabilities from the total assets gives a person's **net worth**. A convenient way of determining net worth is by creating a record of assets and liabilities. This statement is sometimes described as a balance sheet. Suppose Mr. and Mrs. Smith have a home worth \$225,000 and bank accounts and investments totaling \$45,000. They have furniture, art, cars, and other possessions valued at \$30,000. They have a mortgage of \$80,000 and a car loan of \$6,000.

Complete the table below to create a net worth statement for the Smiths.

Assets	Amount (\$)	Liabilities	Amount (\$)
Home	225,000	Mortgage	80,000
Bank accounts	45,000	Car loan	6,000
Furniture, art, cars, other	30,000		
Total Assets	300,000	Total Liabilities	86,000

$$\text{Net worth} = \text{total assets} - \text{total liabilities}$$

In this example, the Smiths' net worth is $\$300,000 - \$86,000 = \$214,000$.

Net worth can change over time. Suppose this couple pays off some loans or increases their savings. Then their net worth increases. If instead, they take out a loan for another car or spend some of their savings to take vacation, their net worth can decrease. Ideally, people should work to increase their net worth over time. Keep in mind that the term *net worth* refers to financial status only. It in no way measures the true value of someone as a person.

Words to Know
asset
liability
mortgage
student loan
net worth

Lesson 31

Net Worth

Guided Instruction

Problem 1 The Jones family listed their assets and liabilities in a chart. What is their net worth?

Item	Amount	Asset or Liability?
Mortgage	\$200,000	L
Credit-card balances	\$8,000	L
Cash	\$1,200	A
Retirement accounts	\$30,000	A
Value of home	\$250,000	A
Value of cars	\$45,000	A
Installment plan for television and sound system	\$3,000	L
Value of home furnishings	\$10,000	A

Step 1 Label each entry in the table as A for asset or L for liability.

Step 2 Find the total assets.

$$\begin{aligned} \$1,200 + \$30,000 + \$250,000 + \$45,000 + \$10,000 \\ = \$336,200 \end{aligned}$$

Step 3 Find the total liabilities.

$$\$200,000 + \$8,000 + \$3,000 = \$211,000$$

Step 4 Subtract total liabilities from total assets.

$$\$336,200 - \$211,000 = \$125,200$$

Solution

What is their net worth? $\$125,200$

Jed is applying for a loan of \$50,000. He must have a net worth that is greater than or equal to the amount of the loan in order to be approved. Jed's assets and liabilities are listed below. What is Jed's net worth? Will Jed be able to get the loan based on his net worth?

Problem 2

Mortgage: \$160,000 L	Value of furniture: \$5,000 A	Credit card balances: \$4,000 L
Motorcycle loan: \$7,600 L	Value of tools: \$3,000 A	Value of home: \$205,000 A
Savings account: \$6,500 A	Student loan: \$15,000 L	Value of electronics: \$2,100 A

Step 1 Label each entry in the table as A for asset or L for liability.

Step 2 Find the total assets.

$$\$ 6,500 + \$ 5,000 + \$ 3,000 + \$ 205,000 + \$ 2,100 = \$ 221,600$$

Step 3 Find the total liabilities.

$$\$ 160,000 + \$ 7,600 + \$ 15,000 + \$ 4,000 = \$ 186,600$$

Step 4 Subtract total liabilities from total assets.

$$\$ 221,600 - \$ 186,600 = \$ 35,000$$

Step 5 Compare his net worth to the amount required for the loan.

Write a symbol to compare the amounts.

$$\$ 35,000 < \$ 50,000$$

Is Jed's net worth great enough to get the loan? No

Jed's net worth is \$ 35,000. Will Jed be able to get the loan based on his net worth?

no

Solution

Critical Thinking

Solve each problem.



1. Debbie has a membership at a local gym. She pays dues of \$30 each month to belong. Explain why this amount is not considered an asset or a liability.

Sample answer: Debbie does not own anything as a result of her dues, so the amount is not an asset. Even though she pays this amount, she did not take out a loan and she can stop paying this amount at any time. It is not a liability.



2. Scott's assets and liabilities are shown. Then he refinances his mortgage to reduce it by \$50,000. He spends \$2,500 of his savings to file the documents to refinance the mortgage. What is Scott's net worth before and after he refinances his mortgage? By how much does his net worth change?

Mortgage: \$260,000	Value of electronics: \$4,000	Value of home: \$310,000
Savings account: \$8,000	Value of music collection: \$9,000	Value of furniture: \$8,500
Credit card balances: \$7,000	Student loan: \$9,000	Value of car: \$35,000

Scott's total assets are $\$8,000 + \$4,000 + \$9,000 + \$300,000 + \$8,500 + \$35,000 = \$329,500$. Scott's total liabilities are $\$260,000 + \$7,000 + \$9,000 = \$276,000$. His net worth is $\$329,500 - \$276,000 = \$53,500$. If he decreases his mortgage by \$50,000 and his savings by \$2,500, his net worth increases by \$47,500.



3. Tommy collects comic books. His collection is valued at \$825. He borrowed \$100 from his parents to buy some of his books. Based on these two amounts, what is Tommy's net worth? Explain how you found the answer. Predict how his net worth will change if he sells some of his comic books for more than he bought them for.

\$725; His comic book collection is an asset. The amount he owes is a liability. $\$825 - \$100 = \$725$. If he sells some comic books, he will decrease the number of comic books, but increase the amount of cash. If he gets more cash than he spent on the books, his assets will increase, so his net worth will increase.

★ Practice

DIRECTIONS Read each question. Then circle the letter for the correct answer.

- Ben's baseball card collection is valued at \$250. He owes \$50.50 to his parents. He has \$28.75 saved in his piggy bank. What is Ben's net worth?
A \$170.75
B \$228.25
C \$278.78
D \$300.50
- Paula is creating a net worth statement. Which of the following should she list as an asset?
F She has a mortgage on her home.
G She has an installment plan to pay for her furniture.
H She pays \$12 each month to her hiking club.
J She inherited diamond earrings from her grandmother.
- Joe listed some of his assets and liabilities.

Assets	Liabilities
Boat: \$90,000	Boat loan: \$62,000
Electronics: \$3,500	Credit card balances: \$6,800
Investments: \$12,200	

What is Joe's net worth, based on the chart?

- A** \$36,900
B \$68,800
C \$105,700
D \$174,500

- Fred just graduated from college and is making a net worth statement. His net worth is currently negative.

Assets	Liabilities
Car: \$15,000	Student loan: \$16,500
Stamp collection: \$1,200	Credit card balances: \$350

What can Fred do with his next paycheck to get his net worth to zero?

- A** Put \$500 in savings.
B Sell half of his stamp collection.
C Pay \$650 toward his student loan.
D Pay off his credit card balance.

★ Assessment

DIRECTIONS Read each question. Then circle the letter for the correct answer.

- Carlos is creating a net worth statement. Which of the following should he list as a liability?
A He has a retirement account worth \$65,000.
B He has several savings bonds.
C He has a credit card balance of \$3,000.
D He spends \$200 per month for childcare.
- Teresa listed some of her assets and liabilities.

Assets	Liabilities
Home: \$180,000	Mortgage: \$145,000
Furnishings: \$2,100	Credit card balances: \$2,400
Savings: \$4,600	Student loan: \$5,500

She takes money out of her savings account to pay her credit-card balance. What happens to her net worth?

- F** It decreases by \$2,400.
G It increases by \$2,400.
H It increases by \$4,800.
J It stays the same.

- Tyler has a car worth \$11,000, \$4,300 in savings, and \$1,200 in skateboard supplies. He is repaying a loan for \$5,800 to buy the car. What is Tyler's net worth?

- A** \$5,800
B \$8,300
C \$10,700
D \$11,300

- Cheryl is making a net worth statement. She lists her savings and retirement accounts along with the value of her home, car, and furniture as assets. She lists her mortgage, car loan, and the amount she spends on painting supplies as liabilities. Which error does she make?
F The value of her home is not an asset, because she owes money for it.
G The value of her car is not an asset, because she took out a loan for it.
H The car loan is not a liability, because she pays it over time.
J The amount she spends on painting supplies is not a liability.

- The Diaz family is creating a net worth statement summary.

Assets	Liabilities
Home: \$300,000	Mortgage: \$250,000
Home furnishings: \$12,000	Installment plan for swimming pool: \$20,000
Retirement accounts: \$48,000	Car loans: \$25,000

If their net worth is \$68,100, what are the amounts of their savings and credit card balances?

- A** Savings: \$8,200; Credit Card: \$8,200
B Savings: \$8,200; Credit Card: \$5,100
C Savings: \$200; Credit Card: \$8,100
D Savings: \$9,200; Credit Card: \$3,800